DELL™

Dell™ PowerVault™ ML6000
Maintenance Guide

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About This Guide and Your Product

This guide is intended for service personnel who perform maintenance on the Dell™ PowerVault™ ML6000. Be aware that you must be logged in to the ML6000 with service level privileges to perform some of the instructions provided in this guide.

> ☒ Note   Be sure to read all operating instructions in this manual and in the following documents before servicing and operating the library: *Servers and Storage Systems Safety, Environmental, and Regulatory Information*; *Servers and Storage Systems Warranty and Support Information*; and the *Dell Software License Agreement*.

Library Overview

The *PowerVault ML6000* tape library is a member of the growing intelligent library family. Like all intelligent libraries, the *PowerVault ML6000* performs periodic self-tests to ensure that the library is fully operational. If it detects a problem, the library isolates where the problem exists and provides instructions for resolving it. The *PowerVault ML6000* also supports geographic addressing, which means that you can install tape drives in any open tape drive slot, and the library will automatically update its configuration model without requiring you to assign the address of the tape drive yourself.

All *PowerVault ML6000* libraries consist of one 5U Library Control Module and can include one or two 9U Expansion Modules to a maximum rack height of 41U. All libraries must be rack-mounted.

The 5U Library Control Module houses the central intelligence of the library; without it, the library cannot function. The 5U Library Control Module contains several essential components, including the library control blade (LCB) and the robotic picker assembly. The LCB controls the library's functions, while the robotic picker assembly is responsible for physically retrieving data cartridges from the library's modules, inserting the cartridges into the appropriate tape drive, and returning them to their appropriate storage slot. The 5U Library Control Module also provides a configurable import/export (I/E) station for importing and exporting data cartridges, and several columns of fixed storage space. You can control the library using its LCD Operator Panel, or by using the remote Web client.

Each expansion module provides a configurable I/E station, additional space for tape drives, and slots for cartridge storage.

Product Safety Statements

The ML6000 is designed for storing and sharing electronic data via a magnetic tape library system. Any other application of the library is not considered the intended use. Dell will not be held liable for damage arising from unauthorized use of the product. The user assumes all risk in this aspect.

This unit is engineered and manufactured to meet all safety and regulatory requirements. Be aware that improper use may result in bodily injury, damage to the equipment, or interference with other equipment.

⚠ **WARNING** | **BEFORE POWERING ON OR USING THIS EQUIPMENT, READ THE FOLLOWING DOCUMENTS:** *Servers and Storage Systems Safety, Environmental, and Regulatory Information*; *Servers and Storage Systems Warranty and Support Information*; **and the** *Dell Software License Agreement*. **KEEP THE DOCUMENTS FOR FUTURE REFERENCE.**

Explanation of Symbols and Notes

The following symbols appear throughout this document to highlight important information.

⚠ **WARNING** | **INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR BODILY INJURY.**

⚠ **CAUTION** | **Indicates a situation that may cause possible damage to equipment, loss of data, or interference with other equipment.**

✎ Note | Indicates important information that helps you make better use of your system.

Getting More Information or Help

More information about this product is available at http://support.dell.com.

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Common Service Procedures

This chapter provides instructions for common procedures that you perform when servicing the library:

Minimum Installation Requirements

The advanced technologies of the ML6000 tape library make backup configuration and management simpler than ever. However, as with all technologies, a certain level of expertise is required for maximum success in deployment.

The following minimum skills are required to install the ML6000 tape library in a simple environment:

- Ability to lift 50 pounds (23 kilograms)
- System Administrator skills for the technologies being implemented
- Basic understanding of SCSI, Fibre Channel, and SAS interfaces and connectivity
- Basic understanding of the operating system(s) in the installation environment
- Ability to use basic commands to transfer data, for example: tar, dd, or Windows backup
- Ability to modify configuration files as necessary, including root/admin access privileges
- Ability to install device drivers
- Previous experience installing other storage devices; for example: tape- or disk-drive-based storage
- Ability to follow written instructions
- Basic understanding of tape drive and library technology as well as their use

Please note that deploying the ML6000 tape library into a Storage Area Network (SAN) environment can increase complexity, and may require much deeper expertise for success to be assured. Dell recommends that maintenance of the ML6000 only be performed by someone with substantial experience maintaining systems in a SAN environment.

Connecting to the Service Port

The library control blade (LCB) provides an Ethernet port that is reserved for use by service personnel. When servicing a library, connect your laptop to this port to access the remote Web client.
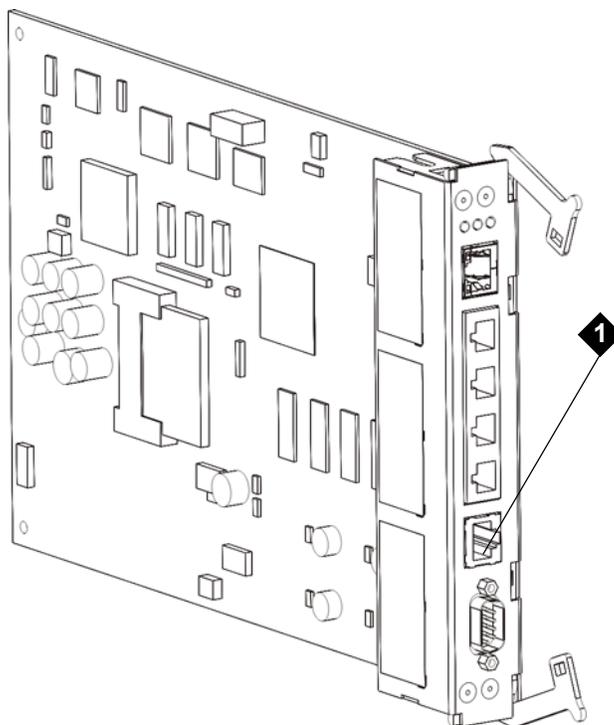
1	Service Port

Use the remote Web client when servicing the library. You must use the remote Web client to perform some tasks that are not available on the local operator panel. These tasks include saving and restoring library configurations and downloading firmware.

1 Connect your laptop to the service port located on the LCB. The service port on the library is running DHCP.

You can connect to the service port using a cross-over cable. However, some laptops will require using a straight cable to connect to the service port.

2 After you connect your laptop to the service port, the library assigns you IP address 10.10.10.100 via DHCP.

If you do not get an IP address, run the **ipconfig /release** and **ipconfig /renew** commands from the Windows command prompt.

If you still do not get an IP address, set a static IP address on your laptop of 10.10.10.100 and a subnet of 255.255.255.0.

3 When you have an IP address, open a Web browser. Supported browsers include Microsoft® Internet Explorer version 6.0 and above, and Firefox version 1.0.6 and above. Access IP address 10.10.10.1.

4 The library login page opens and is ready for you to log in.

Logging in with Service Privileges

The **Service** menu is available only to service personnel. To access the **Service** menu, log on to the operator panel or the remote Web client using your service name and password.

For security reasons, a user with administrator privileges can configure the library to prevent the remote service user from logging in through either the Ethernet port or the library service port. This setting, **Disable Remote Service User**, is configured only from the operator panel using **Tools > System Settings**. See the *Dell PowerVault ML6000 User's Guide* for more information about disabling the remote service user. You can always log on with service privileges using the operator panel, even when remote service user access is disabled.

Logging on as service automatically logs off all other non-service users and unlocks all Import/Export (I/E) station doors.

1   Access the **Logon** window of the operator panel or remote Web client.

2   Enter your service login and password in the appropriate text boxes. The service user name is always **service**. For security reasons the service account details can be found within the Dell internal training pages for ML6000.

3   Click **OK**.

Using the Service Menu

In addition to the **Setup**, **Operations**, **Tools**, and **Reports** menus, there is a hidden **Service** menu that appears when service personnel log in using the service user name and password. The **Service** menu gives service personnel access to troubleshooting tools that are not available to other users.

> **Note**   As of the 1.6 release, November 2008 admin users now have access to some of these diagnostics via the Web client (**Tools > Diagnostics**).

Table 1 compares the **Service** menu selections and the diagnostics available to admin users via the Web client.

Table 1   Service Menu vs. Web Client Diagnostics Menu

Service Menu	Web Client Diagnostics Menu
Tools	**EKM**
> EKM Path Diagnostics	> EKM Path Diagnostics
Drives	**Drives**
> Drive Tests	> Drive Tests
> Wrap Test	> Drive Reset
> Reset	> Media Tests
> Media Tests	> Drive Self Test
> Fast R/W Test	> Read/Write Test
> Media Test	> Fast Read/Write Test
> Read/Write Test	> Media Test
> Self Test	**Robotics**
System	> Robotics Get/Put Test
> Library Tests	
> Robotics	
> I/E	
> Barcode	
> Door	
> Sensors	

You can use the **Service** menu to access various tests for the library's tape drives or for the entire library, to ensure that the library is functioning as expected.

The following tests are available:

- **Drives > Drive Tests**

    - **Wrap Test**—Performs a test to ensure that the tape drive circuitry is working by testing the external tape drive interface circuitry.

    > Note   There are different types of wrap tools for SCSI, Fibre Channel, and SAS tape drives. You must install the appropriate wrap tool for the tape drive type when executing this test. Performing this test without a wrap tool installed will cause the test to fail.

    - **Reset**—Power cycles the tape drive while the tape drive remains in the drive sled in the library.

- **Drives > Media Tests**

    - **Fast R/W Test**—Reads and writes two wraps worth of data in each of the tape's four data sections. For this test, insert a scratch data cartridge in the top I/E station slot. During the test, the drive overwrites the data on the cartridge.

- **Media Test**—Since media damage usually comes from the tape edges, this test reads and writes two wraps worth of data on each of the two outside data bands on both edges of the tape for the entire length of the tape. For this test, insert the suspect cartridge in the top I/E station slot. The data will be overwritten on the suspect cartridge.

- **Read/Write Test**—Reads and writes 96 wraps worth of data in each of the tape's four data sections. For this test, insert a scratch data cartridge in the top I/E station slot. During the test, the drive overwrites the data on the cartridge.

- **Self Test**—Performs the drive's Power On Self Test (POST) to make sure the drive hardware is working properly.

System > Library Tests

- **Robotics**—Performs a test to make sure that the library's robotics system (including the picker assembly and Y-carriage assembly) is functioning correctly.

- **I/E**—Performs a test to make sure that the I/E station is functioning correctly.

- **Barcode**—Performs a test to make sure that the picker assembly can read barcodes correctly.

- **Door**—Performs a test to make sure that the access door is functioning correctly.

- **Sensors**—Performs a test to make sure that the sensors are functioning correctly.

Running EKM Path Diagnostics

The EKM Path Diagnostics choice on the Web Client Diagnostics menu consists of a series of short tests to validate whether the key servers are running, connected, and able to serve keys as required.

Run the **Manual** EKM Path Diagnostics any time you change the key server settings or library encryption settings, and when you replace a tape drive. It is recommended that you test each drive that communicates with key manager servers.

> **Note** With firmware version 585G, a customer can set up the library to run **Automatic** EKM Path Diagnostics. For details, see Differences Between Manual and Automatic EKM Path Diagnostics on page 9 and Using Automatic EKM Path Diagnostics on page 10.

The diagnostics consists of the following tests:

- **Ping** — Verifies the Ethernet communication between the library and the key servers. If the partition in which the selected tape drive resides uses EKM server overrides, then the override IP addresses are tested (see **Setup > Encryption > Partition Configuration**). If the partition does not use overrides, the default system IP addresses are tested (see **Setup > Encryption > System Configuration**).

- **Drive**— Verifies the tape drive's path in the library (communication from library to tape drive sled and from tape drive sled to tape drive). The tape drive must be unloaded, ready, and online in order to run this test. If this test fails, the Path and Config tests are not performed.

- **Path** — Verifies that EKM services are running on the key servers.

  > **Note** This test cannot run if the Drive test fails.

- **Config** — Verifies that the key servers are capable of serving encryption keys.

  > **Note** This test cannot run if the Drive test fails.

If any of the tests fail, try the following resolutions and run the test again to make sure it passes:

- **Ping Test Failure** — Verify that the key server host is running and accessible from the network to which the library is connected.
- **Drive Test Failure** — Look for any tape drive RAS tickets and follow the resolution instructions in the ticket.
- **Path Test Failure** —server is actually running and that the port/SSL settings match the library configuration settings.
- **Config Test Failure** —
  - Verify that the key server is set up to accept the tape drive you are testing.

Differences Between Manual and Automatic EKM Path Diagnostics

There are two ways to perform EKM Path Diagnostics:

- Using Manual EKM Path Diagnostics
- Using Automatic EKM Path Diagnostics
- The Manual diagnostics differs from the Automatic diagnostics in the following ways:

The Manual diagnostics differs from the Automatic diagnostics in the following ways:

- The Manual diagnostics takes affected partitions offline.
- The Automatic diagnostics does not take partitions offline, but it may delay moves to tape drives while they are being tested.
- The Manual diagnostics requires that you select one tape drive to use for the test. Since the test only validates the selected drive, if you want to test the path for each tape drive, you must run the test multiple times (once for each drive). To test all servers, you must run the diagnostics once for each Library Managed Encryption enabled partition (each server pair is connected to a unique partition and tape drive). In addition, if the tape drive is not available (it must be unloaded, ready, and online), the Drive, Path, and Config tests are not performed.
- The Automatic diagnostics tests every connected EKM server in turn, and the library selects the tape drive to use for each test. If the selected tape drive is not available (it must be unloaded, ready, and online), the library tries another tape drive that is connected to the key server until it finds one that is available. If no tape drives connected to a particular key server are available, that server is skipped and the tests are not performed. If a server is skipped for "X" number of consecutive test intervals (where "X" is configurable on the Web client), the library generates a RAS ticket.

  If a tape drive remains loaded for a long time, it is possible that it will never be tested. If you want to test a specific tape drive, use the Manual EKM Path Diagnostics. In particular, if you replace a tape drive, run the Manual EKM Path Diagnostics.

Using Manual EKM Path Diagnostics

1 You can access the EKM Path Diagnostics screen in one of two ways:

- Service users can log on to the Web clientWeb client using the Service logon ID and password and then select **Tools > Diagnostics**. Admin users must enter the **Diagnostics** menu and then select **EKM > EKM Path Diagnostics**.

- Select **Setup > Encryption > System Configuration** or **Setup > Encryption > Partition Configuration** and click the link that says "Click here to run EKM Path Diagnostics." Note that performing this action takes the partition in which the selected tape drive resides offline. When the test completes, the partition automatically comes back online.

  A list of all the tape drives enabled for library-managed encryption is displayed, along with the tape drive status and the partition in which each tape drive resides.

2   Select the tape drive on which you want to perform diagnostics and click **Apply**. Tape drives must be unloaded, ready, and online in order for the test to run.

  A dialog box appears, telling you that the selected partition will be taken offline.

3   Click **OK** to start the diagnostics.

4   The library performs the diagnostics and displays pass/fail results on each of the tests in the Progress Window.

> 📝 Note   The diagnostics tests may take several minutes to complete.

5   Do one of the following:

- If **Completed** appears in the Progress Window, the diagnostics were performed (this does not mean that the diagnostics passed, just that the diagnostics were performed). Click **Close** to close the Progress Window.

- If **Failure** appears in the Progress Window, the diagnostics were not able to be performed. Follow the instructions listed in the Progress Window to resolve any issues that occurred during the operation.

Using Automatic EKM Path Diagnostics

You can enable the library to automatically perform EKM Path Diagnostics at selected intervals. During each interval, the library tests every configured key server. The default test interval is four hours. The library generates a RAS ticket if there are problems.

Automatic EKM Path Diagnostics is disabled by default. It is recommended that you leave Automatic EKM Path Diagnostics disabled, unless network interruptions are a common cause of encryption failures at your site.

> ⚠️ **CAUTION**   **Running Automatic EKM Path Diagnostics may cause an increase in RAS tickets if tests are skipped due to tape drives being unavailable for a configurable number of consecutive test intervals. To reduce the occurrences of RAS tickets, you can specify the number of consecutive test intervals required to generate a RAS ticket to a higher number, or you can set the library to never generate a RAS ticket for missed test intervals.**

For a list of tests performed, see

To enable Automatic EKM Path Diagnostics:

1   From the Web client, select **Setup > Encryption > System Configuration**.

2   Select the **Automatic EKM Path Diagnostics** check box.

3   Select a test interval from the **Interval** drop-down list.

4 From the **Test Warning Threshold** drop-down list, select the number of consecutive, missed test intervals required before the library generates a RAS ticket informing you that the test could not be performed within the specified number of test intervals. You can select **Off** or any value from 1 to 24. If you select **Off,** the library will never generate a RAS ticket, no matter how many tests are missed. The default threshold is 3.

Resetting the Admin Password

The default customer Admin password is **password**, and the customer is required to change this default password the first time they log in. If they forget what they changed it to, they need to call Service for a reset.

You will change the password the same way a customer would, only via the Service menu.

1 Log in as a Service user using the default Service login and password (see <u>Logging in with Service Privileges</u> on page 6).

2 Go to the user management screen as follows:

- From the operator panel, select **Setup > User Mgmt**.

- From the W client, select **Setup > User Management > User Accounts**.

3 Follow the screens to modify a user, choosing **Admin** as the user to modify.

4 Enter the new password twice, in the **Enter Password** and **Confirm Password** text boxes.

5 In the **Admin Password** text box on the operator panel, or in the **Enter your Service password** text box on the W client, enter the default service password you used to log in (see <u>Logging in with Service Privileges</u> on page 6).

6 Click **Apply**.

Capturing a Snapshot

A snapshot provides a summary of the current status of the library, and includes information provided in the library's logs, RAS tickets, and configuration settings. When you capture a snapshot of the library, the library generates an ASCII readable file.

Capture snapshots of the library both *before* and *after* you perform service, and e-mail them to technical support for diagnosis.

> **Note** Security settings on laptops running Windows XP need to be set to low.

E-mailing a Capture Snapshot

1 Ensure that no applications are accessing the library.

If a **Progress Screen** is open, wait until it closes before attempting to generate the snapshot.

> **Note** E-mail accounts must be configured using the Web client before a snapshot can be e-mailed. To configure the e-mail account, select **Setup > Notifications > E-mail Configuration**. For further details, see the online help or the *Dell PowerVault ML6000 Tape Library User's Guide*.

2 Using the Web client or the operator panel, select **Tools > Capture Snapshot**.

The **Capture Snapshot** window appears.

3 If using the Web client, select **Send the file to an e-mail account**.

If the library e-mail account is not configured, an error message appears. See the *ML6000 User's Guide* for more information on setting up the library e-mail account.

4 Enter an e-mail address in the e-mail address text box.

> **Note** Enter only one e-mail address in the **Send the file to an e-mail address** text box. The library does not support e-mailing the library snapshot to more than one e-mail address.

5 Click **Apply** (or **OK** if on the operator panel).

The **Progress Window** appears, and indicates **Success** after the e-mail has been sent.

6 Click **Close** to close the **Progress Window**.

Downloading a Capture Snapshot

Security settings on service laptops using Windows XP must be set to low or the capture snapshot download will fail.

1 Ensure that no applications are accessing the library.

If a **Progress Screen** is open, wait until it closes before attempting to generate the snapshot.

2 Using the remote Web client, select **Tools > Capture Snapshot**.

3 Select **Download the file using the browser**.

4 Click **Apply**.

The **Progress Window** appears, and indicates **Success**.

5 Click **Close** to close the **Progress Window**.

Saving and Restoring the Configuration

The library has many configurable items, such as tape drive IDs, partitions, user accounts, Import/Export (I/E) stations, and cleaning slots. In the event of a hardware failure or firmware upgrade, the save and restore operations can be used to restore the library's configurable items to a previous state.

> **Note** The saving and restoring operations should not be performed concurrently by multiple administrative users logged in from different locations. If this happens, you can access the screens, but you cannot apply changes while another administrative user is performing the same operation.

Saving the Configuration

⚠️ CAUTION	**Always save the library configuration after modifying a configurable item and before upgrading firmware. This allows you to restore the most current settings if necessary.**

This operation saves your current library configuration and library firmware. Save your library configuration when it is in a known working state. In the event of a hardware failure, the saved configuration can be used to restore the configuration after hardware repairs are made. Also, before initiating a firmware upgrade, you should save the library configuration. You then have the option to restore the configuration after either a successful or an unsuccessful upgrade.

The **Save/Restore Configuration** operation is available only on the Web client. The path to open the appropriate screen is:

- From the Web client, select **Tools > Save/Restore Configuration**.

Restoring the Configuration and Library Firmware

You can use the **Restore System Configuration** screen to restore the library's configurable items to a previous state using a saved configuration file. If the library firmware has been updated since the configuration was last saved, the library automatically restores the firmware to the version that was saved with the configuration.

You can also downgrade library firmware to an earlier version using the **Tools > Update Library Firmware** command. Note that you will lose all your current library configuration information except for network settings, date and time, and license keys. You can restore the other configurable items using a configuration file that was saved when the earlier version of library firmware was installed on the library, or you can reconfigure your library's settings.

If the library is running firmware version 600G or later, you can only downgrade firmware to version 410G and later, and can only restore a saved configuration that was created with firmware version 410G or later. If a customer needs to restore a configuration created with firmware earlier than 410G, they are directed to contact Dell Support for assistance.

The **Save/Restore Configuration** operation is available only on the Web client. As mentioned in the last section, the path to open the appropriate screen is:

- From the Web client, select **Tools > Save/Restore Configuration**.

Taking the Library Online/Offline

Some maintenance activities require that you take the entire library offline, while other activities require that you power off the entire library. To take the library offline, change the mode of all partitions from online to offline. See .

Taking Partitions Online

Taking a library/partition *online* makes it accessible to host applications from the SAN.

1	Using the library's operator panel, select **Operations > Change Partition Mode**. You can also use the Web client by selecting **Operations > Partitions > Change Mode**.

2 For each partition that you want to take online, click **Online**.

3 Click **Apply**.

Taking Partitions Offline

Taking a library/partition *offline* makes it inaccessible to host applications from the SAN.

1 Using the library's operator panel or the remote Web client, select **Operations > Change Partition Mode**.

2 For each partition that you want to take offline, click **Offline**.

3 Click **Apply**.

Powering On the Library

When you are finished servicing the library, power it on and prepare it for use.

1 Connect all power cords to their electrical source.

2 Turn on each power supply's power, using the switch on the rear of the power supply.

3 Press the power switch located on the front door of the library's control module.

When you power on the library, the library performs a self-test to ensure that all of its parts are functioning properly.

Shutting Down, Turning Off, and Completely Removing Power From the Library

Some maintenance activities require that you take the entire library offline, while other activities require that you turn off the library.

Always perform a shutdown before turning off or removing power from the library. Shutting down a library shuts down the library's operating system and firmware. When you perform a shutdown, the library finishes the current command and lowers the robot to the floor of the library.

Shutting Down the Library

1 Check any host applications to ensure that no applications are accessing the library.

2 If a **Progress Screen** is open, wait until it closes.

3 From the operator panel, select **Operations > Shutdown**; or from the Web client, select **Operations > System Shutdown**.

4 Select **Shutdown** and click or press **Apply**.

5 In the confirmation screen, click or press **OK**.

A Success screen displays.

6 Click **Close** to close this screen.

The shutdown takes a few moments to complete. When complete, the operator panel screen goes blank and the blue LED on the back of the LCB comes ON solid. The solid blue LED indicates that the library application code and operating system have stopped processing, and the library is ready to be turned off.

Powering Off the Library

1 Perform the shutdown procedure as described in Shutting Down the Library on page 14.

2 Press the power button located on the front of the library's control module.

The library takes several moments to turn off. The blue LCB LED turns OFF. The blue LED on each power supply turns ON. The robot slowly lowers to the floor of the library.

Completely Removing Power from the Library

1 Shut down the library by following the shutdown procedure (see Shutting Down the Library on page 14).

2 Power OFF the library by pressing the power button on the front of the library's control module (see Powering Off the Library on page 15).

3 Access the back of the library, and turn each power supply OFF, using the switch on the rear of the power supply.

4 Wait for the blue LED on each power supply to turn off.

5 Disconnect the power supply cables from their electrical source.

Restarting the Library

Restarting the library shuts down and restarts the library's operating system and firmware. During the shutdown phase, the library finishes the current command. The library then takes all partitions offline and shuts down the operating system and the firmware. During the restart phase, the library restarts the operating system and firmware, takes the partitions online, and performs an inventory of all cartridges, tape drives, and slots. Any tape drives that were offline before the restart are brought back online when the library is restarted.

1 Using the library's operator panel or the remote Web client, ensure that no applications are accessing the library.

2 If a **Progress Screen** is open, wait until it closes before attempting to restart the library.

3 From the operator panel, select **Operations > Shutdown**; or from the Web client, select **Operations > System Shutdown**.

4 Select **Restart** and click or press **Apply**.

5 In the confirmation screen, click or press **Apply**.

Manually Unlocking an I/E Station Door

Although the recommended procedure is to unlock an I/E station door using the **Operations > I/E Station Lock/Unlock** command, you can also unlock the I/E station door manually.

How you manually unlock an I/E station door is different, depending on the I/E door design. Newer libraries ship with an I/E station that manually unlocks when you push a button within the door front. Earlier libraries may include an I/E station that you manually lock and unlock by turning a TORX screw. You can access either lock mechanism through a small hole on the front of the I/E station door.

Unlocking a Push-Button Lock

Required tools: small pencil-shaped object, less than 0.25-inch in diameter

The process for manually unlocking an I/E station door includes the following steps:

1. Standing in front of the library, look for the access hole located near the bottom of the I/E station door of the 5U Library Control Module or 9U Library Expansion Module.

2. Insert a pencil-shaped object into the access hole and push inward. You will hear a click when the door unlocks.

Unlocking a Screw Lock

Required tools: T-10 TORX screwdriver

The process for manually unlocking an I/E station door includes the following steps:

1. Standing in front of the library, look for the access hole located near the bottom of the I/E station door of the 5U Library Control Module or 9U Library Expansion Module. The access hole is large enough to accommodate a screwdriver.

2. Insert a T-10 TORX screwdriver in the access hole and turn the screw counterclockwise for a quarter of a turn. You will hear a click when the door unlocks.

If you need to leave the library powered off and want to lock an I/E station door for security purposes, use the same procedure described above for manually unlocking the I/E station door, but turn the screw clockwise, rather than counterclockwise. Libraries that use the newer I/E station door design do not provide a way to manually lock the door.

If an I/E station is configured as storage, the station door will lock automatically when you close it, assuming that the library is powered on. If you unlocked the door while the library was powered off, the door will lock automatically during power up.

Testing Your Fix

After you have serviced a library, when all stations are locked, and you have powered the system back up and restarted it, you can use the **Service** menu of the remote Web client, test the library to ensure that it is functioning as expected. See Using the Service Menu on page 6 for the list of available commands.

Using the Installation Verification Test

You may run the Installation Verification Test (IVT) following a library service action to determine if the library is ready for production use. Examples of such library service actions include installing a new library or replacing a field replaceable unit (FRU) or customer replaceable unit (CRU).

> **Note** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
>
> - If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
> - If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

The IVT is divided into five subtests. You can run only certain subtests, depending on the amount of time available, and your area of interest. The full IVT may take up to 5-1/2 hours to complete for large configurations. The five subtests are as follows

- The **Robot** test evaluates the basic functionality of the library robotics assembly, including the picker assembly and the Y-carriage assembly, the barcode scanner, and the calibration sensors.

  Time required to complete the Robot test is approximately 5 minutes.

- The **Frame** test assesses the control and expansion module configuration and alignment.

  Time required to complete the Frame test is approximately 3 minutes per module.

- The **I/E Station** test assesses the configuration and functionality of each I/E station.

  Time required to compete the I/E Station test is approximately 3 minutes per I/E station.

- The **Drives** test performs functional tests on the library tape drives.

  Time required to complete the Drives test is approximately 15 minutes per drive.

- The **Tour** moves a scratch data cartridge through all storage slots in the extreme library locations. It also scans the topmost and bottommost slots in the library and performs get/put operations, using non-scratch data cartridges.

  Time required to complete the Tour is approximately 5 minutes per module.

Running the IVT

> **Note** You must configure the library e-mail account using the Web client if you intend to e-mail the IVT log after running the IVT. To configure the e-mail account, select **Setup > Notifications > E-mail Configuration**. For further details, see the online help or the *Dell PowerVault ML6000 Tape Library User's Guide*.

1 Log on to the library, using the operator panel, as an administrator or service user.

2 Ensure that no applications are accessing the library.

  If a **Progress Screen** is open, wait until it closes before attempting to run the IVT.

3 Select **Tools > Library Tests**.

4 Select **Installation & Verification Tests**, and then select **Next**.

5 All IVT subtests are preselected by default. Clear the check box next to a subtest name to exclude that test from this IVT run. Select **Apply** when you are ready to run the IVT.

6 The Robot, Drives and Tour subtests each require that you to provide a scratch data cartridge before the test can begin. When you are prompted to do so, place a scratch data cartridge into the top I/E station slot, and then select **Apply**. You must import the scratch data cartridge into the system partition.

  A subtest will fail if a required resource is missing. A required resource could be a scratch data cartridge or an empty drive with available matching media type.

  The IVT starts by performing an inventory of the library. The inventory is recorded in the IVT log, along with the test results.

  To see the IVT results, select **Details** on the **Library Test Progress** screen. If the IVT is still running, you will only see results for tests that have completed.

  To cancel the current IVT run between subtests, select **Stop** on the **Library Test Progress** screen, The last issued commands will complete before library control is returned.

7 Once the selected tests are complete, select **Next**.

8 You can choose to view the detailed IVT log or e-mail the detailed IVT log. Make your choice and select **Next**.

9 Select **Close** to return to the **Tools** menu.

About the IVT Log

A new IVT Log is created each time you run IVT. The log reports detailed information about library readiness and indicates where specific marginal conditions and failures are located in the library subsystems, if there are any.

As outlined below, you can view a summary or detailed version of a log following an IVT run. You can also send the detailed log as a text file to an e-mail address.

Viewing the Last Summary Log

1 Log on to the library using the operator panel.

2 Select **Tools > Library Tests**.

3 Select **View Last Summary Log**, and then select **Next**.

The summary log from the last IVT run is displayed on screen.

Viewing the Last Detailed Log

1 Log on to the library using the operator panel.

2 Select **Tools > Library Tests**.

3 Select **View Last Detailed Log**, and then select **Next**.

The detailed log from the last IVT run is displayed on screen.

E-mailing the Last Detailed Log

> ✍ Note   You must configure the library SMTP e-mail settings using the Web client if you intend to e-mail the IVT log.

1 Log on to the library using the operator panel.

2 Select **Tools > Library Tests**.

3 Select **E-mail Last Summary Log**, and then select **Next**.

4 Use the touch screen to enter an e-mail address. The last detailed IVT log will be sent to this address.

5 Select **Apply** to send the log file.

Running Library Demo

Running the Library Demo is a simple way to test robotics functionality following a FRU or CRU replacement. It shows the library's ability to correctly move a scratch data cartridge from an I/E station to randomly selected open storage slots, until the demonstration is stopped.

Media in the storage magazines are not affected by the demonstration. The scratch data cartridge is returned to the I/E station following each cycle of 20 moves, or when the demonstration is stopped.

Starting Library Demo

1 Log on to the library using the operator panel.

2   Ensure that no applications are accessing the library.

If a **Progress Screen** is open, wait until it closes before attempting to run Library Demo.

3   Select **Tools > Library Tests**.

4   Select **Library Demo**, and then select **Next**.

5   Place a scratch data cartridge into the top I/E station slot. The library robot will use this cartridge to perform its moves during the demonstration.

6   When you close the I/E station, the **Assign IE** screen appears. Assign the new scratch data cartridge to the **System** partition, and then select **Apply**.

Before the demonstration starts, the library may perform an inventory. If the screen shows the flashing "Library Not Ready" message, which indicates that an inventory is occurring, wait until the library is ready. Then, select **Apply** to begin Library Demo.

7   Select **Apply** to begin Library Demo.

The operator panel will show that the demonstration is in progress. There is an intentional delay of two seconds between move media commands, to prevent unnecessary wear on the robotics.

Stopping Library Demo

1   Log on to the library using the operator panel.

The screen shows that a demonstration is in progress.

2   On the **Library Demo** screen, select **Stop**.

The last issued commands will complete before the demonstration is stopped and library control is returned. The operator panel will display a "Demo Being Stopped" message.

3   Once the demonstration is stopped, select **Close** to return to the **Tools** menu.

Restoring Defaults

You may need to restore the default configuration settings when troubleshooting the library. Restoring the default configuration clears most of the library's configurable items, such as partitions, user accounts, I/E station slots, cleaning slots, and so on. However, it does not clear the following settings:

- Date and time
- Network configuration
- License keys

This operation is available to service users using the service login and password, and also to administrators using the admin login and password.

Using the library's operator panel, select **Tools > Factory Defaults**. You can also use the Web client by selecting **Tools > Reset Factory Defaults**.

☑ Note	As of firmware release 500G.GS002, logical serial number addressing is turned **ON** by default (in previous versions, it was turned **OFF** by default). This allows for tape drive swapping without host re-configuration. If you have a previous version and upgrade to 500G or later, you will be unaffected unless you perform a reset to factory defaults after you upgrade. If you reset to factory defaults after upgrading, your host applications may fail to recognize the drives, as the serial numbers for the drives will change to logical serial numbers.

To enable/disable logical serial number addressing, select **Tools > System Settings** on the operator panel. After you change the setting, you must power cycle the library for the changes to take effect. |

Deleting All Library Partitions

Library users logged on with Service privileges can delete all library partitions at once. Admin users must delete partitions one at a time.

1 Log on to the library as a Service user, using the library operator panel.

2 Ensure that no applications are accessing the library.

   If a **Progress Screen** is open, wait until it closes before proceeding.

3 Select **Setup > Partition Mgmt**.

4 Select **Delete all Partitions**, and then click **Next**.

5 If you are sure you want to delete all library partitions, click **Apply**.

Using Advanced Reporting

Library users logged on with Service privileges have access to the Advanced Reporting functions, even if these functions are not licensed on the library. For complete instructions on how to use Advanced Reporting, see the *Dell PowerVault ML6000 User's Guide*.

Library Installation and CRU Replacement

This chapter describes how to add, remove, and replace hardware within your library. Adding, removing, or replacing library components may require you to power off the entire library. There are a few components, however, that you can service without powering off the library, such as tape drives. Instead, you may only need to take a specific partition offline, or you may not need to impact the status of the library at all. See Table 9 on page 141 to determine the state that the library must be in before you service each part.

This chapter covers:

- Cabling the Library
    - Specific Instructions for LTO-5 and LTO-6 Tape Drives
    - Cabling Libraries with SCSI Tape Drives
    - Cabling Libraries with SAS Tape Drives
    - Cabling Libraries with Fibre Channel Tape Drives Connected Directly to a Host or Switch
    - Cabling Libraries with Fibre Channel Tape Drives Connected to Fibre Channel I/O Blades
    - If you need to add 9U expansion modules to the 5U library control module, remove the module terminator from the 5U library control module terminator connection that is closest to the 9U expansion module.
- Cable Management Guidelines
    - Cable Management Kit
    - Managing Power Cords
    - Managing Ethernet Cables
- Installing a Stand-Alone 5U Library Control Module
- Installing a New Multi-Module Library Configuration
- Adding 9U Expansion Modules to an Existing Library
- Preparing to Remove or Replace a Module
- Permanently Removing 9U Expansion Modules From an Existing Library
- Replacing a 5U Library Control Module
- Replacing a 9U Expansion Module
- Removing and Replacing the Library Control Blade and LCB Compact Flash Card
- Adding, Removing, and Replacing Power Supplies
- Using the Rack-mount Kit to Install a Library in a Rack

> ⚠️ **WARNING**   ALL LIBRARIES TALLER THAN 14U MUST BE INSTALLED IN A RACK HAVING A MAIN PROTECTIVE EARTHING (GROUNDING) TERMINAL, AND POWER MUST BE SUPPLIED VIA AN INDUSTRIAL PLUG AND SOCKET-OUTLET AND/OR AN APPLIANCE COUPLER COMPLYING WITH IEC 60309 (OR AN EQUIVALENT NATIONAL STANDARD) AND HAVING A PROTECTIVE EARTH (GROUND) CONDUCTOR WITH A CROSS SECTIONAL AREA OF AT LEAST 1.5 MM^2 (14 AWG).
>
> TO ENSURE PROPER AIRFLOW AND ACCESS SPACE, ALLOW 60 CM (24 INCHES) IN THE FRONT AND BACK OF THE LIBRARY.

> ⚠️ **WARNING**   UNDER NO CIRCUMSTANCES SHOULD A RACK BE MOVED WHILE LOADED WITH ONE OR MORE MODULES.

> ⚠️ **WARNING**   WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, A 5U LIBRARY CONTROL MODULE WEIGHS APPROXIMATELY 60 LBS (27.2 KG). A 9U EXPANSION MODULE, WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, EXCEEDS 65 LBS (29.5 KG).
>
> TO AVOID SERIOUS INJURY, AT LEAST TWO PEOPLE ARE REQUIRED TO SAFELY LIFT THE MODULES INTO POSITION.

Cabling the Library

Use the cabling procedure appropriate for your tape drive type.

- [Specific Instructions for LTO-5 and LTO-6 Tape Drives](#) on page 22

- [Cabling Libraries with SCSI Tape Drives](#) on page 24

- [Cabling Libraries with SAS Tape Drives](#) on page 27

- [Cabling Libraries with Fibre Channel Tape Drives Connected Directly to a Host or Switch](#) on page 31

- [Cabling Libraries with Fibre Channel Tape Drives Connected to Fibre Channel I/O Blades](#) on page 34

- [If you need to add 9U expansion modules to the 5U library control module, remove the module terminator from the 5U library control module terminator connection that is closest to the 9U expansion module.](#) on page 38

Specific Instructions for LTO-5 and LTO-6 Tape Drives

The library handles the Ethernet and data ports on LTO-5 and LTO-6 tape drives differently, depending on the tape drive. See Figure 1 and Figure 2 for details.

⚠️ CAUTION	**LTO-5 and LTO-6 Fibre Channel tape drives can be configured for speeds of up to 8 Gb/s. If they are configured for 8 Gb/s, you should connect them directly to a host or switch and not to an FC I/O blade, because the FC I/O blade only allows speeds up to 4 Gb/s. If you connect an LTO-5 or LTO-6 Fibre Channel tape drive to an FC I/O blade, the speed will autonegotiate to 4 Gb/s.**

Figure 1   IBM LTO-5 Single Port Fibre Channel Tape Drive
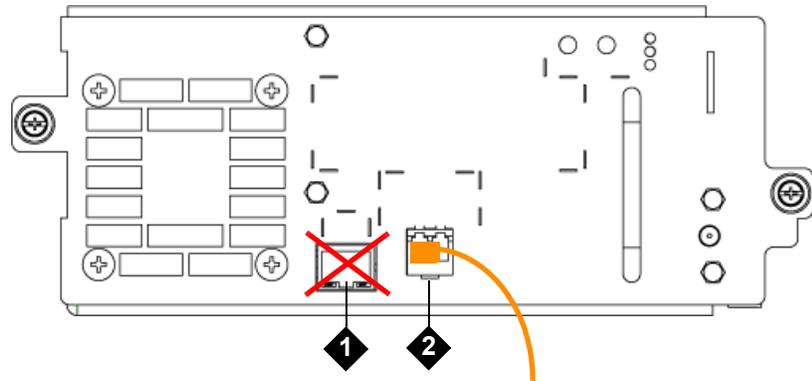
1	Ethernet port - do not use
2	Fibre Channel port - use this port

Figure 2   IBM LTO-5 Dual Port SAS Tape Drive
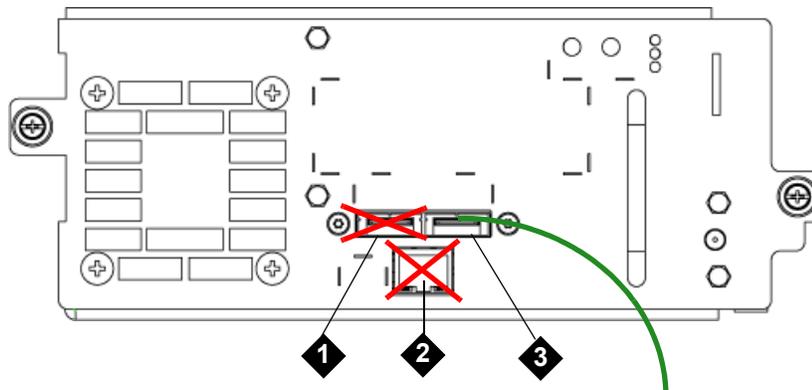
1	SAS port 1 - use this port
2	SAS port 2 - do not use
3	Ethernet port - do not use

Cabling Libraries with SCSI Tape Drives

Use this procedure, along with <u>Figure 3</u> and <u>Figure 4</u> on page 25, if you are installing a library that includes SCSI tape drives:

⚠ **WARNING**	**ALL LIBRARIES TALLER THAN 14U MUST BE INSTALLED IN A RACK HAVING A MAIN PROTECTIVE EARTHING (GROUNDING) TERMINAL, AND POWER MUST BE SUPPLIED VIA AN INDUSTRIAL PLUG AND SOCKET-OUTLET AND/OR AN APPLIANCE COUPLER COMPLYING WITH IEC 60309 (OR AN EQUIVALENT NATIONAL STANDARD) AND HAVING A PROTECTIVE EARTH (GROUND) CONDUCTOR WITH A CROSS SECTIONAL AREA OF AT LEAST 1.5 MM^2 (14 AWG).**
	TO ENSURE PROPER AIRFLOW AND ACCESS SPACE, ALLOW 60 CM (24 INCHES) IN THE FRONT AND BACK OF THE LIBRARY.

Figure 3   Stand-Alone 5U Library Control Module SCSI Cabling
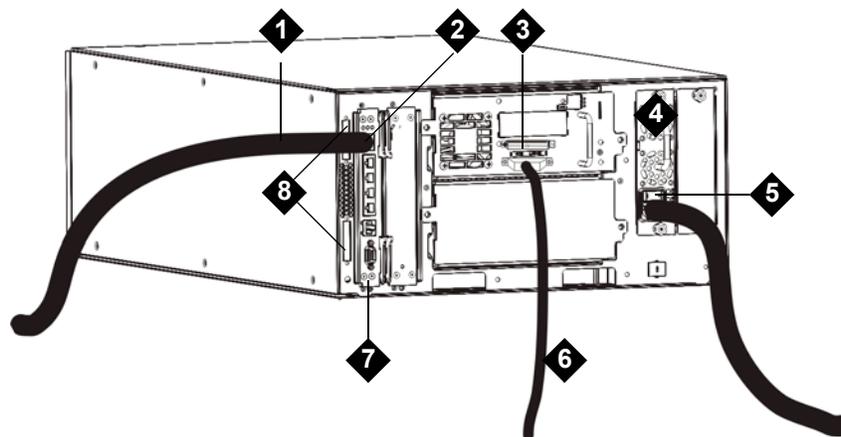
1	Ethernet cable to customer network	**5**	Rear power switch
2	GB Ethernet port	**6**	SCSI cable to host
3	SCSI terminator	**7**	Library control blade
4	Power supply	**8**	Module terminators

Figure 4   Multi-Module SCSI Cabling
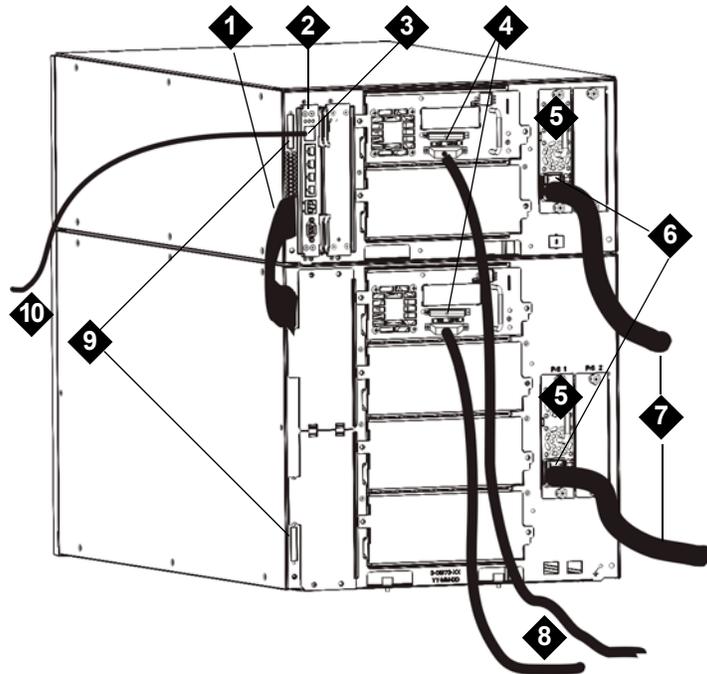
1	Module-to-module cable	**6**	Rear power switch
2	Library control blade	**7**	Power cords
3	GB Ethernet port	**8**	SCSI drive to host cable
4	SCSI terminator	**9**	Module terminator
5	Power supply	**10**	Ethernet cable to customer network

1   If your library is taller than 14U, install it in a rack. See Using the Rack-mount Kit to Install a Library in a Rack on page 108 for instructions. The instructions include procedures for removing and replacing tape drives.

2   Connect the SCSI cables to the tape drives. There are two recommended ways to cable SCSI tape drives: one tape drive per SCSI bus or two tape drives per SCSI bus (see Figure 5).

> Note   To avoid possible performance issues, do not connect more than 2 SCSI drives per SCSI bus.

To connect one tape drive per SCSI bus:

a. Use a SCSI cable to connect the bottom port of the tape drive to your host.

b. Use a SCSI terminator to terminate the top port of the tape drive.

To connect two tape drives per SCSI bus:

a. Connect one end of the SCSI cable to the top SCSI port of the bottom tape drive. Then connect the other end of the cable to the bottom SCSI port of the tape drive above. The SCSI cable connecting the two tape drives should be at least 30 cm in length.

b. Use another SCSI cable to connect the bottom tape drive of the SCSI bus to your host.

c. Use a SCSI terminator to terminate the top tape drive of the SCSI bus.

Figure 5   Cabling One or Two Tape Drives Per SCSI Bus
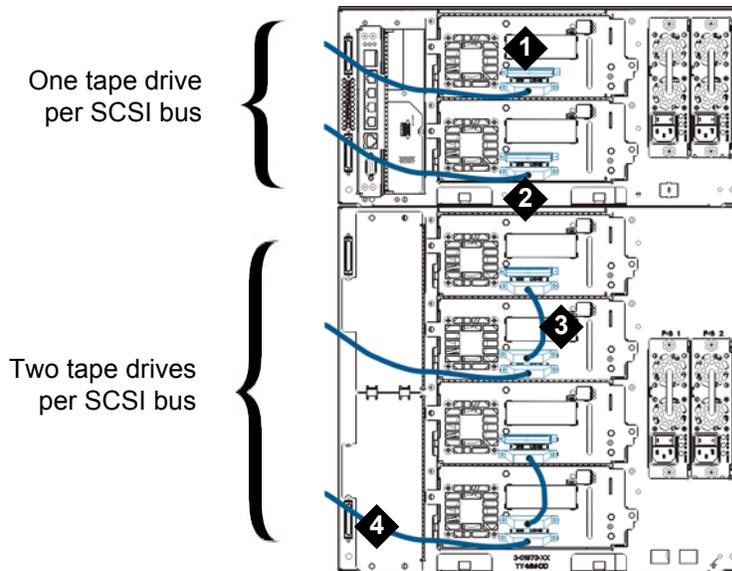
1	SCSI terminator	**3**	SCSI cable connecting two SCSI tape drives
2	SCSI drive to host cable	**4**	SCSI drive to host cable

3 Connect the module-to-module cables.

> ⚠️ **CAUTION** **The module terminator is not the same as a SCSI terminator. Using a SCSI terminator instead of a module terminator will damage the library.**

    a. Using the module terminators, terminate the top and bottom modules in the library stack. Install one module terminator in the top terminator connector on the topmost module and one in the bottom terminator connector on the bottommost module.

       If your library configuration consists of a single module, place module terminators in the module's top and bottom module terminator connector.

    b. If you need to add 9U Expansion Modules to the 5U Library Control Module, remove the module terminator from the 5U Library Control Module terminator connection that is closest to the 9U Expansion Module.

    c. Replace the module terminator in the 9U Expansion Module in the terminator connection that is furthest from the 5U Library Control Module.

    d. Connect the module-to-module cable from the 5U Library Control Module to the 9U Expansion Module.

4 Connect your Ethernet cable to the Gigabit (GB) Ethernet port on the library control blade (LCB) for remote access to the library via the Web client.

5 Connect a power cord to the outlet on the power supply on the rear of the library.

There should always be a power cord connected to the power supply on the 5U Library Control Module. If redundant power supplies are used, connect a power cord to each of the additional power supply outlets.

6 Power on the library:

    a. Turn on the rear power switch of each of the power supplies.

    b. Turn on the front power switch.

    c. Power up the host system.

7 Verify communication with all devices on the bus.

8 Configure the library using the commands on the operator panel.

See "Configuring Your Library" in the *Dell PowerVault ML6000 Tape Library User's Guide*.

Cabling Libraries with SAS Tape Drives

Each SAS tape drive should be connected directly to the host using one SAS cable. The LTO-4 and LTO-5 SAS tape drives in the Dell PowerVault ML6000 library use the SFF-8088 type SAS connector. The connector needed on the host end of the cable depends on the type of Host Bus Adapter (HBA) being used.

The library does not support daisy-chaining SAS cables. The library does not support the use of SAS expander devices or cables at this time.

Use this procedure, along with [Figure 6](#) and [Figure 7](#) on page 29, to connect SAS cables directly to the host.

> ⚠️ **WARNING** **ALL LIBRARIES TALLER THAN 14U MUST BE INSTALLED IN A RACK HAVING A MAIN PROTECTIVE EARTHING (GROUNDING) TERMINAL, AND POWER MUST BE SUPPLIED VIA AN INDUSTRIAL PLUG AND SOCKET-OUTLET AND/OR AN APPLIANCE COUPLER COMPLYING WITH IEC 60309 (OR AN EQUIVALENT NATIONAL STANDARD) AND HAVING A PROTECTIVE EARTH (GROUND) CONDUCTOR WITH A CROSS SECTIONAL AREA OF AT LEAST 1.5 MM^2 (14 AWG).**
>
> **TO ENSURE PROPER AIRFLOW AND ACCESS SPACE, ALLOW 60 CM (24 INCHES) IN THE FRONT AND BACK OF THE LIBRARY.**

Figure 6   Stand-Alone 5U Library Control Module SAS Cabling
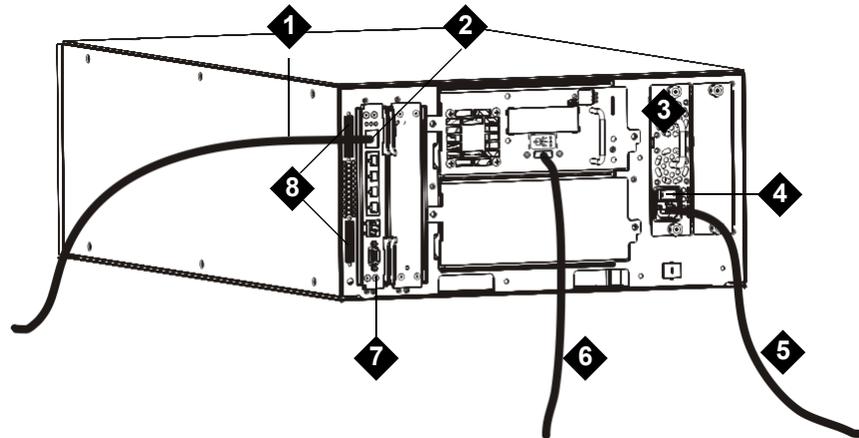
1	Ethernet cable to customer network	**5**	Power cord
2	GB Ethernet port	**6**	SAS cable to host
3	Power supply	**7**	Library control blade
4	Rear power switch	**8**	Module terminators

Figure 7   Multi-Module SAS Cabling
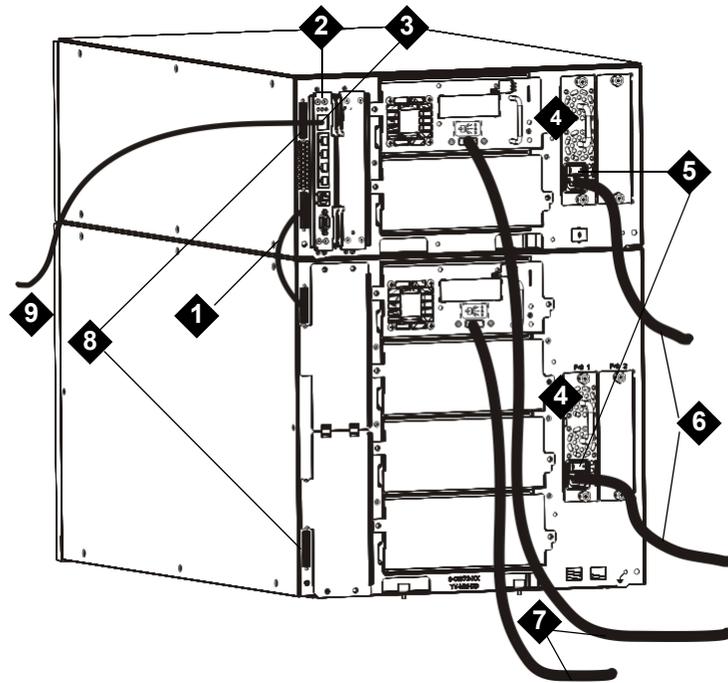
1	Module-to-module cable	**6**	Power cords
2	Library control blade	**7**	SAS cables to host
3	GB Ethernet port	**8**	Module terminators
4	Power supply	**9**	Ethernet cable to customer network
5	Rear power switch		

1   If your library is 14U or taller, install it in a rack. See <u>Using the Rack-mount Kit to Install a Library in a Rack</u> on page 108   for instructions. The instructions include procedures for removing and replacing tape drives.

2   Connect one end of the SAS cable to the tape drive. Connect the other end of the SAS cable to the host.

3   If your library configuration consists of a single module, place module terminators in the module's top and bottom module terminator connectors.

> ⚠️ **CAUTION**   **The module terminator is not the same as a SCSI terminator. Using a SCSI terminator instead of a module terminator will damage the library.**

4 If the library consists of more than one module, connect the modules together as follows:

> ⚠️ **CAUTION** **The module terminator is not the same as a SCSI terminator. Using a SCSI terminator instead of a module terminator will damage the library.**

    a. Using the module terminators, terminate the top and bottom modules in the library stack. Install one module terminator in the top terminator connector on the topmost module and one in the bottom terminator connector on the bottommost module.

    b. If you need to add 9U Expansion Modules to the 5U Library Control Module, remove the module terminator from the 5U Library Control Module terminator connection that is closest to the 9U Expansion Module.

    c. Replace the module terminator in the 9U Expansion Module in the terminator connection that is furthest from the 5U Library Control Module.

    d. Connect the module-to-module cable from the 5U Library Control Module to the 9U Expansion Module.

5 Connect your Ethernet cable to the Gigabit (GB) Ethernet port on the library control blade (LCB) for remote access to the library via the Web client.

6 Connect a power cord to the outlet on the power supply on the rear of the library.

There should always be a power cord connected to the power supply on the 5U Library Control Module. If redundant power supplies are used, connect a power cord to each of the additional power supply outlets.

7 Plug the power cord into a nearby AC power source.

8 Power on the library.

    a. Turn on the rear power switch of each of the power supplies.

    b. Turn on the front power switch.

    c. Power up the host system.

9 Verify communication with all devices on the bus.

10 Configure the library using the commands on the operator panel.

Cabling Libraries with Fibre Channel Tape Drives Connected Directly to a Host or Switch

Use this procedure, along with <u>Figure 8</u> and <u>Figure 9</u> on page 32, if you are installing a library that includes FC tape drives that are connected directly to a host.

Figure 8   Stand-Alone 5U Library Control Module Fibre Channel Cabling
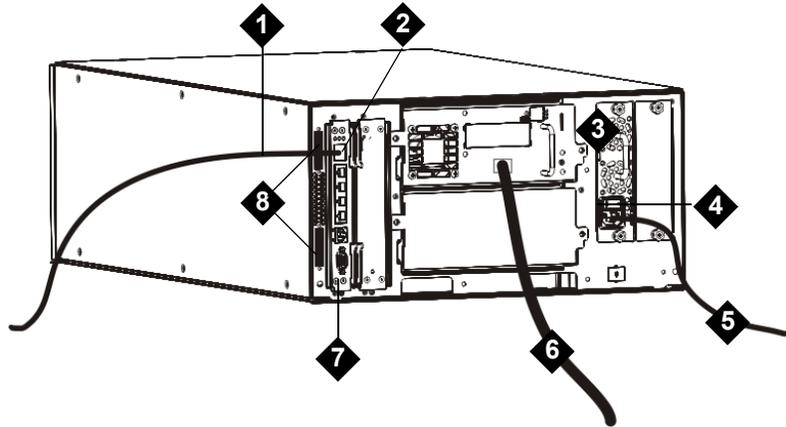
1	Ethernet cable to customer network	**5**	Power cord
2	GB Ethernet port	**6**	Fibre cable to host
3	Power supply	**7**	Library control blade (LCB**)**
4	Rear power switch	**8**	Module terminators

Figure 9   Multi-Module Fibre Channel Cabling
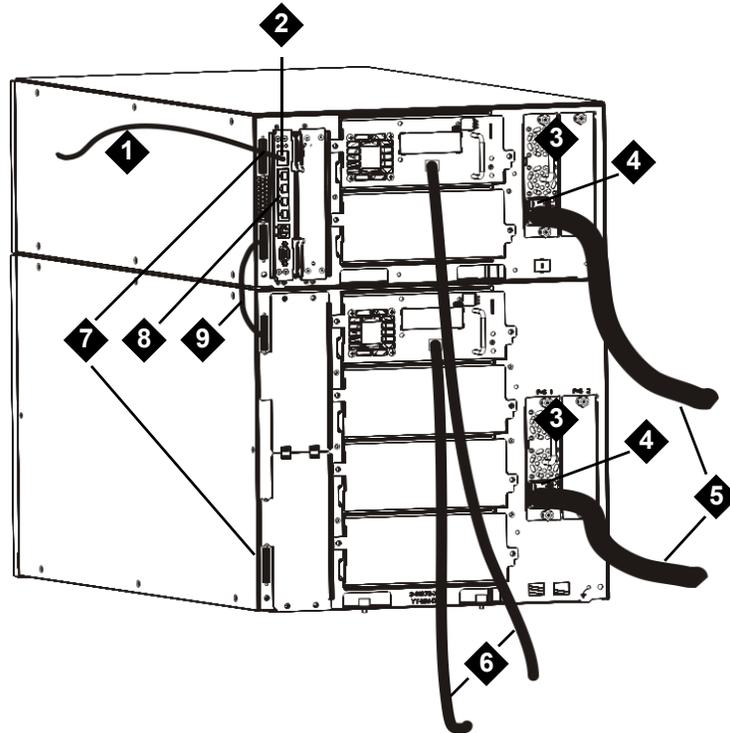
1	Ethernet cable to customer network	**5**	Power cords
2	GB Ethernet port	**6**	Fibre cables to host
3	Power supplies	**7**	Module terminators
4	Rear power switches	**8**	Library control blade (LCB)
		9	Module-to-module cable

⚠️ **WARNING**   **ALL LIBRARIES TALLER THAN 14U MUST BE INSTALLED IN A RACK HAVING A MAIN PROTECTIVE EARTHING (GROUNDING) TERMINAL, AND POWER MUST BE SUPPLIED VIA AN INDUSTRIAL PLUG AND SOCKET-OUTLET AND/OR AN APPLIANCE COUPLER COMPLYING WITH IEC 60309 (OR AN EQUIVALENT NATIONAL STANDARD) AND HAVING A PROTECTIVE EARTH (GROUND) CONDUCTOR WITH A CROSS SECTIONAL AREA OF AT LEAST 1.5 MM^2 (14 AWG).**

TO ENSURE PROPER AIRFLOW AND ACCESS SPACE, ALLOW 60 CM (24 INCHES) IN THE FRONT AND BACK OF THE LIBRARY.

📝 Note   Pay attention to where the operator panel is positioned in the rack for optimum usability.

1 If your library is 14U or taller, install it in a rack.

See Using the Rack-mount Kit to Install a Library in a Rack on page 108 for instructions. The instructions include procedures for removing and replacing tape drives.

2 Connect the fibre cables to the tape drives.

    a. Attach one end of the fibre cable to the fibre port on each tape drive.

    b. Attach the other end of the cable to the host or switch.

> **Note**   The fibre cable can be connected from the tape drive to a switch rather than a host.

3 Connect the module-to-module cables.

> ⚠ **CAUTION**   **The module terminator is not the same as a SCSI terminator. Using a SCSI terminator instead of a module terminator will damage the library.**

    a. Using the module terminators, terminate the top and bottom modules in the library stack. Install one module terminator in the top terminator connector on the topmost module and one in the bottom terminator connector on the bottommost module.

       If your library configuration consists of a single module, place module terminators in the module's top and bottom module terminator connectors.

    b. If you need to add 9U Expansion Modules to the 5U Library Control Module, remove the module terminator from the 5U Library Control Module terminator connection that is closest to the 9U Expansion Module.

    c. Replace the module terminator in the 9U Expansion Module terminator connection furthest from the 5U Library Control Module.

    d. Connect the module-to-module cable from the 5U Library Control Module to the 9U Expansion Module.

4 Connect your Ethernet cable to the Gigabit (GB) Ethernet port on the library control blade (LCB) for remote access to the library via the Web client.

5 Connect a power cord to the outlet on the power supply on the rear of the library.

There should always be a power cord connected to the power supply on the 5U Library Control Module. If redundant power supplies are used, connect a power cord to each of the additional power supply outlets.

6 Power on the library.

    a. Turn on the rear power switch of each of the power supplies.

    b. Turn on the front power switch.

    c. Power up the host system.

7 Verify communication with all devices on the bus.

Configure the library using the commands on the operator panel.

For configuration information, see "Configuring Your Library" in the User's Guide.

Cabling Libraries with Fibre Channel Tape Drives Connected to Fibre Channel I/O Blades

These instructions explain how to install the FC cables that connect the FC drives to the FC I/O blades. The FC I/O blades support connections to LTO-3 and LTO-4 drives. For information on installing FC I/O blades, see Adding, Removing, and Replacing FC I/O Blades on page 130.

Cabling may be affected by partitioning or zoning changes made as part of configuration. When cabling to tape drives, ensure that they are cabled to the correct hosts for the defined partitions. If the FC I/O blades have active channel zoning, ensure that the tape drives are attached to ports that are accessible to the defined zone.

For configuration information, see the chapter on "Configuring Your Library" in the User's Guide.

Details about cabling FC I/O blades include:

- Each expansion module can support up to two FC I/O blades. A maximum of four FC I/O blades can be present in any library configuration. A maximum of four FC drives can be connected to one FC I/O blade.

- Ports 1 and 2 on each FC I/O blade are reserved for connection to hosts. Ports 1 and 2 are always in target mode. The other four ports (3, 4, 5 and 6) are always in initiator mode. See Figure 14 on page 45.

- SAN-ready tape drives that are shipped with FC I/O blades include 24-inch, orange fibre optic cables to connect tape drives to initiator ports on an FC I/O blade.

- Ideally, an installed tape drive should be cabled to a port on the nearest FC I/O blade to eliminate the need to manage excessively long cables. The nearest FC I/O blade is usually located in the same 9U library expansion module as the tape drive.

📝 Note   See Cable Management Guidelines on page 40 for best-practice guidelines for cabling a library.

Figure 10   FC I/O Blade
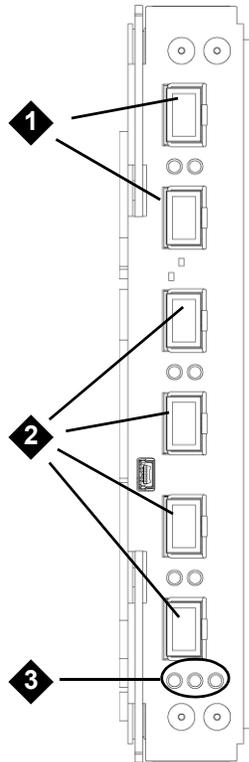
1	Target ports 1 and 2 to host(s)
2	Initiator ports 3 – 6 to drives
3	LEDs (blue, amber, green)

Use the following procedure, along with , if you are installing a library that includes FC tape drives that are connected to FC I/O blades.

Figure 11   FC With I/O Blade Cabling
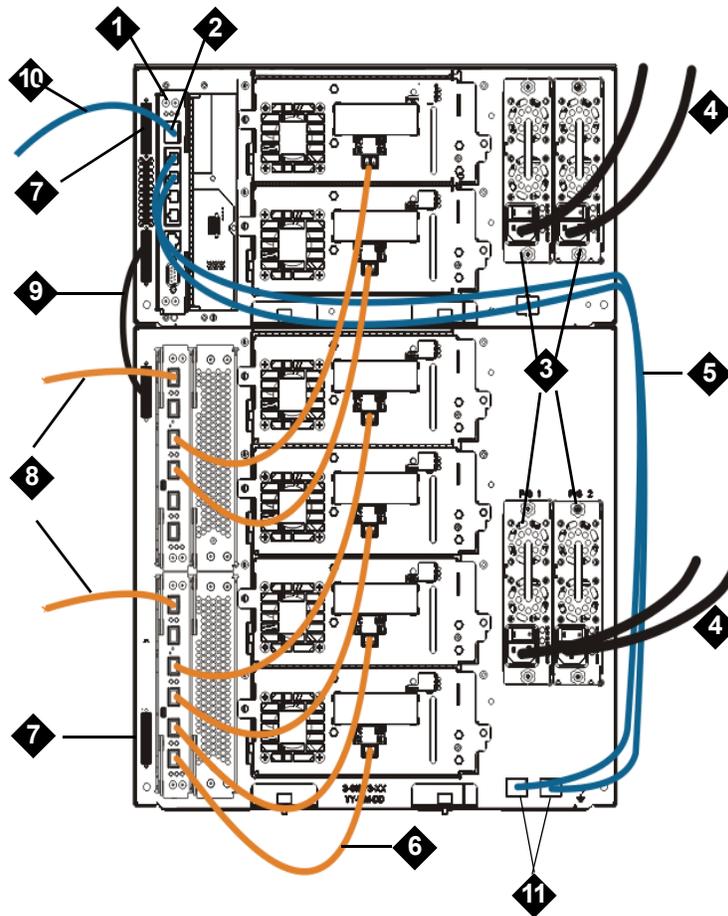
1	Library control blade (LCB)	**6**	FC cable to tape drive
2	GB Ethernet port	**7**	Module terminator
3	Power supplies	**8**	FC cable to host
4	Power cords	**9**	Module-to-module cable
5	Ethernet cables from LCB to expansion module (one per FC I/O blade)	**10**	Ethernet cable to customer network
		11	UPPPER and LOWER Ethernet ports

Required tools: None

1 If your library is 14U or taller, install it in a rack. See <u>Using the Rack-mount Kit to Install a Library in a Rack</u> on page 108 for instructions. The instructions include procedures for removing and replacing tape drives.

> ⚠️ **WARNING** **ALL LIBRARIES TALLER THAN 14U MUST BE INSTALLED IN A RACK HAVING A MAIN PROTECTIVE EARTHING (GROUNDING) TERMINAL, AND POWER MUST BE SUPPLIED VIA AN INDUSTRIAL PLUG AND SOCKET-OUTLET AND/OR AN APPLIANCE COUPLER COMPLYING WITH IEC 60309 (OR AN EQUIVALENT NATIONAL STANDARD) AND HAVING A PROTECTIVE EARTH (GROUND) CONDUCTOR WITH A CROSS SECTIONAL AREA OF AT LEAST 1.5 MM^2 (14 AWG).**
>
> **TO ENSURE PROPER AIRFLOW AND ACCESS SPACE, ALLOW 60 CM (24 INCHES) IN THE FRONT AND BACK OF THE LIBRARY.**

> 📝 **Note** Pay attention to where the operator panel is positioned in the rack for optimum usability.

2 For each FC I/O blade installed in a 9U expansion module, connect the 9U expansion module containing the FC I/O blade(s) to a port in the Ethernet hub on the LCB:

> 📝 **Note** Without these Ethernet cables connected, the I/O blades will not work.

- If the FC I/O blade is installed in the bottom bay of the expansion module, connect one end of an Ethernet cable to the Ethernet port labeled **LOWER** in the lower right corner of the expansion module. Connect the other end of the cable to a port in the Ethernet hub on the LCB.

- If the FC I/O blade is installed in the upper bay of the expansion module, connect one end of an Ethernet cable to the Ethernet port labeled **UPPER** in the lower right corner of the expansion module. Connect the other end of the cable to a port in the Ethernet hub on the LCB.

- Follow the instructions in <u>Cable Management Guidelines</u> on page 40 for best practices in routing the Ethernet cables.

3 Remove and discard the necessary number of the black rubber protective covers from the ports on the FC I/O blades.

4 Carefully unwrap the FC cables and remove the two white plastic protective caps from each end of the cable.

> ⚠️ **CAUTION** **FC cables will be damaged if they are bent at more than a four-inch arc.**

5 Connect the FC cable to one of the following initiator ports on the FC I/O blade: 3, 4, 5, or 6. When you choose the port, take into account the location of any other tape drives that you plan to connect to the same FC I/O blade. See <u>Cable Management Guidelines</u> on page 40 for best-practice guidelines for cabling a library.

6 Insert the other end of the FC cable into the FC port on the FC tape drive.

7 Repeat the above steps for each FC drive you want to connect to the I/O blade. Do not connect any of these FC cables to ports 1 or 2 on the FC I/O blade.

8 Connect the host(s) to ports 1 and/or 2 on the FC I/O blade.

9 Install the module terminators.

> ⚠️ **CAUTION**   **The module terminator is not the same as a SCSI terminator. Using a SCSI terminator instead of a module terminator will damage the library.**

   a. Using the module terminators, terminate the top and bottom modules in the library stack. Install one module terminator in the top terminator connector on the topmost module and one in the bottom terminator connector on the bottommost module.

     If your library configuration consists of a single module, place module terminators in the module's top and bottom module terminator connectors.

   b. If you need to add 9U expansion modules to the 5U library control module, remove the module terminator from the 5U library control module terminator connection that is closest to the 9U expansion module.

   c. Replace the module terminator in the 9U expansion module terminator connection furthest from the 5U library control module.

10 Connect the module-to-module cable from the 5U library control module to the 9U expansion module.

11 Connect an Ethernet cable to the Gigabit (GB) Ethernet port on the library control blade (LCB) for remote access to the library via the Web client.

12 Connect a power cord to the outlet on the power supply on the rear of the library.

There should always be a power cord connected to the power supply on the 5U library control module. If redundant power supplies are used, connect a power cord to each of the additional power supply outlets.

13 Power on the library.

   a. Turn on the rear power switch of each of the power supplies.

   b. Turn on the front power switch.

   c. Power up the host system.

14 Verify communication with all devices on the bus

15 Configure the library using the commands on the operator panel.

Recommended Library Cabling for FC I/O Blades

Fibre optic cables connect Fibre Channel tape drives to I/O blades and I/O blades to a Storage Area Network (SAN) fabric or host. Correctly managing these cables on the rear of the library can prevent damage to the cables and Fibre Channel ports and ensure optimal data throughput.

SAN-ready tape drives that are shipped with I/O blades include 24-inch fibre optic cables to connect drives to initiator ports on an I/O blade. The short length of these fibre cables is intentional. Ideally, an installed tape drive should be cabled to a port on the nearest I/O blade to eliminate the need to manage excessively long cables. The nearest I/O blade is usually located in the same expansion module as the tape drive.

The 24-inch fibre cables are orange in color. You will need to provide fibre cables long enough to connect a host or a SAN switch to a target port on an I/O blade.

It is important to consider how drives are assigned to partitions when cabling tape drives and hosts to an I/O blade. If you want a host to be able to communicate with a tape drive that is assigned to a particular partition, both the drive and the host that has access to the partition should communicate through the same I/O blade.

Table 2 provides an example of a 41U library and ML6030 Control Module, plus two ML600 9U Expansion Modules with I/O blade-attached tape drives. The information next to the image shows each tape drive and the I/O blade and port to which each tape drive is connected.

Table 2   Recommended Fibre Channel Cabling With I/O Blades in Maximum Capacity Library

Recommended Cabling	Tape Drive	FC I/O Blade	FC I/O Blade Port
	[1,1]	N/A (direct attached)	
	[1,2]	N/A (direct attached)	
	[1,3]	[1,2]	Port 3
	[1,4]	[1,2]	Port 4
	[0,1]	[1,2]	Port 5
	[0,2]	[1,2]	Port 6
	[-1,1]	[-1,2]	Port 3
	[-1,2]	[-1,2]	Port 4
	[-1,3]	[-1,2]	Port 5
	[-1,4]	[-1,2]	Port 6
	[-2,-1]	[-2,-2]	Port 3
	[-2,-2]	[-2,-2]	Port 4
	[-2,-3]	[-2,-2]	Port 5
	[-2,-4]	[-2,-2]	Port 6
	[-3,1]	[-3,2]	Port 3
	[-3,2]	[-3,2]	Port 4
	[-3,3]	[-3,2]	Port 5
	[-3,4]	[-3,2]	Port 6
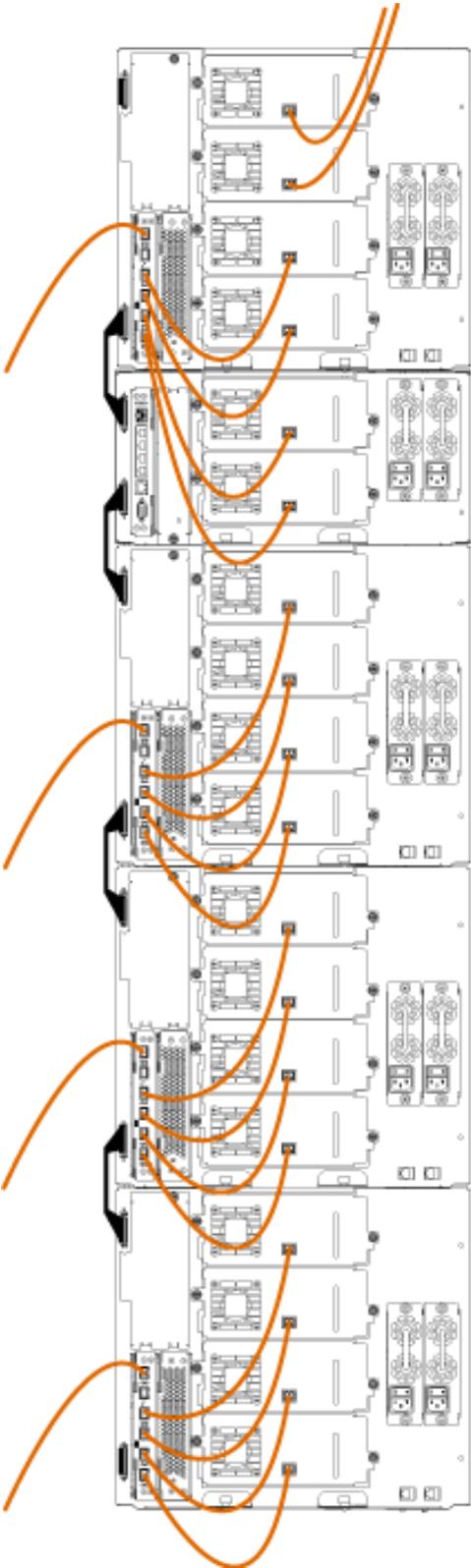
Cable Management Guidelines

As the library expands to support larger configurations, it is important to restrain and organize cables and power cords on the rear of the library. Doing so ensures that the rear of the library remains accessible and reduces the possibility that cables become damaged.

Use this section to find cable management guidelines and best practices for power cords and Ethernet cables. Use the equipment specified in Cable Management Kit below.

Cable Management Kit

Customers who purchase a Fibre Channel I/O blade will receive a cable management kit with all the equipment necessary to perform these procedures. You can also order the cable management kit by contacting your Sales Representative. The color of the straps matches the color of the cords they are designed to secure.

Table 3   Cable Management Kit Contents
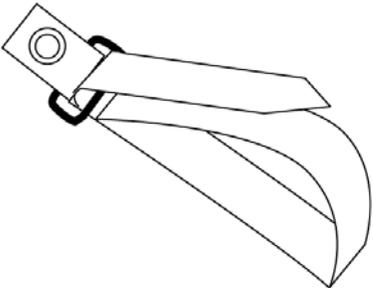
Component	Description	Quantity
	Black hook-and-loop fastener — to secure power cords to	1
	Blue hook-and-loop fastener — to secure Ethernet cables to	1
	Push-in clip — to secure hook-and-loop fasteners to 9U library expansion modules.	2
	M5 thumbscrew — for older library models without drilled holes for push-in clips. The M5 thumbscrew attaches hook-and-loop fasteners to the M5 threaded hole on the lower right of any module chassis.	2
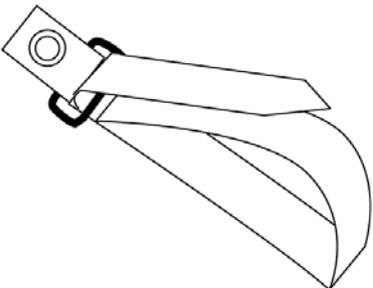
Table 3 Cable Management Kit Contents

Component	Description	Quantity
	Push-in wire saddle cable clamp — to secure Ethernet cables to the 5U Library Control Module.	2
	Adhesive-backed wire saddle cable clamp — for older library models without drilled holes for push-in wire saddle clamps. The adhesive-backed wire saddle clamp secures Ethernet cables to the 5U Library Control Module.	2
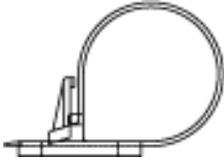
Managing Power Cords

Power cord management is important especially for the larger, expanded library configurations. An ML6030 CM plus two PowerVault ML6000 9U Expansion Modules with redundant power, the maximum configuration, may contain as many as 10 power supply units with 10 power cords to manage.

To organize power cords on the rear of the library, mount a black hook-and-loop fastener to each module and then secure the power cords with the fastener. Power cords that are shipped with the library are black in color.

You can apply the following procedure to any library that contains at least one 9U Expansion Module.

To secure a power cord to the library frame:

1 Facing the rear of the library, locate a specific hole that is drilled into the back of the 9U Expansion Module for the hook-and-loop fastener. This hole is located on the rear of the library, about three inches from the top of the 9U Expansion Module near the right side of the library chassis. See for the location of this hole.

> **Note** If your module chassis does not have the drilled hole, use an M5 thumbscrew to attach the black hook-and-loop fastener to the nearest available M5 threaded hole on the lower right of any module chassis.

2 Insert a push rivet into the rivet hole on the black hook-and-loop fastener. The head of the rivet should be on the same side of the fastener as the plastic loop.

3 Firmly press the push rivet through the hole in the 9U Expansion Module described above. The hook-and-loop fastener should now be secured to the library chassis.

4 Plug the power cord into power supply unit closest to the hook-and-loop fastener.

5 Determine how much cord length you need to reach and easily plug into the AC power source. Do not plug the cord into a power source until you are ready to power on the library.

6 If there is excess power cord, loop the excess cord into a bundle in the shape of a figure-eight. The bundle should be small enough to hold comfortably with one hand, or about eight inches in length.

7 Wrap the bundle with the hook-and-loop fastener. Thread the strap through the plastic loop and tighten the strap around the bundled cord. Secure the strap by pressing it down.

The power cord is now secured to the 9U Expansion Module. Repeat these steps to secure other power cords, if necessary. Bundle adjacent power cords together using the same hook-and-loop fastener.

Once complete, power cord management for an ML6030 CM plus two PowerVault ML6000 9U Expansion Modules should look similar to <u>Figure 12</u> below.

Figure 12   Power Cord Management
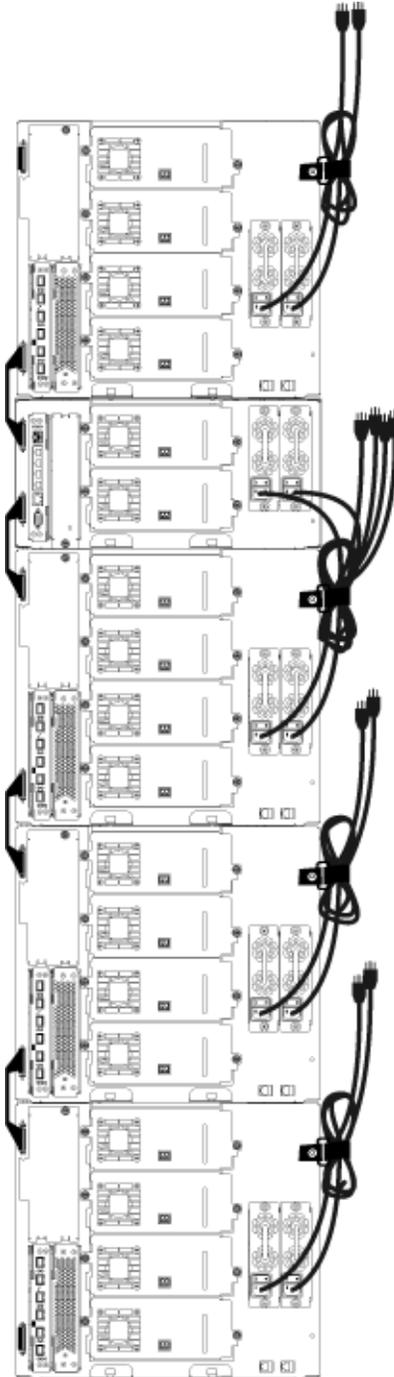
Managing Ethernet Cables

A Dell PowerVault ML6000 library with FC I/O blades uses external Ethernet cables on the rear of the library to provide connectivity between the LCB in the 5U Control Module and a 9U Expansion Module. The upper and lower FC I/O blade bays within a 9U Expansion Module each have a corresponding Ethernet port on the back of the module. Running an Ethernet cable between this port and one of the Ethernet hub ports on the LCB establishes Ethernet connectivity between the blade and the LCB.

The LCB provides ports for up to four Ethernet cables on its internal Ethernet hub. This allows the library to support a total of four FC I/O blades.

To organize Ethernet cables on the rear of the library, mount two wire saddles on the 5U Control Module to route the Ethernet cable(s) to the right side of the library. Mount a blue hook-and-loop fastener to each module and then secure the Ethernet cables with the fastener.

Ethernet cables and Ethernet hook-and-loop straps that are shipped with the library are blue in color.

Apply the following procedure to any library that contains at least one 9U Expansion Module and at least one FC I/O blade.

To secure an Ethernet cable to the library frame using a cable tie:

1 Facing the rear of the library, install the two push-in wire saddle cable clamps onto the 5U Control Module chassis. Push the rivet of one clip into the hole drilled into the cover plate located to the right of the LCB. Push the rivet of the other clip into the hole located near the extreme right side of the library, below the 5U Control Module's power supplies. See Figure 13 on page 44 for the locations of these holes.

> **Note** If your 5U Control Module chassis does not have the drilled holes, use the adhesive -backed wire saddle cable clamps in the location shown in Figure 13.

2 Locate a specific hole that is drilled into the back of the 9U Expansion Module for the hook-and-loop strap. This hole is located on the rear of the library, about three inches from the bottom of the 9U Expansion Module on the right side of the frame back plane. See Figure 13 on page 44 for the location of this hole.

> **Note** If your module chassis does not have the drilled hole, use an M5 thumbscrew to attach the black hook-and-loop fastener to the nearest available M5 threaded hole on the lower right of any module chassis.

3 Insert a push rivet into the rivet hole on the blue hook-and-loop fastener. The head of the rivet should be on the same side of the fastener as the plastic loop.

4 Firmly press the push rivet through the hole in the 9U Expansion Module described above. The hook-and-loop fastener should now be secured to the library chassis.

5 Plug the one end of the Ethernet cable into one of the four Ethernet hub ports on the LCB.

6 Plug the other end of the Ethernet cable into the appropriate port on the 9U Expansion Module.

If the FC I/O blade is installed in the module's upper I/O blade bay, plug the cable into the Ethernet port labeled **UPPER**. If the FC I/O blade or Ethernet Expansion blade is installed in the module's lower I/O blade bay, plug the cable into the Ethernet port labeled **LOWER**.

7 Open the wire saddle nearest the LCB, place the Ethernet cable inside, and snap the wire saddle shut.

8 Repeat for the other wire saddle.

9 If there is excess Ethernet cable, loop the excess cable into a bundle in the shape of a figure-eight. The bundle should be small enough to hold comfortably with one hand, or about six inches in length.

10 Wrap the bundle with the hook-and-loop fastener. Thread the strap through the plastic loop and tighten the strap around the bundled cable. Secure the strap by pressing it down.

The Ethernet cable is now secured to the 9U Expansion Module. Repeat these steps to secure other Ethernet cables, if necessary.

Once complete, the Ethernet cabling for a an ML6030 Control Module plus two PowerVault ML6000 9U Expansion Modules containing four I/O blades should appear similar to the illustration below.

Figure 13   Ethernet Cable Management
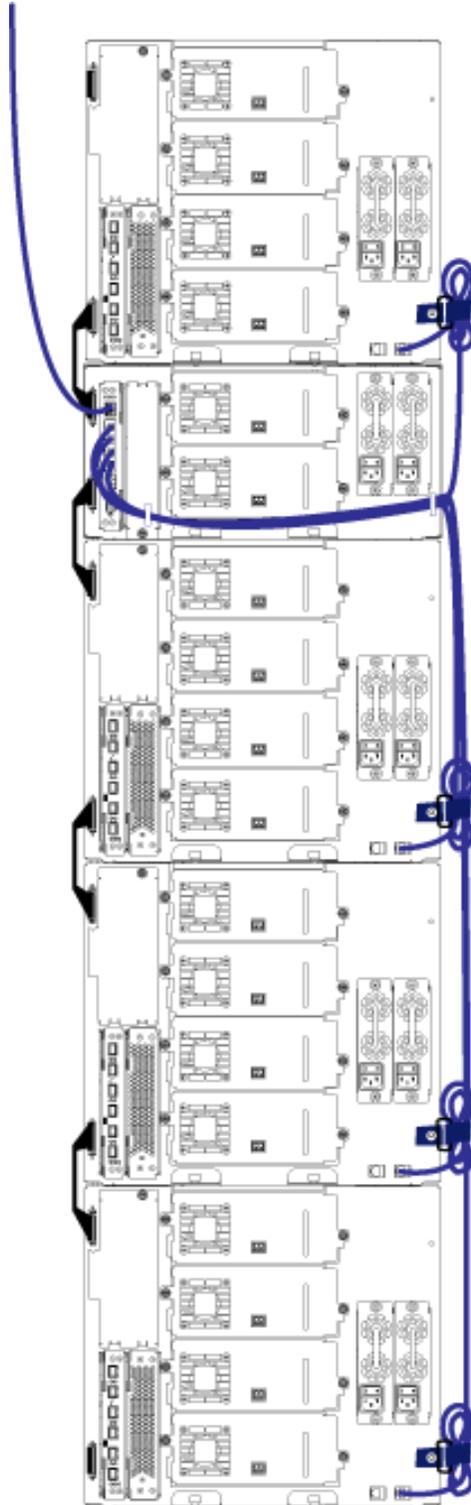
Figure 14 shows how a 41U library with FC I/O blades would appear with power, Ethernet, and fibre cables installed and managed according to these guidelines.

Figure 14   Cable Management, All Cables, FC I/O Blades Installed
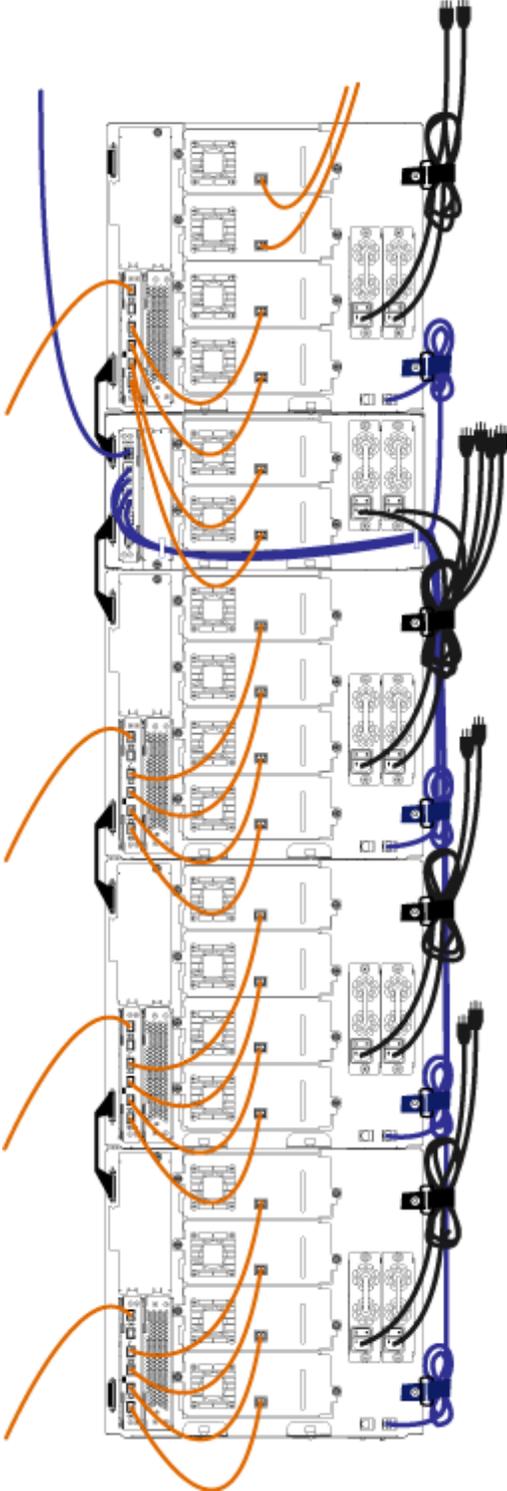
Installing a Stand-Alone 5U Library Control Module

Required tools: None

Use this procedure to install a 5U library configuration:

1   Prepare the rack to hold modules, if you plan to install your library in a rack. See Using the Rack-mount Kit to Install a Library in a Rack on page 108 for instructions on installing a rack-mount kit.

2   Make sure all tape drives have been removed from the 5U Library Control Module. See Adding, Removing, and Replacing Tape Drives on page 127 for instructions on removing tape drives.

3   Make sure all power supplies have been removed from the 5U Library Control Module. See Adding, Removing, and Replacing Power Supplies on page 106 for instructions on removing power supplies.

4   Open the library's I/E station door and access door and lift the 5U Library Control Module and place it in the desired location.

5   If you are placing the control module in a rack, use the rack ears to fasten the 5U Library Control Module to the rack.

6   If not already installed, install the library control blade (LCB) in the 5U Library Control Module. See Removing and Replacing the Library Control Blade and LCB Compact Flash Card on page 102 for instructions on installing the LCB.

7   Add the tape drives to the module.

8   Install the power supplies. See Adding, Removing, and Replacing Power Supplies on page 106 for instructions on installing power supplies.

9   If tape blockers are required, make sure they are installed in the bottom two rows of the library. The tape blockers block slots in the bottom two rows of the library. You can insert the tape blockers through the open access door.

⚠ **CAUTION**   Libraries that have a Model 2 robot installed no longer use tape blockers. If your library contains a Model 2 robot, do NOT install tape blockers. For more information, see Removing and Replacing the Robot Assembly on page 164 and How to Determine Which Robot Your Library Contains on page 165.
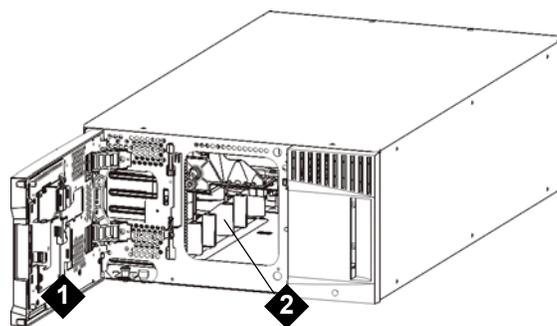
1	access door	**2**	tape blockers (installed)

10   Close the library's I/E station door and access door.

11   Connect all power cords and network data cables. See Cabling the Library on page 22.

12 Install module terminators in the top and bottom module terminator connectors. See <u>Cabling the Library</u> on page 22 for information on installing the module terminators.

13 Power on the library.

14 Configure the library using the operator panel Setup Wizard.

15 Add the tape cartridges to the library using the I/E station.

16 If your host application inventories the location of each tape cartridge in the library, open the host application and re-inventory to sync the logical inventory with the physical inventory of the library.

Installing a New Multi-Module Library Configuration

Use this procedure for installing a new multi-module library. A multi-module library contains a 5U Library Control Module and one or two 9U Expansion Modules.

There are no restrictions on where the 5U Library Control Module can be installed in the library configuration. However, the recommended placement of the control module for library configurations up to 32U is on top of all installed 9U expansion modules. The recommended placement of the control module for 41U library configurations is on top of three 9U expansion modules and below the top expansion module.

5U Library Control Module
9U Expansion Module
9U Expansion Module
9U Expansion Module
9U Expansion Module

⚠️ **WARNING** **ALL LIBRARIES TALLER THAN 14U MUST BE INSTALLED IN A RACK HAVING A MAIN PROTECTIVE EARTHING (GROUNDING) TERMINAL, AND POWER MUST BE SUPPLIED VIA AN INDUSTRIAL PLUG AND SOCKET-OUTLET AND/OR AN APPLIANCE COUPLER COMPLYING WITH IEC 60309 (OR AN EQUIVALENT NATIONAL STANDARD) AND HAVING A PROTECTIVE EARTH (GROUND) CONDUCTOR WITH A CROSS SECTIONAL AREA OF AT LEAST 1.5 MM[2] (14 AWG).**

TO ENSURE PROPER AIRFLOW AND ACCESS SPACE, ALLOW 60 CM (24 INCHES) IN THE FRONT AND BACK OF THE LIBRARY.

Preparing to Install a Multi-Module Library

Required tools:

- Phillips #2 screwdriver, for removing and replacing the top cover plate
- T10 TORX screwdriver, for removing and replacing the bottom cover plate

1 Prepare the rack to hold modules, if you plan to install your library in a rack. See Using the Rack-mount Kit to Install a Library in a Rack on page 108 for instructions on installing a rack-mount kit.

2 Make sure all tape drives have been removed from all of the modules you plan to install. See Adding, Removing, and Replacing Tape Drives on page 127 for instructions on removing tape drives.

3 Make sure all power supplies have been removed from all of the modules you plan to install. See Adding, Removing, and Replacing Power Supplies on page 106 for instructions on removing power supplies.

4 Park the robot assembly in the 5U Library Control Module. Before unstacking the library, the robot assembly must be placed in the 5U Library Control Module.

   a. Open the I/E station and access doors of each module.

   b. Using your hands, gently lift the robot assembly into the 5U Library Control Module. The robot assembly should glide slowly and with some resistance.

   ⚠ **CAUTION**   **Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

   c. After raising the robot assembly to the approximate middle of the 5U Library Control Module, hold it in place with one hand, and using your other hand, move the parking tab to the "parked" position (**Model 1 parking tab**: swivel toward you; **Model 2 parking tab**: move the parking tab in a counter-clockwise direction). The metal parking tab is located at the bottom of column 1.

   d. Gently release the robot assembly to rest on the parking tab.
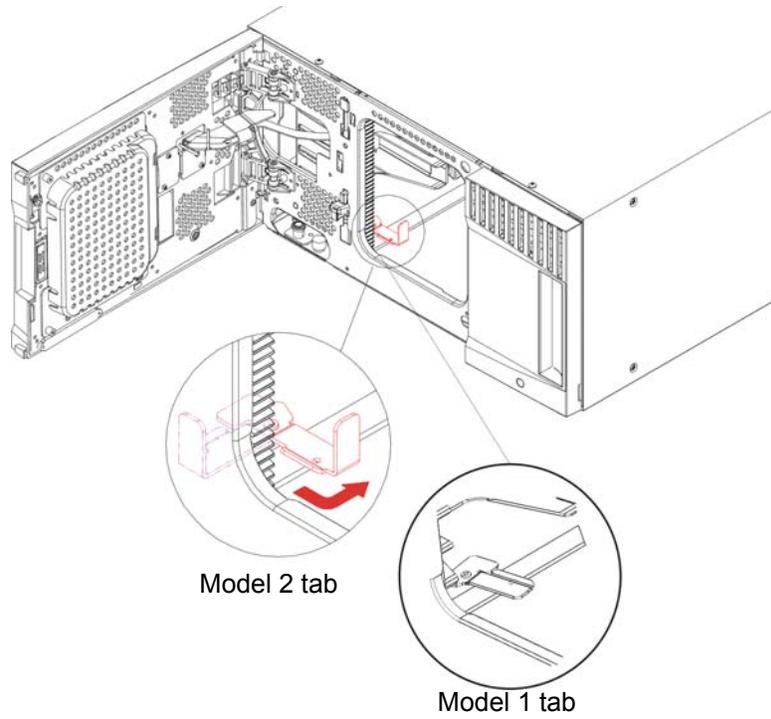
Model 2 tab

Model 1 tab

Parking tab in "parked" position. Note that your parking tab may look different from the picture.

5 Remove and replace the cover plates, if appropriate. When removing the cover plate, ensure that you do not remove the y-home flag screw, as shown in Figure 15,

⚠ CAUTION	**Before removing the 5U Library Control Module's bottom cover plate, the robot assembly must be parked as described in Step 4 on page 48.**

Figure 15   Cover plate with y-home flag
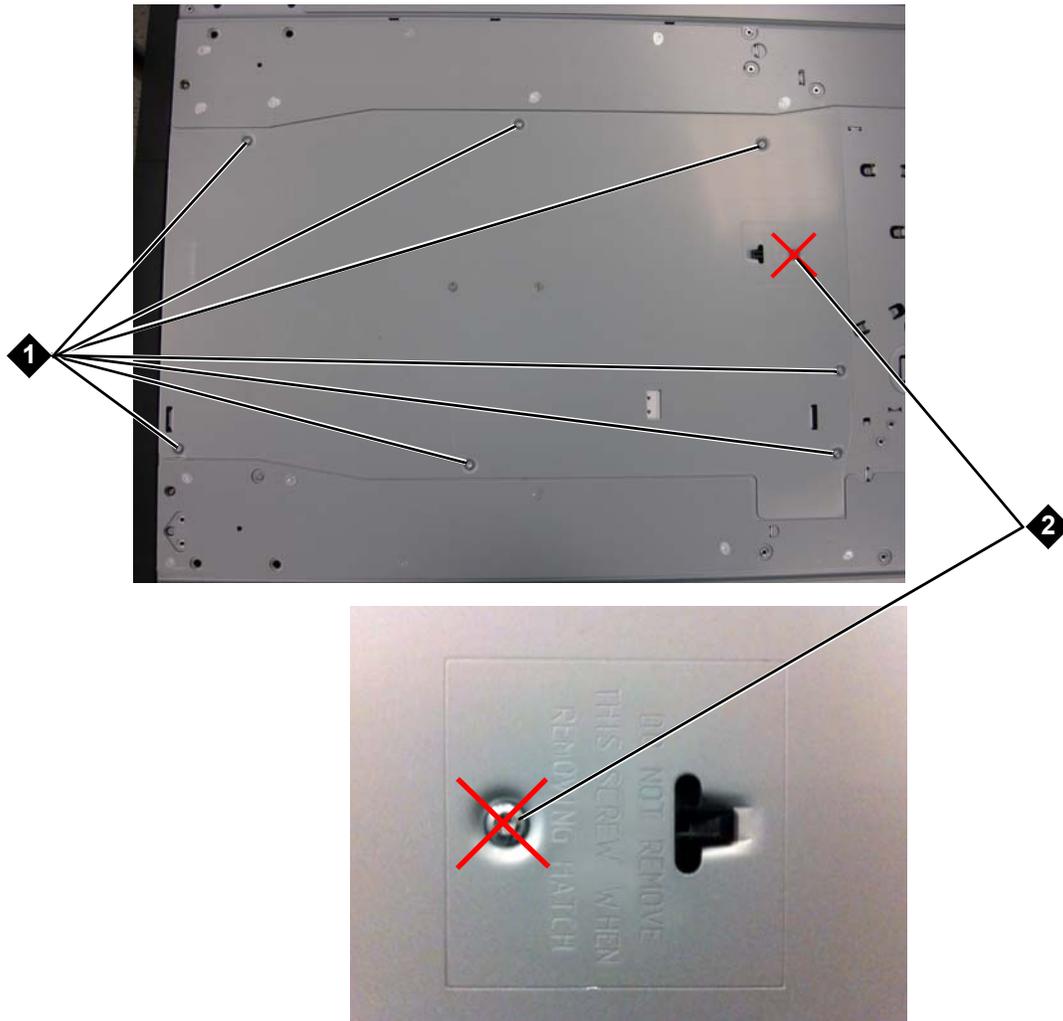
1	Screws to remove
2	Y-home flag screw - do not remove

- If you plan to stack the 5U Library Control Module at the top of the library, and if a 9U Expansion Module will be located below it, remove the 5U Library Control Module's bottom cover plate and the 9U Expansion Module top plate.

• If you plan to stack the 5U Library Control Module between 9U Expansion Modules, remove both the top and bottom plates of the 5U Library Control Module. Also remove the top plate of the 9U Expansion Module located below the 5U Library Control Module and the bottom plate of the 9U Expansion Module located above the 5U Library Control Module.

• If you plan to stack the 5U Library Control Module at the bottom of the library, and if a 9U Expansion Module will be located above it, remove the 5U Library Control Module's top plate and the 9U Expansion Module's bottom plate.

Table 4   Cover Plate Location

ML6010	ML6020	ML6030	ML6030 CM + 1 9U Expansion Module	ML6030 CM + 2 9U Expansion Modules
				cover plate
			cover plate	NEW 9U Expansion Module*
		cover plate	5U Library Control Module	5U Library Control Module
	cover plate	5U Library Control Module	9U Expansion Module	9U Expansion Module
cover plate	5U Library Control Module	9U Expansion Module	9U Expansion Module	9U Expansion Module
5U Library Control Module	NEW 9U Expansion Module*	NEW 9U Expansion Module*	NEW 9U Expansion Module*	9U Expansion Module
cover plate	cover plate	cover plate	cover plate	cover plate

* Recommended location for adding an expansion module.

Installing the 9U Expansion Module

1 Open the 9U Expansion Module's access door and raise the guide pin by pulling it up and turning it slightly, as if it were a screw. Otherwise, the guide pin may scratch the front doors of the module on which you are stacking.
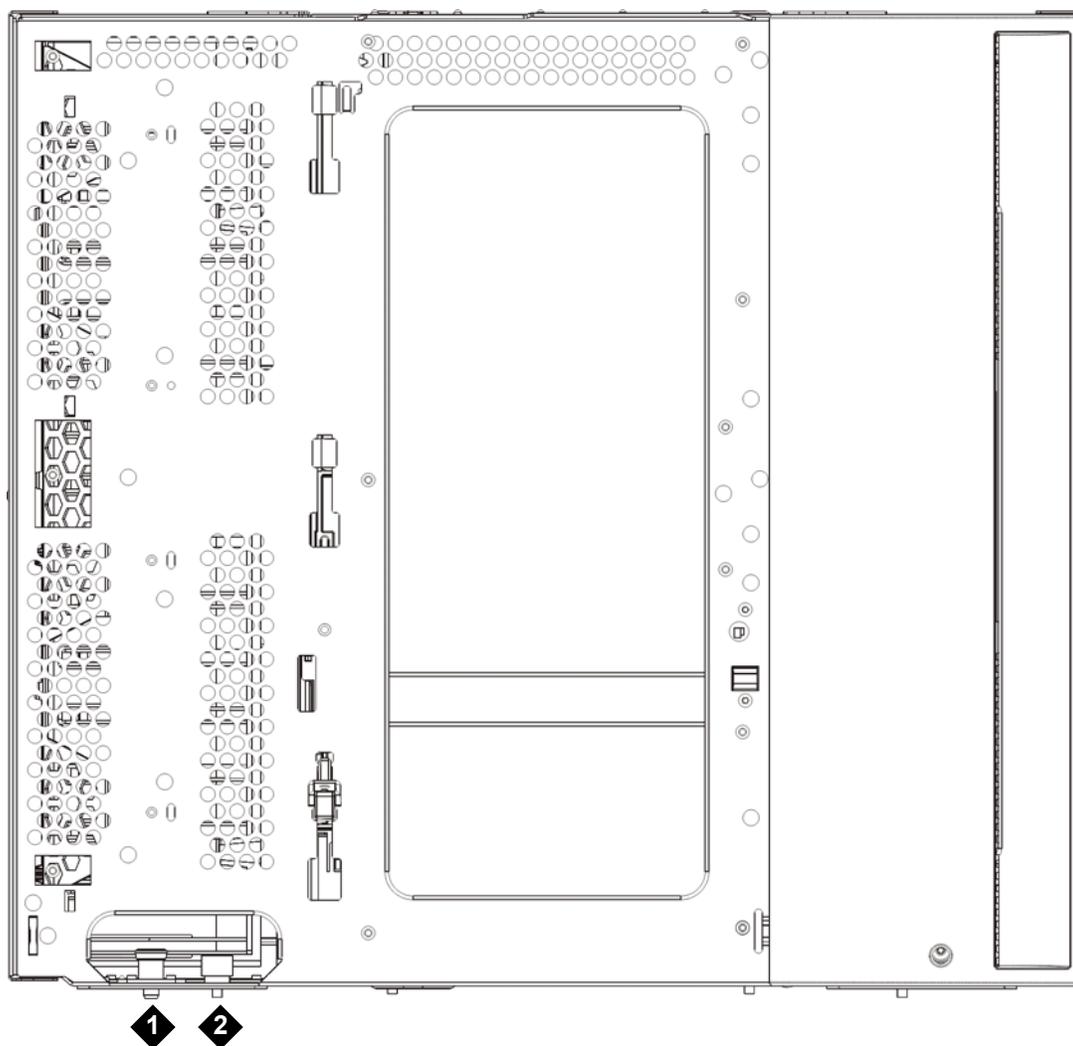
1	Guide pin
2	Thumbscrew

2 Lift the new 9U Expansion Module, and from the front of the library, place it in the desired location.

3 If stacking the 9U Expansion Module on top of another module, secure the two modules together by tightening the two thumbscrews at the base of the front of the module and the two thumbscrews located at the base of the back of the module. Then lower the module's guide pin (located at the base of the front of the module) by turning it and pushing it down.

4 Tighten all thumbscrews located at the base of the front and back of the modules.

5 Fasten the module to the rack with rack ears. See Using the Rack-mount Kit to Install a Library in a Rack on page 108 for information on installing a rack-mount kit.

6 If stacking the 9U Expansion Module on top of another module, engage the Y-rails of the new module in your library configuration. Ensure that the Y-rails are properly aligned and the thumbscrews are tightened.

1	Front Y-rail	**3**	Y-rail (this end up)
2	Rear Y-rail	**4**	Squeeze here to release

a. From the front of the library, open the I/E station and access doors of the 9U Expansion Module. Squeeze the handle of the Y-rail release mechanism, lift it out of its locked position, and slide it downward as far as it will go.

b. From the back of the library, find the rear Y-rail release mechanism, which is located in the interior of the right side of the module. Squeeze the handle of the Y-rail release mechanism, lift it out of its locked position, and slide it downward as far as it will go.

⚠ **CAUTION**   **Check to make sure that there is no gap between the top and bottom Y-rails on both the front and back of the library. If a gap exists, the library cannot mechanically initialize.**

Doing this aligns the Y-rails with the Y-rails of the module beneath it.

1	Y-rail in unlocked, functional position

7   Repeat these steps for each 9U Expansion Module you are installing.

Installing the 5U Library Control Module

1 Open the 5U Library Control Module's I/E station door and access door.

2 Lift the 5U Library Control Module and place it in the desired location.

3 If stacking the 5U Library Control Module on top of another module, secure the two modules together by tightening the two thumbscrews at the base of the front of the module and the two thumbscrews located at the base of the back of the module. Then lower the module's guide pin (located at the base of the front of the module) by turning it and pushing it down.

4 Tighten all thumbscrews located at the base of the front and back of the modules.

5 Use the rack ears to fasten the 5U Library Control Module to the rack.

6 If not already installed, install the library control blade (LCB) in the 5U Library Control Module. See Removing and Replacing the Library Control Blade and LCB Compact Flash Card on page 102 for instructions on installing the LCB.

Preparing to Use the Multi-Module Library

1 Unpark the robot assembly.

   a. Gently raise the robot assembly so that it no longer rests on the parking tab.

   ⚠ **CAUTION**   **Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

   b. With your free hand, move the parking tab to the "unparked" position so that it is removed completely from the interior of the module (**Model 1 parking tab:** swivel the parking tab away from you; **Model 2 parking tab**: move in a clockwise direction). When replaced correctly, the parking tab will not accidentally swivel into the path of the robot.

c. Gently release the robot assembly. It will lower to the bottom module of the library.

Model 2 tab

Model 1 tab

2 Close the library's I/E station and access doors.

3 Add the tape drives to the modules. For details, see Adding, Removing, and Replacing Tape Drives on page 127.

4 If your library contains FC I/O blades, install both the I/O blades and the accompanying fan blades in the expansion module. For details, see Adding, Removing, and Replacing FC I/O Blades on page 130 and Adding, Removing, and Replacing the FC I/O Fan Blade on page 137.

5 Add the power supplies. For details, see Adding, Removing, and Replacing Power Supplies on page 106.

6 Connect all power cords, network data cables, and module-to-module cables. Make sure the module terminators are installed at the top and bottom of the stack of modules. For cabling instructions, see Cabling the Library on page 22.

7 Power on the library. For libraries larger than a ML6020, boot time may take 15-20 minutes.

8 Configure the library using the **Setup Wizard** that appears on the operator panel interface.

9 Add the tape cartridges to the library's modules using the I/E station commands from the operator panel or Web client.

10 Open the host application and reinventory in order to synchronize its logical inventory with the physical inventory of the library.

Adding 9U Expansion Modules to an Existing Library

Adding 9U Expansion Modules to the library increases the number of data cartridges available within the library system. These instructions explain how to add a 9U Expansion Module to an existing library.

The maximum number of 9U Expansion Modules supported in a library depends on the level of firmware the library is running. The latest firmware must be installed on the library if you are upgrading from a 5U or 14U configuration to a larger configuration. The latest firmware can be found on the Dell Support Website. For the Dell Support Website address, see Contacting Dell. See the library Users Guide for more information.

There are some configuration settings to take into account when adding a 9U Expansion Module to an existing library.

- All COD licenses remain the same. If the current license key does not cover the expanded capacity, you will need a new license key to use the newly available slots.

- Partition, I/E station slot, and cleaning slot assignments do not change; however, unassigned slots may change location.

- Modifying partitions can cause the storage slots to be scattered throughout the library.

- I/E station slots in the new module(s) are assigned as data storage slots. You can reconfigure these slots as I/E station slots after the 9U Expansion Module has been added to the library.

A library can use up to four 9U Expansion Modules to a maximum height of 41U.

There are no restrictions on where the control module can be installed in the library configuration. However, the recommended placement of the control module for library configurations up to 32U is on top of all installed 9U expansion modules. The recommended placement of the control module for 41U library configurations is on top of three 9U expansion modules and below the top 9U expansion module.

When adding additional 9U expansion modules to an existing library configuration, the recommended placement of the new 9U expansion module is at the bottom of the existing library configuration (except for the 41U library configurations, where recommended placement is on top). Installing the new 9U expansion module at the bottom of the existing library configuration will logically assign slot numbering within the library.

9U Expansion Module
5U Library Control Module
9U Expansion Module
9U Expansion Module
9U Expansion Module

⚠ **WARNING** **ALL LIBRARIES TALLER THAN 14U MUST BE INSTALLED IN A RACK HAVING A MAIN PROTECTIVE EARTHING (GROUNDING) TERMINAL, AND POWER MUST BE SUPPLIED VIA AN INDUSTRIAL PLUG AND SOCKET-OUTLET AND/OR AN APPLIANCE COUPLER COMPLYING WITH IEC 60309 (OR AN EQUIVALENT NATIONAL STANDARD) AND HAVING A PROTECTIVE EARTH (GROUND) CONDUCTOR WITH A CROSS SECTIONAL AREA OF AT LEAST 1.5 MM^2 (14 AWG).**

TO ENSURE PROPER AIRFLOW AND ACCESS SPACE, ALLOW 60 CM (24 INCHES) IN THE FRONT AND BACK OF THE LIBRARY.

⚠ **WARNING** **WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, A 5U LIBRARY CONTROL MODULE WEIGHS APPROXIMATELY 60 LBS (27.2 KG). A 9U EXPANSION MODULE, WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, EXCEEDS 65 LBS (29.5 KG).**

TO AVOID SERIOUS INJURY, AT LEAST TWO PEOPLE ARE REQUIRED TO SAFELY LIFT THE MODULES INTO POSITION.

Preparing to Install an Additional 9U Expansion Module

⚠ WARNING	**WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, A 5U LIBRARY CONTROL MODULE WEIGHS APPROXIMATELY 60 LBS (27.2 KG). A 9U EXPANSION MODULE, WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, EXCEEDS 65 LBS (29.5 KG).** **TO AVOID SERIOUS INJURY, AT LEAST TWO PEOPLE ARE REQUIRED TO SAFELY LIFT THE MODULES INTO POSITION.**

⚠ CAUTION	**If the library contains a partition that spans modules, and you plan to install the new 9U Library Expansion Module between those modules, you must delete the partition before adding the new module, and re-create the partition after installing the module.**

Required tools:

- Phillips #2 screwdriver, for removing and replacing the top cover plate
- T10 TORX screwdriver, for removing and replacing the bottom cover plate

You need to unstack the library to install the new 9U Expansion Module expansion module at the bottom of the new library configuration.

1 Upgrade the library firmware to a level that can support the number of modules you are adding.

For information on updating firmware, see the *Dell PowerVault ML6000 Tape Library User's Guide*.

2 If you have a partition that spans modules, and you plan to add the new 9U Library Expansion Module between those modules, you must delete the partition before adding the new module.

3 Remove all tape cartridges from the library, using the import and export commands of the operator panel or Web client.

4 Power off the library.

5 Disconnect all power cords, network data cables, and module-to-module cables from all of the modules.

📝 Note	Label all cables before you remove them, so you can later reconnect them to their proper locations.

6 Park the robot assembly in the 5U Library Control Module. Before unstacking the library, the robot assembly must be placed in the 5U Library Control Module.

   a. Open the I/E station and access doors of each module.

   b. Using your hands, gently lift the robot assembly into the 5U Library Control Module. The robot assembly should glide slowly and with some resistance.

⚠ CAUTION	**Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

c. After raising the robot assembly to the approximate middle of the 5U Library Control Module, hold it in place with one hand, and using your other hand, move the parking tab to the "parked" position (Model 1 parking tab: swivel toward you; Model 2 parking tab: move in a counter-clockwise direction). The metal parking tab is located at the bottom of column 1.

d. Gently release the robot assembly to rest on the parking tab.

Model 2 tab

Model 1 tab

7   Remove all power supplies from each module.

8   Remove all tape drives from each module.

9   Remove the tape blockers (if present) from the bottom row of the lowest module in the library. Set the tape blockers aside to be installed in the new library configuration.

> ⚠ **CAUTION**   Libraries that have a Model 2 robot installed no longer use tape blockers. If your library contains a Model 2 robot, do NOT install tape blockers. For more information, see Removing and Replacing the Robot Assembly on page 164 and How to Determine Which Robot Your Library Contains on page 165.

Unstacking the Existing Modules

1   Starting with the topmost module of your library, open the I/E station and access doors.

> ⚠ **CAUTION**   **Before unstacking the modules, the robot assembly must be parked as described in Step 6 on page 59.**

2   If your current configuration already uses a 9U Expansion Module, disengage the Y-rails so the modules can be safely unstacked.

     a. From the front of the library, find the Y-rail release mechanism, which is located on the left side of the module. Squeeze the handle of the Y-rail release mechanism, lift it, and release it so that it locks into place.

     b. From the rear of the library, find the rear Y-rail release mechanism located in the interior of the right side of the module. Squeeze the handle of the Y-rail release mechanism, lift it, and release it so that it locks into place.

       📝 Note   The rear Y-rail is impossible to lift up with the tape drives installed.
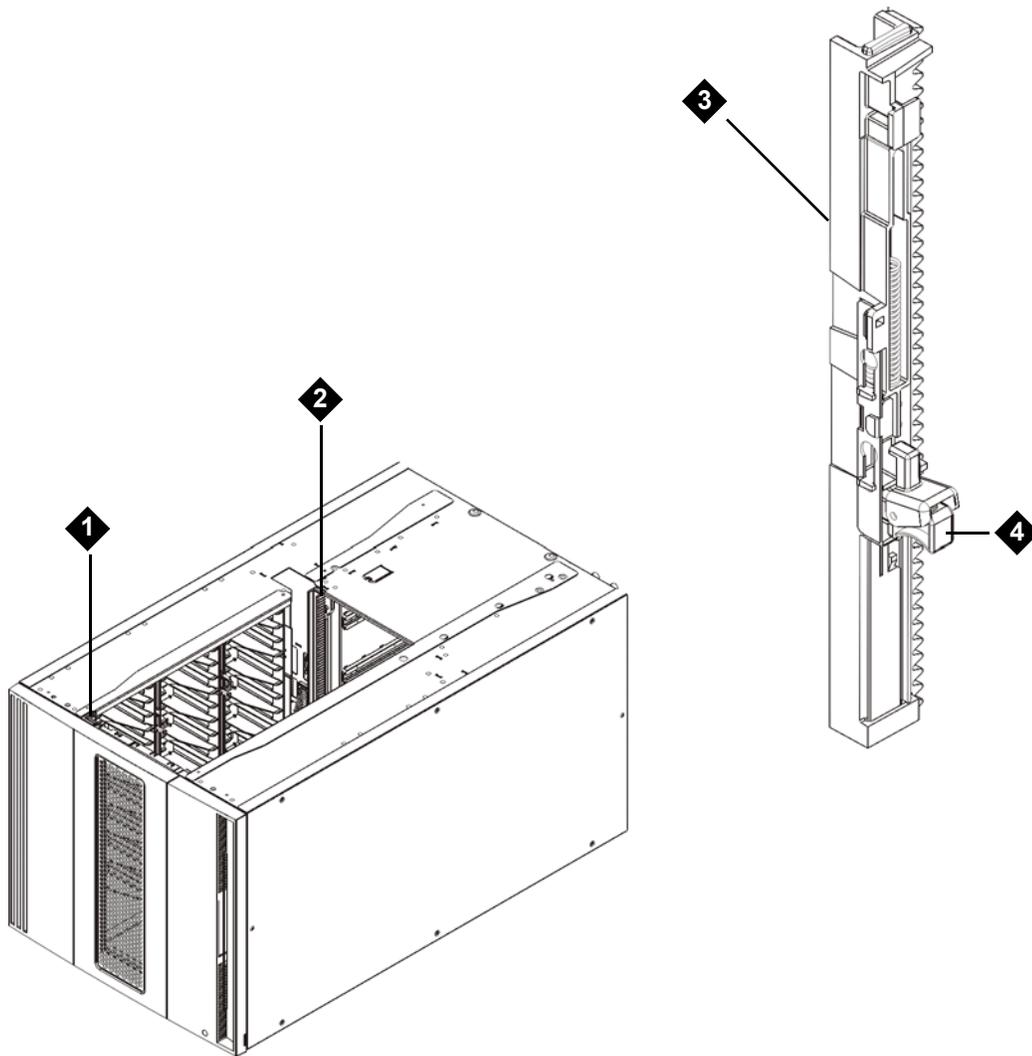
1	Front Y-rail	**3**	Y-rail (this end up)
2	Rear Y-rail	**4**	Squeeze here to release

3 Remove the rack ears that fasten the module to the rack.

4 Loosen the thumbscrews located at the base of the front and rear of the module.
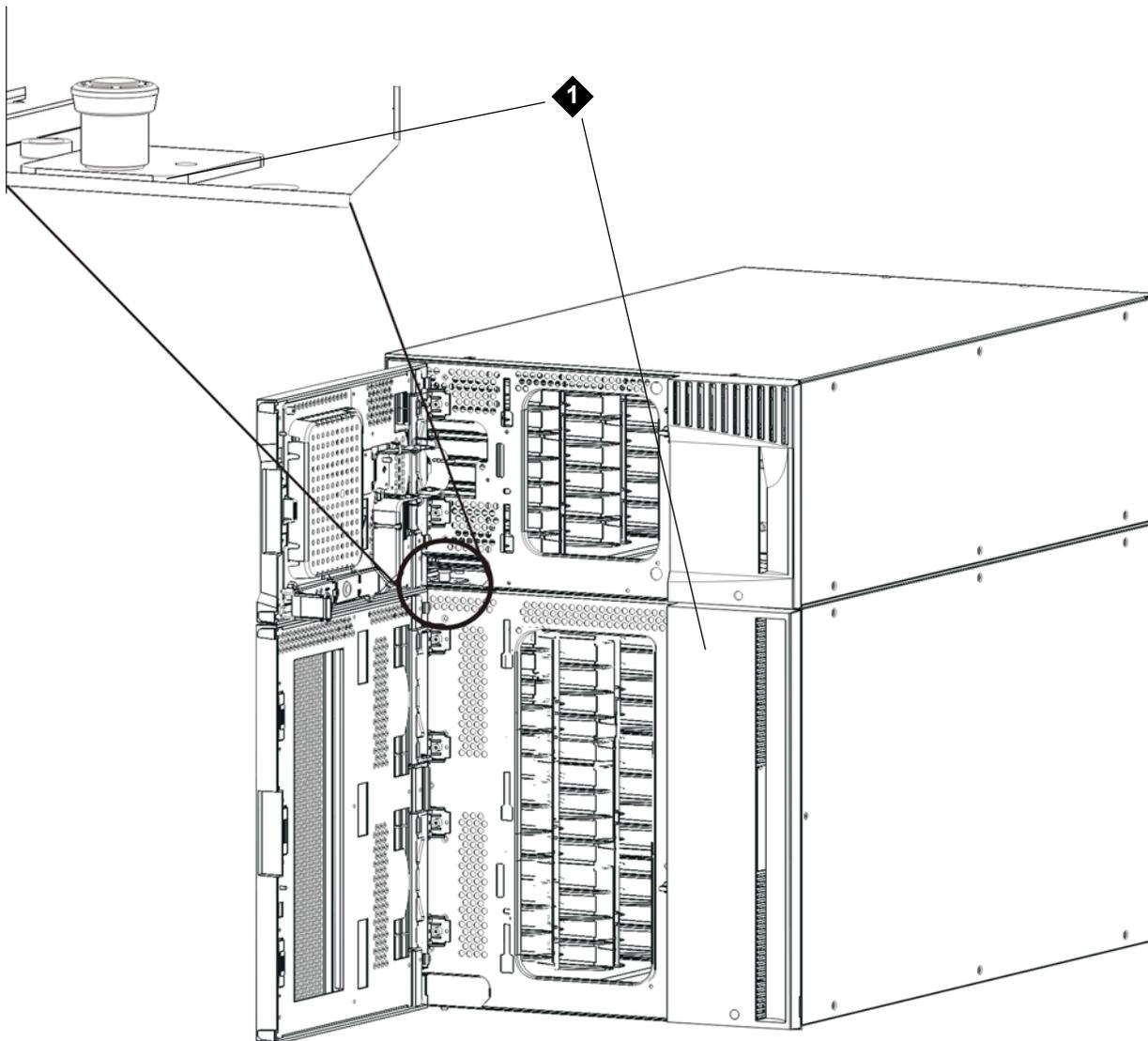
1	Thumbscrews (behind doors)

5 Open the module's access door and raise the guide pin by pulling it up and turning it slightly, as if it were a screw. Otherwise, the guide pin may scratch the front doors of the module beneath it.
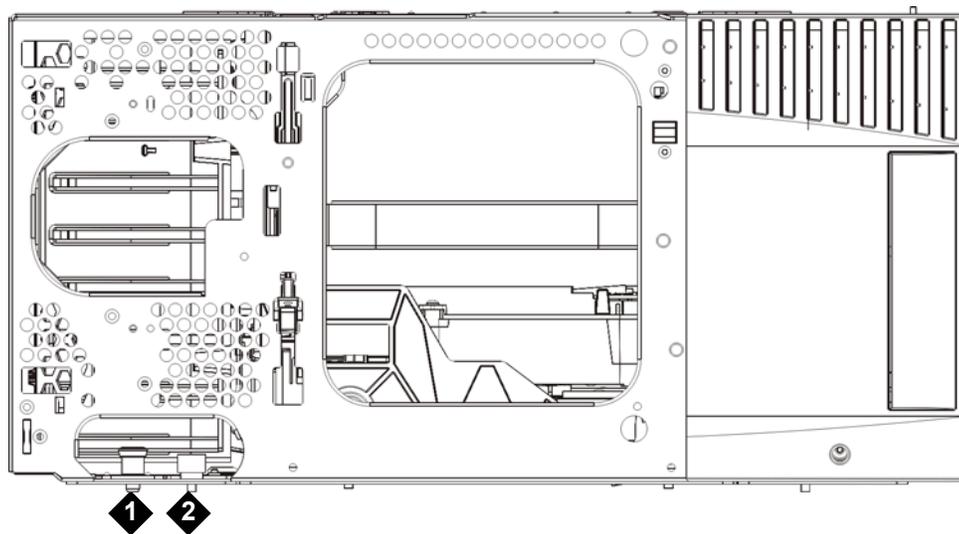
1	Guide pin
2	Thumbscrew

6 From the front of the library, slide the entire module toward you and lift it off of the module below it.

7 Repeat these steps for each module that you need to remove.

Installing the New 9U Expansion Module

1 Prepare the rack to hold modules, if you plan to install your library in a rack. See <u>Using the Rack-mount Kit to Install a Library in a Rack</u> on page 108 for instructions on installing a rack-mount kit.

2 Remove and replace the cover plates, if appropriate.

> ⚠️ **CAUTION**   **Before removing the 5U Library Control Module's bottom cover plate, the robot assembly must be parked as described in <u>Step 6</u> on page 59.**

- If you plan to stack the 5U Library Control Module at the top of the library, and if a 9U Expansion Module will be located below it, remove the 5U Library Control Module's bottom cover plate and the 9U Expansion Module top plate.

- If you plan to stack the 5U Library Control Module between 9U Expansion Modules, remove both the top and bottom plates of the 5U Library Control Module. Also remove the top plate of the 9U Expansion Module located below the 5U Library Control Module and the bottom plate of the 9U Expansion Module located above the 5U Library Control Module.

- If you plan to stack the 5U Library Control Module at the bottom of the library, and if a 9U Expansion Module will be located above it, remove the 5U Library Control Module's top plate and the 9U Expansion Module's bottom plate.

Table 5   Cover Plate Location after Adding a 9U Expansion Module

ML6010	ML6020	ML6030	ML6030 CM + 1 9U Expansion Module	ML6030 CM + 2 9U Expansion Modules
				cover plate
			cover plate	NEW 9U Expansion Module*
		cover plate	5U Library Control Module	5U Library Control Module
	cover plate	5U Library Control Module	9U Expansion Module	9U Expansion Module
cover plate	5U Library Control Module	9U Expansion Module	9U Expansion Module	9U Expansion Module
5U Library Control Module	NEW 9U Expansion Module*	NEW 9U Expansion Module*	NEW 9U Expansion Module*	9U Expansion Module
cover plate	cover plate	cover plate	cover plate	cover plate

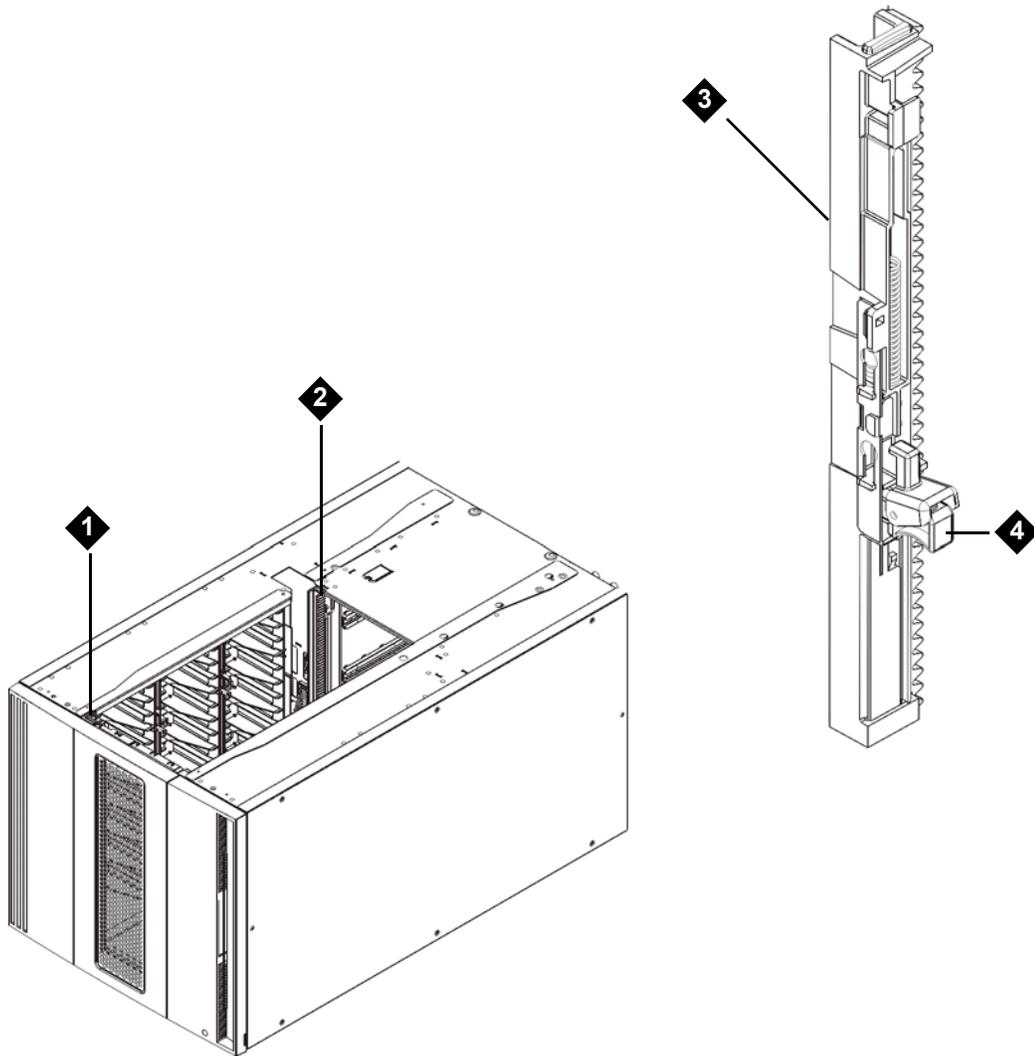* Recommended location for adding an expansion module.

3 Open the 9U Expansion Module's access door and raise the guide pin by pulling it up and turning it slightly, as if it were a screw. Otherwise, the guide pin may scratch the front doors of the module on which you are stacking it.
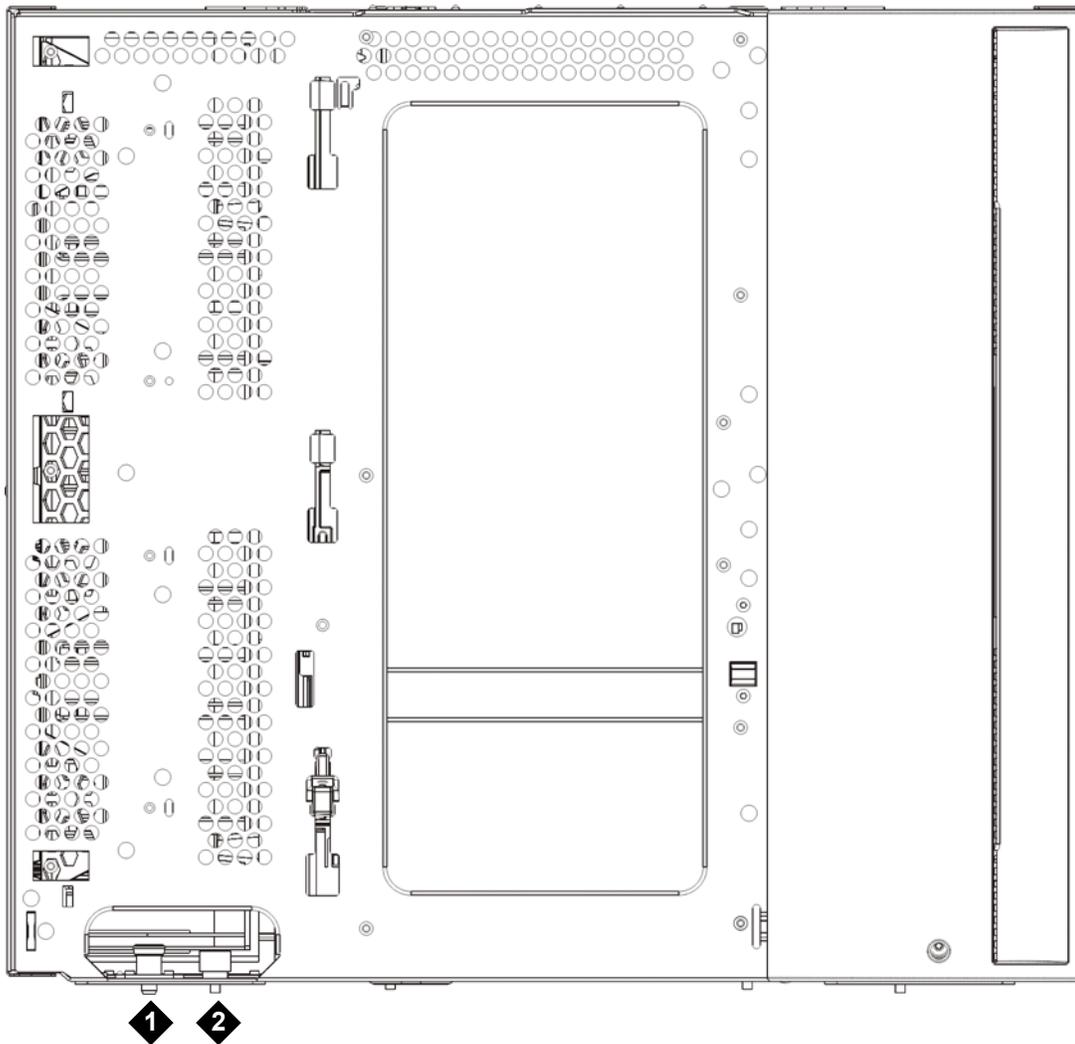
1	Guide pin
2	Thumbscrew

4 Lift the new 9U Expansion Module and, from the front of the library, place it in the desired location.

5 If there is already a module installed, secure the two modules together by tightening the two thumbscrews at the base of the front of the module and the two thumbscrews located at the base of the back of the module. Then lower the module's guide pin (located at the base of the front of the module) by turning it and pushing it down.

6 Tighten all thumbscrews located at the base of the front and back of the modules.

7 Fasten the module to the rack with rack ears.

8 Engage the Y-rails of the new module in your library configuration. Ensure that the Y-rails are properly aligned and the thumbscrews are tightened.
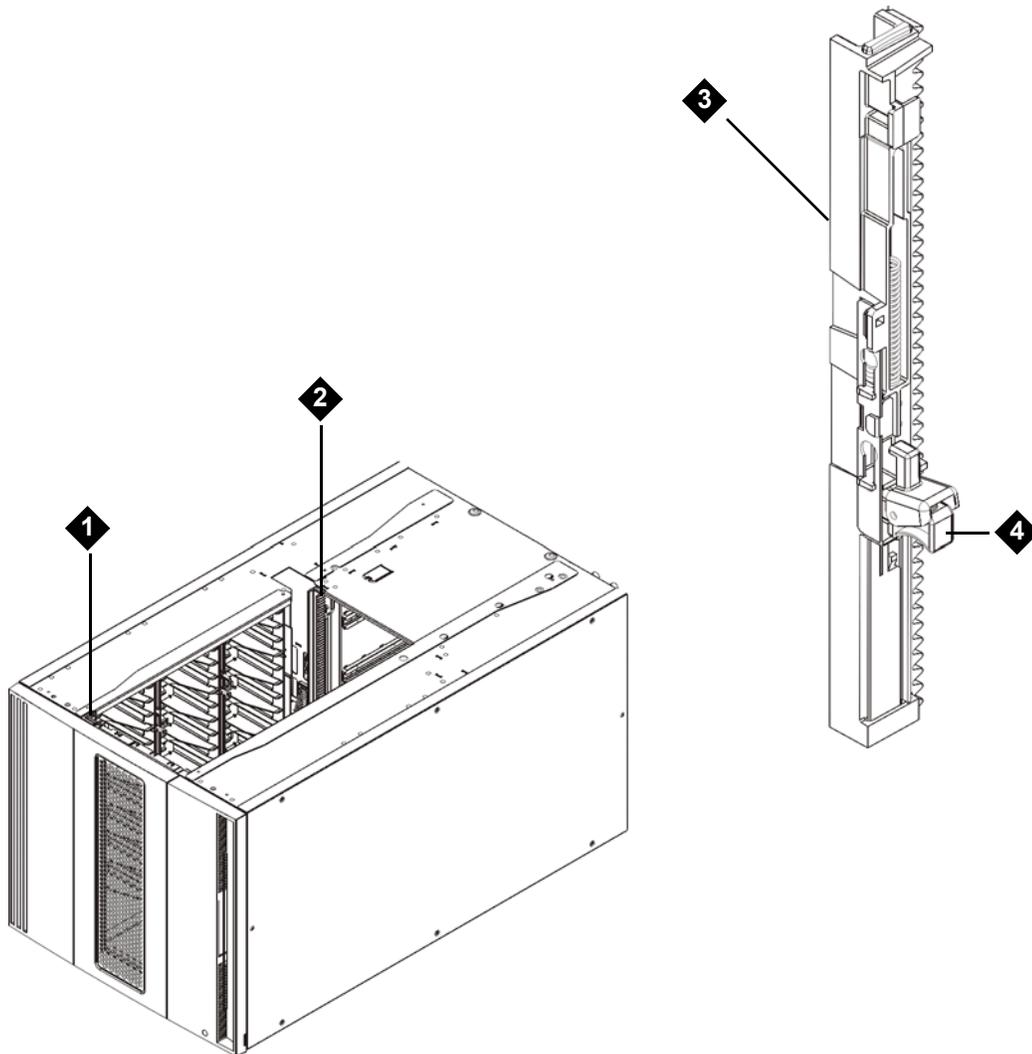
1	Front Y-rail	**3**	Y-rail (this end up)
2	Rear Y-rail	**4**	Squeeze here to release

a. From the front of the library, open the I/E station and access doors of the 9U Expansion Module.

b. Squeeze the handle of the Y-rail release mechanism, lift it out of its locked position, and slide it downward as far as it will go.

c. From the back of the library, find the rear Y-rail release mechanism, which is located in the interior of the right side of the module. Squeeze the handle of the Y-rail release mechanism, lift it out of its locked position, and slide it downward as far as it will go.

Doing this aligns the Y-rails with the Y-rails of the module beneath it.

⚠ **CAUTION** **Check to make sure that there is no gap between the top and bottom Y-rails on both the front and back of the library. If a gap exists, the library cannot mechanically initialize.**
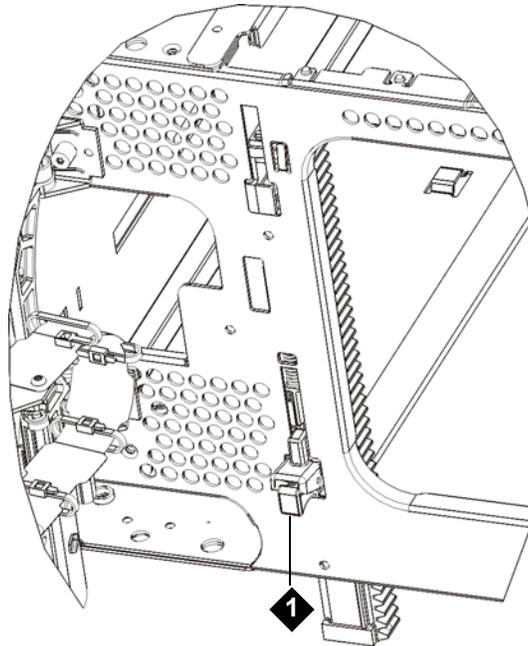
1	Y-rail in unlocked, functional position

9 Repeat these steps for each module you need to re-install in the library configuration.

Preparing to Use the Library

1 Replace the tape blockers (if required) in the bottom row of the lowest module of the library. The tape blockers block slots in the bottom two rows of the library. You can insert the tape blockers through the open access door.

> ⚠️ **CAUTION**   Libraries that have a Model 2 robot installed no longer use tape blockers. If your library contains a Model 2 robot, do NOT install tape blockers. For more information, see Removing and Replacing the Robot Assembly on page 164 and How to Determine Which Robot Your Library Contains on page 165.
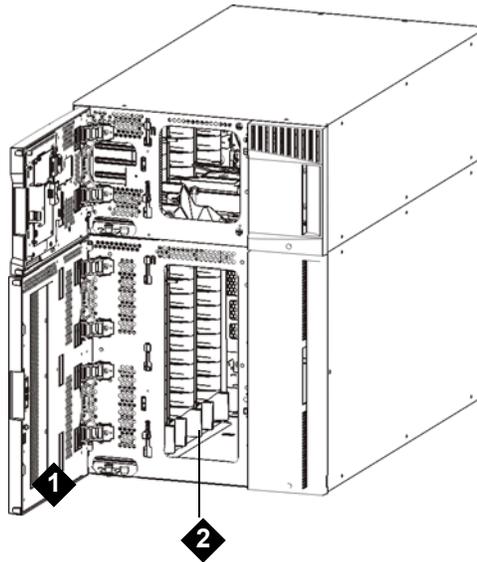
1	access door	**2**	tape blockers (installed)

2 Add the tape drives to the modules. For details, see Adding, Removing, and Replacing Tape Drives on page 127.

3 Add the power supplies. For details, see Adding, Removing, and Replacing Power Supplies on page 106.

4 Add the LCB to the 5U Library Control Module. For details, see Removing and Replacing the Library Control Blade and LCB Compact Flash Card on page 102.

5 If your library contains FC I/O blades, install both the I/O blades and the accompanying fan blades in the expansion module. For details, see Adding, Removing, and Replacing FC I/O Blades on page 130 and Adding, Removing, and Replacing the FC I/O Fan Blade on page 137.

6 Unpark the robot assembly.

    a. Gently raise the robot assembly so that it no longer rests on the parking tab.
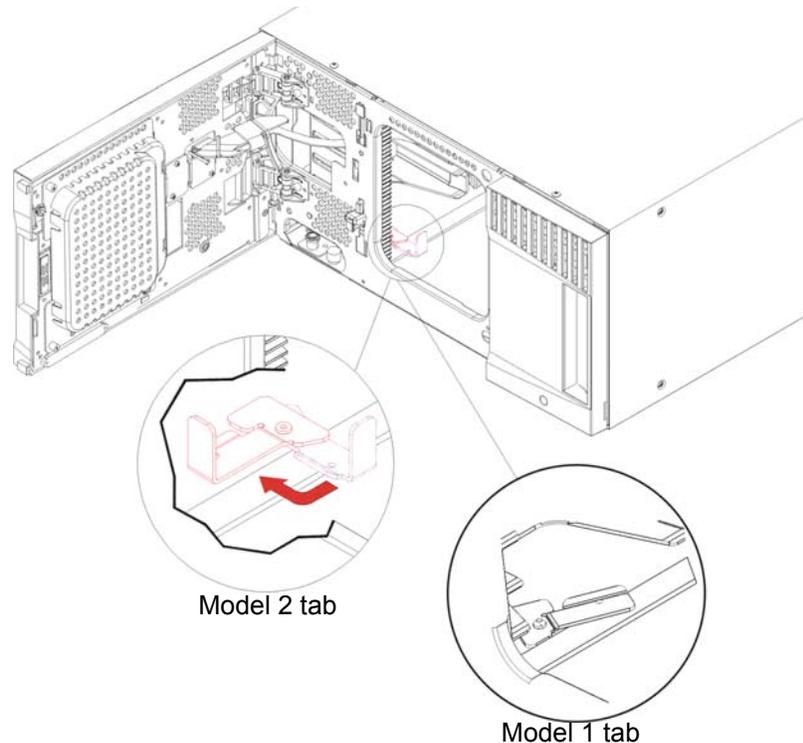
⚠ CAUTION	**Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

    b. With your free hand, move the parking tab to the "unparked" position so that it is removed completely from the interior of the module (**Model 1 parking tab:** swivel the parking tab away from you; **Model 2 parking tab**: move in a clockwise direction). When replaced correctly, the parking tab will not accidentally swivel into the path of the robot.

    c. Gently release the robot assembly. It will lower to the bottom module of the library.

Model 2 tab

Model 1 tab

7 Connect all power cords, network data cables, and module-to-module cables. Make sure the module terminators are installed at the top and bottom of the stack of modules. For cabling instructions, see Cabling the Library on page 22.

8 Power on the library.

9 Reconfigure the library, including applying the new COD license key, using the operator panel or Web client.

10 Recreate any partitions you deleted prior to installing the module.

11 Add the tape cartridges to the library's modules using the I/E station commands from the operator panel or Web client.

12 Open the host application and reinventory to synchronize its logical inventory with the physical inventory of the library. Due to the way the library logically addresses its tape drives and slots internally (see Understanding Logical Element Addressing on page 543), adding an expansion module will change the

element addresses, and this can affect proper communication to a controlling host. Because of this, you must refresh the configuration of any backup application that manages the library to reflect the adjusted positions. In addition, you may need to reboot the host server(s) or rescan the bus to detect the changes.

Preparing to Remove or Replace a Module

Follow the instructions in this section before performing any of the following procedures:

- Permanently Removing 9U Expansion Modules From an Existing Library on page 75

- Replacing a 5U Library Control Module on page 84

- Replacing a 9U Expansion Module on page 92

> **Note**   If a 5U Library Control Module is replaced, all library configuration data will be invalidated and a new library configuration is required. Follow the instructions below to completely export all tape cartridges and completely delete all partition configuration and cleaning slot assignments.

> **Note**   If one or more 9U Library Expansion Modules are removed or replaced, you must follow the steps below to modify or delete all the affected partitions before removing the module. Recreate the partitions after the removal or replacement is complete.

Required tools:

- Phillips #2 screwdriver, for removing and replacing the top cover plate
- T10 TORX screwdriver, for removing and replacing the bottom cover plate

Instructions:

1 View your library's current configuration (**Reports > Library Configuration**) before removing or replacing any library modules to determine which partitions may be affected, which tape cartridges belong to which partition, and whether cleaning slots are configured within the library module you are removing or replacing.

   For example, in Figure 16, there are three partitions configured. All three partitions share six I/E elements in the 5U Library Control Module. The library is configured for automatic cleaning and has three cleaning slots configured in the 9U Library Expansion Module.

   - **Library_a** includes all storage elements in the 5U Library Control Module, and has one drive configured in the 5U Library Control Module, and one drive configured in the 9U Library Expansion Module.

   - **Library_b** includes most storage elements in the 5U Library Control Module, but references its last storage element in the 9U Library Expansion Module. This partition has one drive configured in the 5U Library Control Module and one drive configured in the 9U Library Expansion Module.

   - **Library_c** includes all storage elements in the 9U Library Expansion Module, and also two drives in this 9U Library Expansion Module.

Figure 16   Library Configuration Example 1
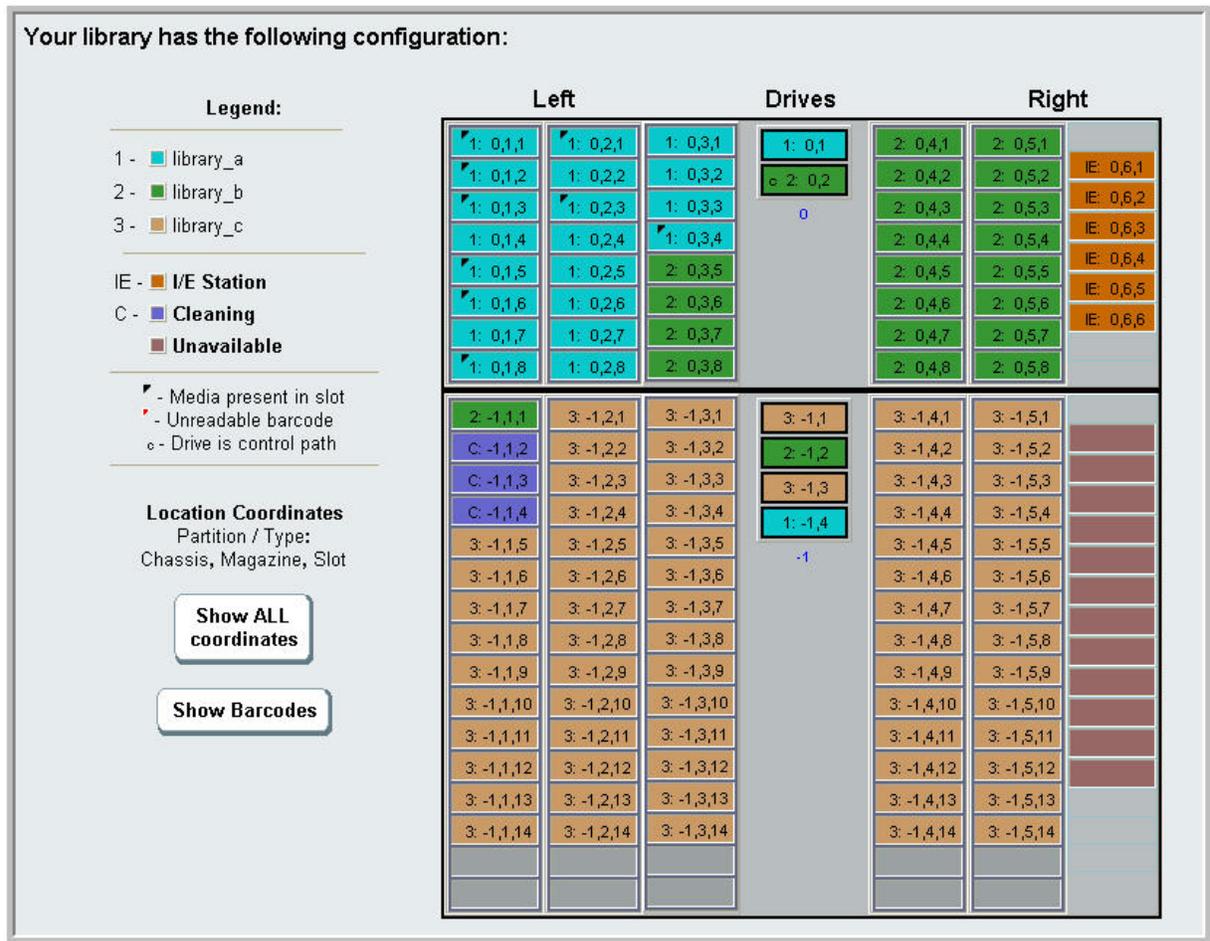
2   If cleaning slots are configured for automatic, library–initiated cleaning operations, export all affected cleaning media from the elements contained within the module you are removing or replacing.

3   If cleaning slots are affected and all cleaning media has been exported from the module you are removing or replacing, reduce or delete the cleaning slots so that cleaning slots are no longer configured within the module you are removing or replacing. You can designate new cleaning slots after the module has been removed or replaced.

4   If the module you are removing or replacing contains tape drives, make sure that none of the drives have media mounted.

5   If the module you are removing or replacing contains I/E slots, remove all media from the affected I/E slots and store them separately for each partition so you can import them back into the same partition once the module removal or replacement is complete.

6   If one or more partitions reference any storage slots within the module you are removing or replacing, export all tape cartridges from the affected partitions and keep the exported cartridges separated by partition, so you can import them back into the same partition once the module removal or replacement is complete.

⚠️ CAUTION	**The library will not be able to locate tape cartridges that are removed from one partition and returned to a different partition. The tape cartridges must be returned to the same partition from which they were removed.**

7 If a partition references storage slots within the module you are removing or replacing, delete that partition. You can create new partitions after modules have been removed or replaced.

📝 Note	If the last elements of a partition reside in the module you are removing or replacing, you may be able to modify the partition instead of deleting it (see Understanding Logical Element Addressing on page 543 for information on how the library logically addresses tape drives and slots). In that case, you would 1) export those tape cartridges that reside in the module you are removing or replacing, and 2) modify the partition, instead of deleting it, so that the partition no longer references any storage or drive elements within the module you are removing or replacing.
	For example, in Figure 17, after exporting all affected tape cartridges from the module you are removing, the cleaning slots are deleted, then Library_c is completely deleted, and Library_b is modified to reduce its storage slot count by one, since this deletes the storage slot reference in the 9U Library Expansion Module. No storage element modifications are required for Library_a.

Figure 17 Library Configuration Example 2
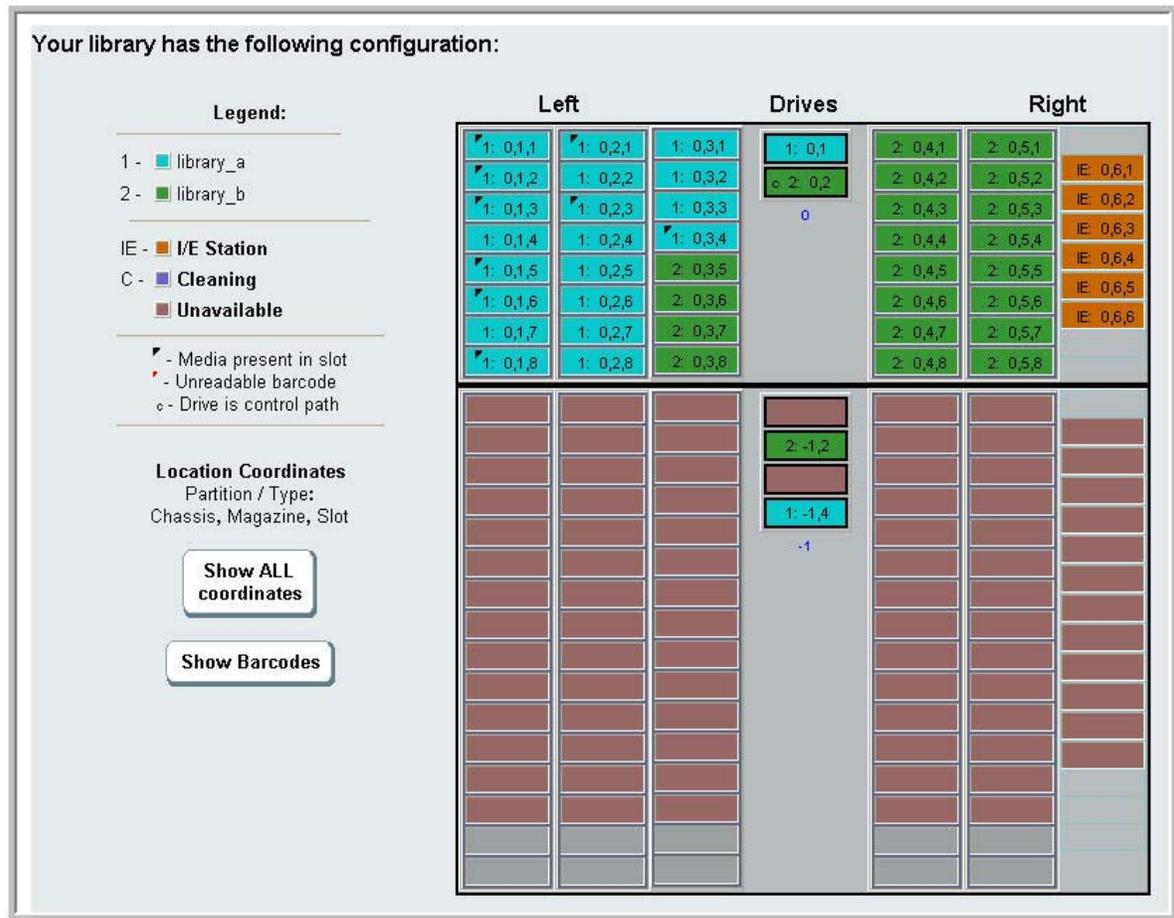
8 If a partition references tape drives within the module you are removing or replacing, modify any affected partition by removing the referenced drive elements from the partition.

For example, in , all partitions reference drives in the 9U Library Expansion Modules. In , Library_c was deleted, as well as its drive references in the 9U Library Expansion Module. Library_a and Library_b still require partition modifications to remove the drive reference and free the 9U Library Expansion Module of all partition resource references.

9 If you are removing or replacing a 9U Library Expansion Module, set the number of I/E station slots to six. You can reconfigure I/E station slots after the module removal or replacement is complete.

10 Power off the library.

11 Disconnect all power cords, network data cables, and module-to-module cables from each module you will be removing.

> **Note** Label all cables before you remove them so you can later reconnect them to their proper locations.
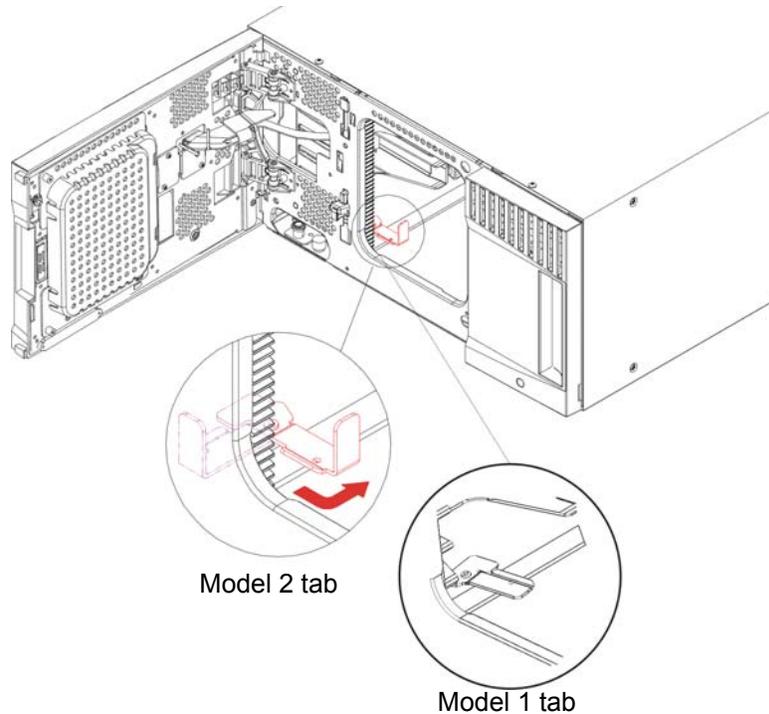
12 Park the robot assembly in the 5U Library Control Module. Before unstacking the library, the robot assembly must be placed in the 5U Library Control Module.

    a. Open the I/E station and access doors of each module.

    b. Using your hands, gently lift the robot assembly into the 5U Library Control Module. The robot assembly should glide slowly and with some resistance.

> ⚠️ **CAUTION**   **Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

    c. After raising the robot assembly to the approximate middle of the 5U Library Control Module, hold it in place with one hand and, using your other hand, move the parking tab to the "parked" position (Model 1 parking tab: swivel toward you; Model 2 parking tab: move in a counter-clockwise direction). The metal parking tab is located at the bottom of column 1.

    d. Gently release the robot assembly to rest on the parking tab.

Model 2 tab

Model 1 tab

13 If you are removing the lowest module of the library, remove the tape blockers (if present) from the bottom row of that module. Set the tape blockers aside to be replaced in the new library configuration.

> ⚠️ **CAUTION**   Libraries that have a Model 2 robot installed no longer use tape blockers. If your library contains a Model 2 robot, do NOT install tape blockers. For more information, see Removing and Replacing the Robot Assembly on page 164 and How to Determine Which Robot Your Library Contains on page 165.

14 Remove all power supplies from each module that you intend to remove. For details, see Adding, Removing, and Replacing Power Supplies on page 106.

15 Remove all tape drives from each module that you intend to remove. If you are going to replace the module, label the drives with their locations so you can re-install them in the same locations later. For details, see Adding, Removing, and Replacing Tape Drives on page 127.

16 If the module you are removing or replacing contains FC I/O blades, remove both the FC I/O blades and the accompanying fan blades from the 9U Library Expansion Module. For details, see Adding, Removing, and Replacing FC I/O Blades on page 130 and Adding, Removing, and Replacing the FC I/O Fan Blade on page 137.

17 Before removing a module, you must first remove all 9U Library Expansion Modules (if any) positioned above it. Disconnect all power cords, network data cables, and module-to-module cables from the module you are removing or replacing, and all modules located above it. Then remove the modules.

Permanently Removing 9U Expansion Modules From an Existing Library

These instructions explain how to permanently remove a 9U Expansion Module from the library.

There are some configuration settings to take into account when removing a 9U Expansion Module from an existing library.

- COD licenses remain the same. After the 9U Expansion Module is removed, there may be more slots licensed than are available. Only the available slots appear on the **License** screen.

- All resources in the removed module(s) are removed. A partition with all resources in the removed module(s) will be present with no slots or drives. This partition can only be deleted.

⚠️ **WARNING** WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, A 5U LIBRARY CONTROL MODULE WEIGHS APPROXIMATELY 60 LBS (27.2 KG). A 9U EXPANSION MODULE, WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, EXCEEDS 65 LBS (29.5 KG).

TO AVOID SERIOUS INJURY, AT LEAST TWO PEOPLE ARE REQUIRED TO SAFELY LIFT THE MODULES INTO POSITION.

Removing the 9U Expansion Module

1 Before permanently removing a module, follow the instructions in Preparing to Remove or Replace a Module on page 70.

2 For each module that you plan to remove, open the I/E station and access doors of each module.

⚠️ **CAUTION** Before unstacking the modules, the robot assembly must be parked as described in Preparing to Remove or Replace a Module on page 70.

3   Disengage the Y-rails so the modules can be unstacked safely.

1	Front Y-rail	**3**	Y-rail (this end up)
2	Rear Y-rail	**4**	Squeeze here to release

a. From the front of the library, find the Y-rail release mechanism, which is located on the left side of the 5U Library Control Module. Squeeze the handle of the Y-rail release mechanism, lift it, and release it so that it locks into place.

b. From the rear of the library, find the rear Y-rail release mechanism located in the interior of the right side of the module. Squeeze the handle of the Y-rail release mechanism, lift it, and release it so that it locks into place.

1	Y-rail in locked, non-functional position

4 Remove the rack ears that fasten the module to the rack. See Using the Rack-mount Kit to Install a Library in a Rack on page 108 for detailed instructions on using the rack ears.

5 Loosen the thumbscrews located at the base of the front of the module.

1 Thumbscrews (behind doors)

6 Loosen the two thumbscrews located at the base of the back of the module.

**7** Open the module's access door and raise the guide pin by pulling it up and turning it slightly, as if it were a screw. Otherwise, the guide pin may scratch the front doors of the module beneath it.

8 From the front of the library, slide the entire module toward you and lift it off of the module below it.

9 Repeat these procedures for each module that you intend to remove.

10 Remove and replace the cover plates, if appropriate.

> ⚠️ **CAUTION**   **Before removing the 5U Library Control Module's bottom cover plate, the robot assembly must be parked as described in <u>Preparing to Remove or Replace a Module</u> on page 70.**

- • If you plan to stack the 5U Library Control Module at the top of the library, and if a 9U Expansion Module will be located below it, remove the 5U Library Control Module's bottom cover plate and the 9U Expansion Module top plate.

- • If you plan to stack the 5U Library Control Module between 9U Expansion Modules, remove both the top and bottom plates of the 5U Library Control Module. Also remove the top plate of the 9U Expansion Module located below the 5U Library Control Module and the bottom plate of the 9U Expansion Module located above the 5U Library Control Module.

- • If you plan to stack the 5U Library Control Module at the bottom of the library, and if a 9U Expansion Module will be located above it, remove the 5U Library Control Module's top plate and the 9U Expansion Module's bottom plate.

Table 6   Cover Plate Location after Removing a 9U Expansion Module

5U	14U	23U	32U
			cover plate
		cover plate	**5U Library Control Module**
	cover plate	**5U Library Control Module**	**9U Expansion Module**
cover plate	**5U Library Control Module**	**9U Expansion Module**	**9U Expansion Module**
5U Library Control Module	**9U Expansion Module**	**9U Expansion Module**	**9U Expansion Module**
cover plate	cover plate	cover plate	cover plate

Preparing to Use the New Library Configuration

1 Ensure that the Y-rails are properly aligned and the thumbscrews are tightened.

1	Front Y-rail	**3**	Y-rail (this end up)
2	Rear Y-rail	**4**	Squeeze here to release

a. From the front of the library, open the I/E station and access doors of the 9U Expansion Module. Squeeze the handle of the Y-rail release mechanism, lift it out of its locked position, and slide it downward as far as it will go.

b. From the back of the library, find the rear Y-rail release mechanism, which is located in the interior of the right side of the module. Squeeze the handle of the Y-rail release mechanism, lift it out of its locked position, and slide it downward as far as it will go.

Doing this aligns the Y-rails with the Y-rails of the module beneath it.

⚠ **CAUTION** **Check to make sure that there is no gap between the top and bottom Y-rails on both the front and back of the library. If a gap exists, the library cannot mechanically initialize.**

| 1 | Y-rail in unlocked, functional position |

2 Install the tape blockers (if required) in the bottom row of the lowest module of the new configuration. The tape blockers block slots in the bottom two rows of the library. You can insert the tape blockers through the open access door.

> ⚠️ **CAUTION** Libraries that have a Model 2 robot installed no longer use tape blockers. If your library contains a Model 2 robot, do NOT install tape blockers. For more information, see Removing and Replacing the Robot Assembly on page 164 and How to Determine Which Robot Your Library Contains on page 165.
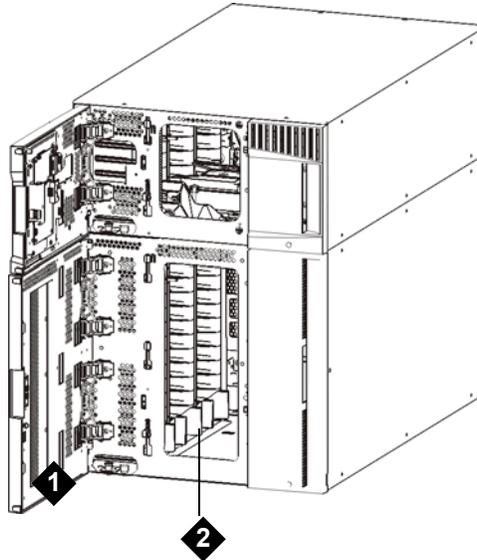
| **1** | access door | **2** | tape blockers (installed) |

3 Add the tape drives to the modules. For details, see Adding, Removing, and Replacing Tape Drives on page 127.

4 Add the power supplies. For details, see Adding, Removing, and Replacing Power Supplies on page 106.

5 If your library contains FC I/O blades, install both the I/O blades and the accompanying fan blades in the expansion module. For details, see Adding, Removing, and Replacing FC I/O Blades on page 130 and Adding, Removing, and Replacing the FC I/O Fan Blade on page 137.

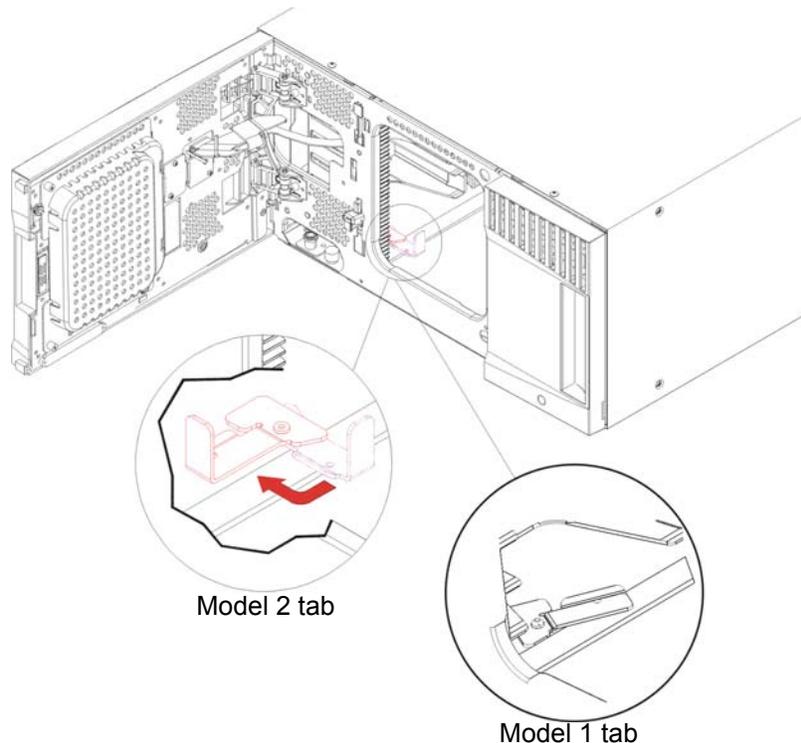**6** Unpark the robot assembly.

   a. Gently raise the robot assembly so that it no longer rests on the parking tab.

> ⚠️ **CAUTION** **Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

b. With your free hand, move the parking tab to the "unparked" position so that it is removed completely from the interior of the module (**Model 1 parking tab:** swivel the parking tab away from you; **Model 2 parking tab**: move in a clockwise direction). When replaced correctly, the parking tab will not accidentally swivel into the path of the robot.

c. Gently release the robot assembly. It will lower to the bottom module of the library.

Model 2 tab

Model 1 tab

7   Close the library's I/E station and access doors.

8   Connect all power cords, network data cables, and module-to-module cables. Make sure the module terminators are installed at the top and bottom of the stack of modules. For cabling instructions, see Cabling the Library on page 22.

9   Power on the library.

10   Re-create and/or modify partitions, cleaning slots, and I/E station slots as desired.

11   Import tape cartridges to the correct library partitions as needed.

12   Save the library configuration (see Saving the Configuration on page 13).

13   If the host application inventories the location of each tape cartridge in the library, open the host application and reinventory to sync its logical inventory with the physical inventory of the library. Due to the way the library logically addresses its tape drives and slots internally (see Understanding Logical Element Addressing on page 543), permanently removing an expansion module from the library will change the element addresses, and this can affect proper communication to a controlling host. Because of this, you must refresh the configuration of any backup application that manages the library to reflect the adjusted positions. In addition, you may need to reboot the host server(s) or rescan the bus to detect the changes.

Replacing a 5U Library Control Module

These instructions explain how to remove a 5U Library Control Module and replace it with a 5U Library Control Module field replaceable unit (FRU). You may need to replace the 5U Library Control Module if its chassis is severely damaged. Typically, however, only certain customer replaceable units (CRUs) or FRUs within the 5U Library Control Module need to be replaced.

5U Library Control Modules are "paired" with robot assemblies (separate control module FRUs are assigned to Model 1 and Model 2 robots). If a 5U Library Control Module with a Model 1 robot needs to be replaced, you must replace it with the CM chassis FRU that belongs with the Model 1 robot. If a 5U Library Control Module with a Model 2 robot needs to be replaced, you must replace it with the CM chassis FRU that belongs with the Model 2 robot. See Physical Indicators on page 165 for how to identify which chassis and robot you have, based on the label part number.

There are some configuration settings to take into account when replacing the 5U Library Control Module.

- If you have applied one or more license keys to the original 5U Library Control Module, you will need to replace each license key and apply it to the new 5U Library Control Module.

- A partition with all resources in the removed module will be present with no slots or drives. This partition can only be deleted.

There are no restrictions on where the 5U Library Control Module can be installed in the library configuration. However, the recommended placement of the 5U Library Control Module for library configurations up to 32U is on top of all installed 9U Expansion Modules. The recommended placement of the Library Control Module for 41U library configurations is on top of three 9U expansion modules and below the top expansion module.

Removing the 5U Library Control Module

1   Before removing a module, follow the instructions in Preparing to Remove or Replace a Module on page 70.

2   Starting with the topmost module of your library, open the I/E station and access doors of the module.

> ⚠ **CAUTION**   **Before unstacking the modules, the robot assembly must be parked as described in Preparing to Remove or Replace a Module on page 70.**

3 Disengage the Y-rails so the modules can be safely unstacked.

    a. From the front of the library, find the Y-rail release mechanism, which is located on the left side of the module. Squeeze the handle of the Y-rail release mechanism, lift it, and release it so that it locks into place.

    b. From the rear of the library, find the rear Y-rail release mechanism located in the interior of the right side of the module. Squeeze the handle of the Y-rail release mechanism, lift it, and release it so that it locks into place.

> ✎ Note   The rear Y-rail is impossible to lift up with the tape drives installed.

1	Front Y-rail	**3**	Y-rail (this end up)
2	Rear Y-rail	**4**	Squeeze here to release

4 Remove the rack ears that fasten the module to the rack.

5 Loosen the thumbscrews located at the base of the front and rear of the module.
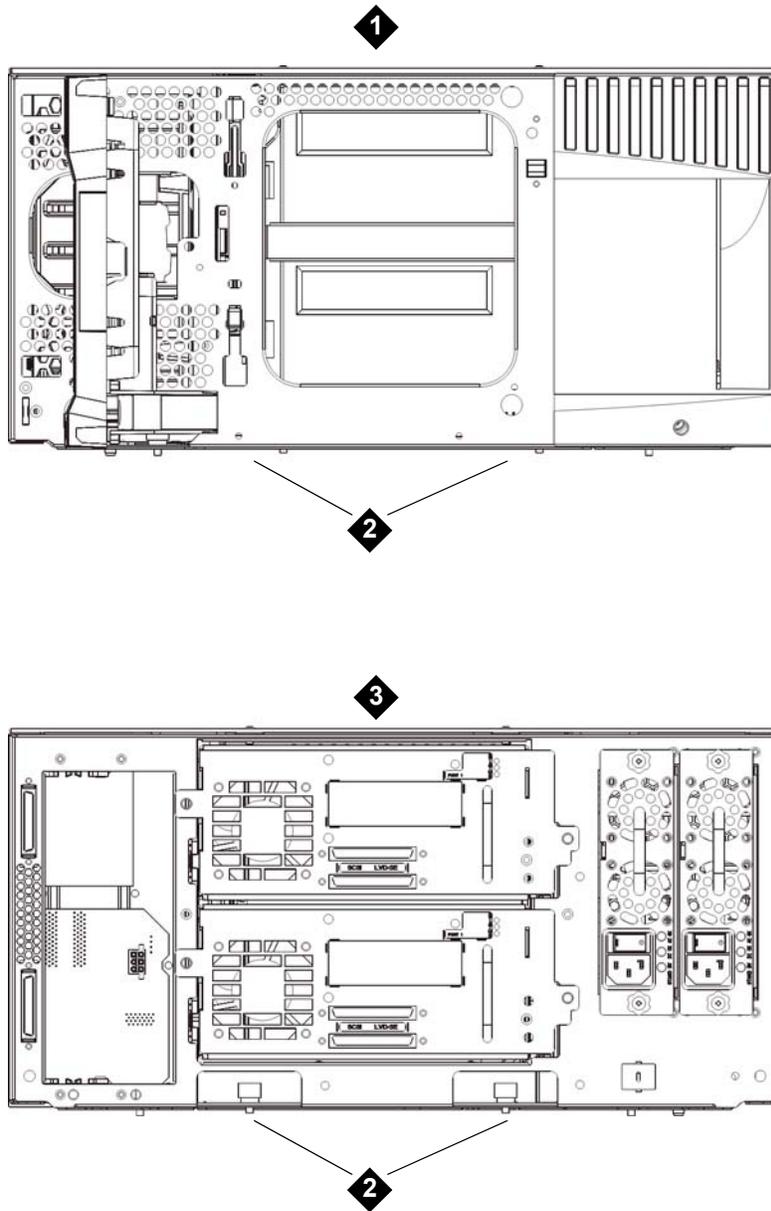
1	5U Library Control Module (front)
2	Thumbscrews
3	5U Library Control Module (rear)

6 Open the module's access door and raise the guide pin by pulling it up and turning it slightly, as if it were a screw. Otherwise, the guide pin may scratch the front doors of the module beneath it.
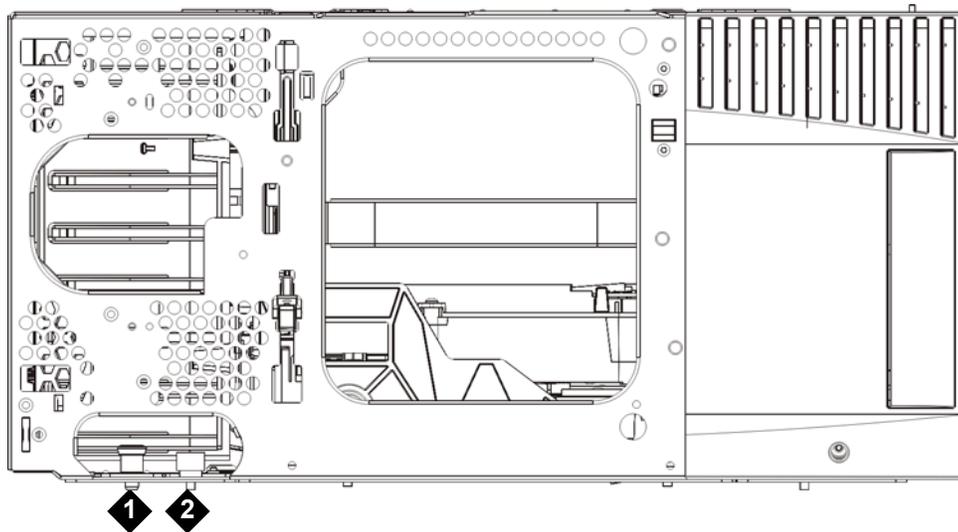
1	Guide pin
2	Thumbscrew

7 Slide the entire module toward you and lift it off of the module below it.

Replacing the 5U Library Control Module

1 If they are not already removed, remove the tape drives and power supplies from the 5U Library Control Module you are replacing.

2 If your library consists of more than just the 5U Library Control Module, using the Phillips #2 screwdriver (for the top cover plate) and the T10 TORX screwdriver (for the bottom cover plate), remove the new 5U Library Control Module plates from the top and bottom of the module, as necessary.

> ⚠️ **CAUTION**   **Before removing the 5U Library Control Module's bottom cover plate, the robot assembly must be parked as described in Preparing to Remove or Replace a Module on page 70.**

- If your library consists of only the 5U Library Control Module, do not remove the plates.

- If you plan to stack the 5U Library Control Module at the top of the library, and if a 9U Library Expansion Module is located below it, remove the 5U Library Control Module's bottom cover plate.

- If you plan to stack the 5U Library Control Module in the middle of the library, remove both the top and bottom cover plates.

- If you plan to stack the 5U Library Control Module at the bottom of the library, and if a 9U Library Expansion Module is located above it, remove the 5U Library Control Module's top cover plate.

3 Remove the LCB from the removed 5U Library Control Module and set it aside.

The LCB stores information about the library's contents and configuration, so you will probably want to install this LCB in the new 5U Library Control Module. For details about removing the LCB, see Removing and Replacing the Library Control Blade and LCB Compact Flash Card on page 102.

4 If the library configuration includes 9U Library Expansion Modules below the 5U Library Control Module, install them in the library now.

5 Install the new 5U Library Control Module in the library. Lift the 5U Library Control Module, and from the front of the library, place it in the desired location.

Place the 5U Library Control Module on top of the 9U Library Expansion Module and slide it to the rear of the unit. A small notch on the bottom of the 5U Library Control Module aligns it with the top of the 9U Expansion Module.

6 Use the rack ears to fasten the 5U Library Control Module on top of a 9U Expansion Module.

7 If you placed the 5U Library Control Module on top of a 9U Library Expansion Module, secure the two modules by tightening the two thumbscrews at the base of the *front* of the module and the two thumbscrews located at the base of the *back* of the module. Then lower the module's guide pin (located at the base of the front of the module) by turning it and pushing it down.

8 Stack all 9U Library Expansion Modules (if any) in their original positions above the 5U Library Control Module. Use rack ears to fasten the modules to the rack.Then tighten all thumbscrews located at the base of the front and back of the modules.

9 Engage the Y-rails. Tighten the thumbscrews and lower the guide pin. Doing this aligns the Y-rail with the Y-rail of the module beneath it.

a. From the front of the library, open the I/E station and access doors of the 5U Library Control Module. Squeeze the handle of the Y-rail release mechanism, lift it out of its locked position, and slide it downward as far as it will go.
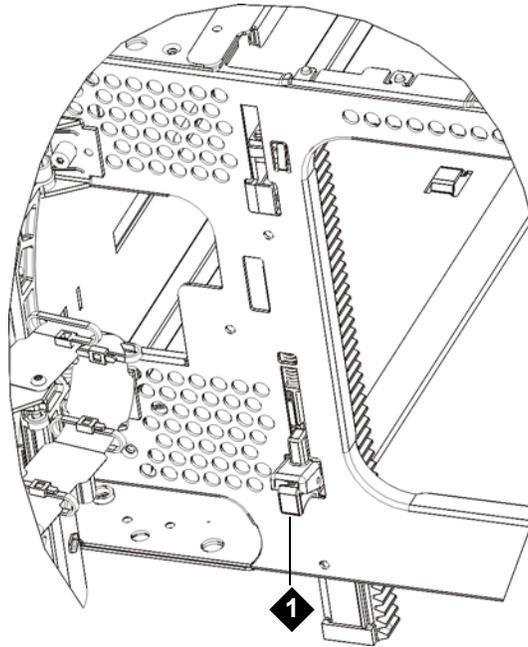
1	Y-rail in unlocked, functional position

b. From the back of the library, find the rear Y-rail release mechanism, which is located in the interior of the right side of the module. Squeeze the handle of the Y-rail release mechanism, lift it out of its locked position, and slide it downward as far as it will go.

10 Unpark the robot assembly.

a. Gently raise the robot assembly so that it no longer rests on the parking tab.

⚠ **CAUTION** **Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

b. With your free hand, move the parking tab to the "unparked" position so that it is removed completely from the interior of the module (**Model 1 parking tab:** swivel the parking tab away from you; **Model 2 parking tab**: move in a clockwise direction). When replaced correctly, the parking tab will not accidentally swivel into the path of the robot.

c. Gently release the robot assembly. It will lower to the bottom module of the library.

Model 2 tab

Model 1 tab

11 If tape blockers are required, make sure they are installed in the bottom two rows of the library. The tape blockers block slots in the bottom two rows of the library. You can insert the tape blockers through the open access door.

> ⚠️ **CAUTION**   Libraries that have a Model 2 robot installed no longer use tape blockers. If your library contains a Model 2 robot, do NOT install tape blockers. For more information, see Removing and Replacing the Robot Assembly on page 164 and How to Determine Which Robot Your Library Contains on page 165.

1	access door	**2**	tape blockers (installed)

Preparing to Use the 5U Library Control Module

1 Close the library's I/E station and access doors.

2 Add the tape drives to the modules. For details, see Adding, Removing, and Replacing Tape Drives on page 127.

3 Add the power supplies. For details, see Adding, Removing, and Replacing Power Supplies on page 106.

4 Install the LCB from the removed 5U Library Control Module in the new 5U Library Control Module. For details, see Removing and Replacing the Library Control Blade and LCB Compact Flash Card on page 102.

5 Connect all power cords, network data cables, and module-to-module cables. Make sure the module terminators are installed in their previous positions at the top and bottom of the stack of modules. For cabling instructions, see Cabling the Library on page 22.

6 Power on the library.

7 Re-create and/or modify partitions, cleaning slots, and I/E station slots as desired.

8 Import tape cartridges into the correct partitions as needed.

9 Save the library configuration (see Saving the Configuration on page 13).

10 If the host application inventories the location of each tape cartridge in the library, open the host application and reinventory to sync its logical inventory with the physical inventory of the library. Due to the way the library logically addresses its tape drives and slots internally (see Understanding Logical Element Addressing on page 543), replacing a control module may change the element addresses, and this can affect proper communication to a controlling host. Because of this, you must refresh the configuration of any backup application that manages the library to reflect the adjusted positions. In addition, you may need to reboot the host server(s) or rescan the bus to detect the changes.

Replacing a 9U Expansion Module

These instructions explain how to remove and replace a 9U Expansion Module. You may need to replace the 9U Expansion Module if its chassis is severely damaged.

A library can use up to four 9U expansion modules, to a maximum height of 41U.

There are some configuration settings to take into account when removing and replacing a 9U Expansion Module.

- COD licenses remain the same. After the 9U Expansion Module is removed, there may be more slots licensed than are available. Only the available slots appear on the **License** screen.

- All resources in the removed module(s) are removed. A partition with all resources in the removed module(s) will be present with no slots or drives. This partition can only be deleted.

> **Note** The maximum number of 9U Expansion Modules supported in a library depends on the level of firmware the library is running. See the library Users Guide for more information.

> **WARNING** **ALL LIBRARIES TALLER THAN 14U MUST BE INSTALLED IN A RACK HAVING A MAIN PROTECTIVE EARTHING (GROUNDING) TERMINAL, AND POWER MUST BE SUPPLIED VIA AN INDUSTRIAL PLUG AND SOCKET-OUTLET AND/OR AN APPLIANCE COUPLER COMPLYING WITH IEC 60309 (OR AN EQUIVALENT NATIONAL STANDARD) AND HAVING A PROTECTIVE EARTH (GROUND) CONDUCTOR WITH A CROSS SECTIONAL AREA OF AT LEAST 1.5 MM^2 (14 AWG).**
>
> **TO ENSURE PROPER AIRFLOW AND ACCESS SPACE, ALLOW 60 CM (24 INCHES) IN THE FRONT AND BACK OF THE LIBRARY.**

> **WARNING** **WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, A 5U LIBRARY CONTROL MODULE WEIGHS APPROXIMATELY 60 LBS (27.2 KG). A 9U EXPANSION MODULE, WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, EXCEEDS 65 LBS (29.5 KG).**
>
> **TO AVOID SERIOUS INJURY, AT LEAST TWO PEOPLE ARE REQUIRED TO SAFELY LIFT THE MODULES INTO POSITION.**

Removing the 9U Expansion Module

1 Before removing the module for replacement, follow the instructions in Preparing to Remove or Replace a Module on page 70.

2 Starting with the topmost module of your library, open the I/E station and access doors of each module.

> ⚠️ **CAUTION**   **Before unstacking the modules, the robot assembly must be parked as described in Preparing to Remove or Replace a Module on page 70.**
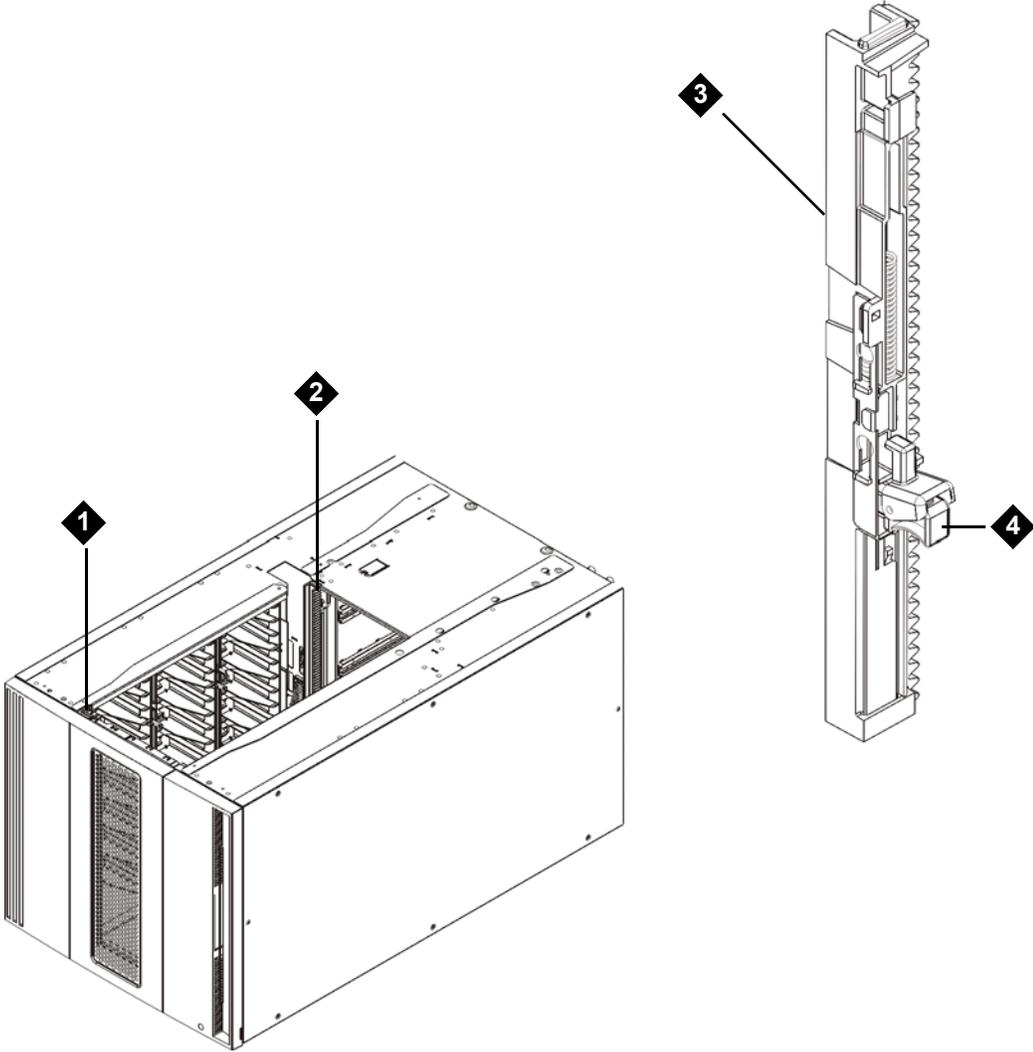
3 Disengage the Y-rails so the modules can be unstacked safely.
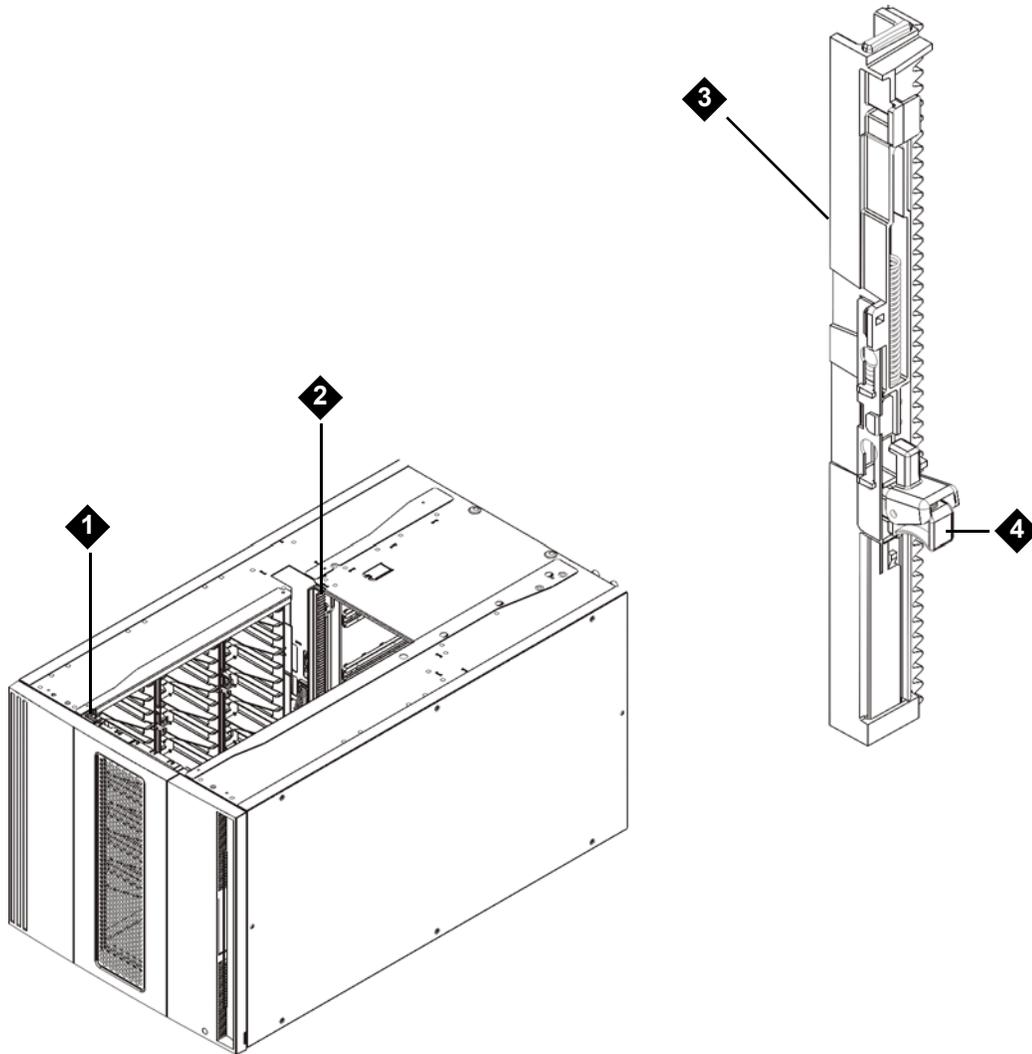
1	Front Y-rail	**3**	Y-rail (this end up)
2	Rear Y-rail	**4**	Squeeze here to release

a. From the front of the library, find the Y-rail release mechanism, which is located on the left side of the 5U Library Control Module. Squeeze the handle of the Y-rail release mechanism, lift it, and release it so that it locks into place.

1	Y-rail in locked, non-functional position

b. From the rear of the library, find the rear Y-rail release mechanism located in the interior of the right side of the module. Squeeze the handle of the Y-rail release mechanism, lift it, and release it so that it locks into place.

4 Remove the rack ears that fasten the module to the rack. See <u>Using the Rack-mount Kit to Install a Library in a Rack</u> on page 108 for detailed instructions on using the rack ears.

5 Loosen the thumbscrews located at the base of the front of the module.

1	Thumbscrews (behind doors)

6 Loosen the two thumbscrews located at the base of the back of the module.

7 Open the module's access door and raise the guide pin by pulling it up and turning it slightly, as if it were a screw. Otherwise, the guide pin may scratch the front doors of the module beneath it.

8 From the front of the library, slide the entire module toward you and lift it off of the module below it.

9 Repeat these procedures for each module that you need to remove.

10 Remove and replace the cover plates, if appropriate.

⚠ **CAUTION** **Before removing the 5U Library Control Module's bottom cover plate, the robot assembly must be parked as described in [Preparing to Remove or Replace a Module](#) on page 70.**

- If you plan to stack the 5U Library Control Module at the top of the library, and if a 9U Library Expansion Module will be located below it, remove the 5U Library Control Module's bottom cover plate and the 9U Library Expansion Module top plate.

- If you plan to stack the 5U Library Control Module between 9U Library Expansion Modules, remove both the top and bottom plates of the 5U Library Control Module. Also remove the top plate of the 9U Library Expansion Module located below the 5U Library Control Module and the bottom plate of the 9U Library Expansion Module located above the 5U Library Control Module.

- If you plan to stack the 5U Library Control Module at the bottom of the library, and if a 9U Library Expansion Module will be located above it, remove the 5U Library Control Module's top plate and the 9U Library Expansion Module's bottom plate.

Replacing the 9U Expansion Module

1 Remove all tape drives from the 9U Library Expansion Module that you are adding. See Adding, Removing, and Replacing Tape Drives on page 127 for instructions on removing tape drives.

2 Remove the power supplies from the 9U Expansion Module that you are adding. See Adding, Removing, and Replacing Power Supplies on page 106 for instructions on removing power supplies.

3 Open the 9U Expansion Module's access door and raise the guide pin by pulling it up and turning it slightly, as if it were a screw. Otherwise, the guide pin may scratch the front doors of the module on which you are stacking it.
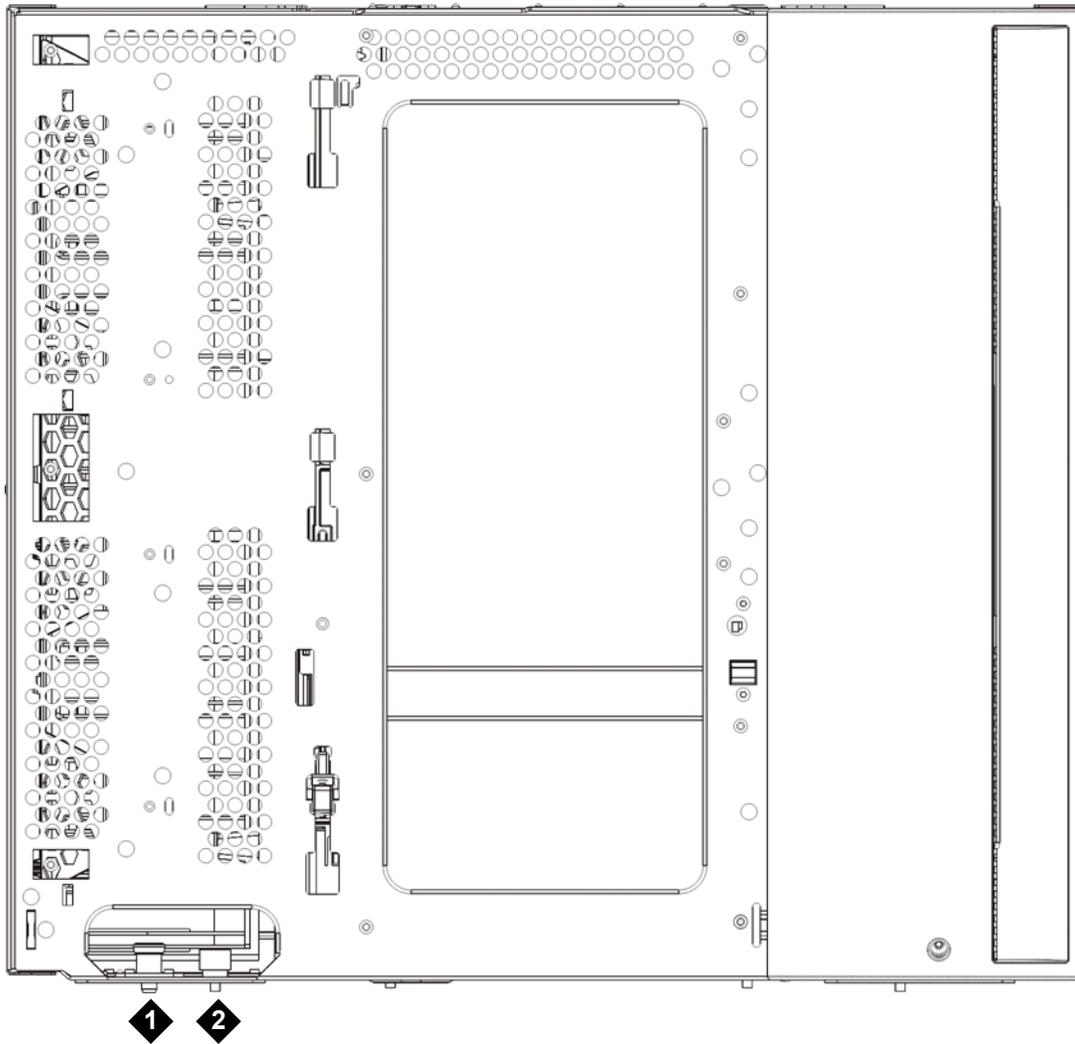
1	Guide pin
2	Thumbscrew

4 Lift the new 9U Expansion Module, and from the front of the library, place it in the desired location.

5 Fasten the module to the rack with the rack ears.

6 Secure the two modules together by tightening the two thumbscrews at the base of the front of the module and the two thumbscrews located at the base of the back of the module. Then lower the module's guide pin (located at the base of the front of the module) by turning it and pushing it down.

7 Tighten all thumbscrews located at the base of the front and back of the modules.

8 Engage the Y-rails of each module in your library configuration. Ensure that the Y-rails are properly aligned and the thumbscrews are tightened.

1	Front Y-rail	**3**	Y-rail (this end up)
2	Rear Y-rail	**4**	Squeeze here to release

a. From the front of the library, open the I/E station and access doors of the 9U Expansion Module. Squeeze the handle of the Y-rail release mechanism, lift it out of its locked position, and slide it downward as far as it will go.

| **1** | Y-rail in unlocked, functional position |

b. From the back of the library, find the rear Y-rail release mechanism, which is located in the interior of the right side of the module. Squeeze the handle of the Y-rail release mechanism, lift it out of its locked position, and slide it downward as far as it will go.

Doing this aligns the Y-rails with the Y-rails of the module beneath it.

> ⚠️ **CAUTION** **Check to make sure that there is no gap between the top and bottom Y-rails on both the front and back of the library. If a gap exists, the library cannot mechanically initialize.**

9 Unpark the robot assembly.

a. Gently raise the robot assembly so that it no longer rests on the parking tab.

> ⚠️ **CAUTION** **Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

b. With your free hand, move the parking tab to the "unparked" position so that it is removed completely from the interior of the module (**Model 1 parking tab:** swivel the parking tab away from you; **Model 2 parking tab**: move in a clockwise direction). When replaced correctly, the parking tab will not accidentally swivel into the path of the robot.

c. Gently release the robot assembly. It will lower to the bottom module of the library.

Model 2 tab

Model 1 tab

10 If required, install the tape blockers in the bottom two rows of the library configuration. The tape blockers block slots in the bottom two rows of the library. You can insert the tape blockers through the open access door.

> ⚠️ **CAUTION** Libraries that have a Model 2 robot installed no longer use tape blockers. If your library contains a Model 2 robot, do NOT install tape blockers. For more information, see Removing and Replacing the Robot Assembly on page 164 and How to Determine Which Robot Your Library Contains on page 165.
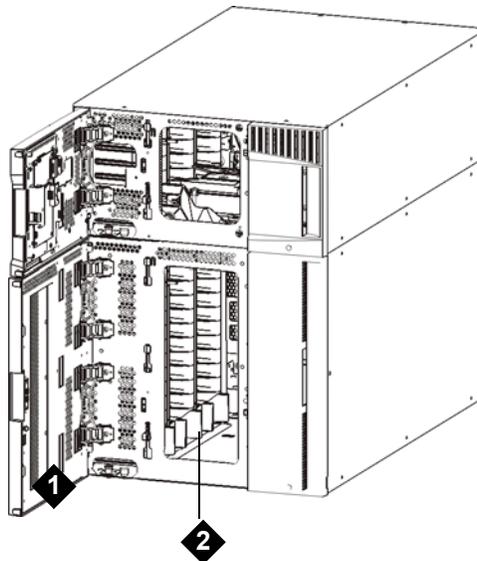
| **1** | access door | **2** | tape blockers (installed) |

Preparing to Use the 9U Expansion Module

1 Close the library's I/E station and access doors.

2 Add the tape drives to the modules. For details, see Adding, Removing, and Replacing Tape Drives on page 127.

3 Add the power supplies. For details, see Adding, Removing, and Replacing Power Supplies on page 106.

4 If your library contains FC I/O blades, install both the I/O blades and the accompanying fan blades in the expansion module. For details, see Adding, Removing, and Replacing FC I/O Blades on page 130 and Adding, Removing, and Replacing the FC I/O Fan Blade on page 137.

5 Connect all power cords, network data cables, and module-to-module cables. Make sure the module terminators are installed at the top and bottom of the stack of modules. For cabling instructions, see Cabling the Library on page 22.

6 Power on the library.

7 Re-create partitions, cleaning slots, and I/E station slots as desired.

8 Import tape cartridges to the correct partitions as needed.

9 Save the library configuration (see Saving the Configuration on page 13.

10 If the host application inventories the location of each tape cartridge in the library, open the host application and reinventory to sync its logical inventory with the physical inventory of the library.

Removing and Replacing the Library Control Blade and LCB Compact Flash Card

The library control blade (LCB) manages the entire library, including the operator panel and picker assembly, and is responsible for running system tests to ensure that the library is functioning properly.

The LCB compact flash card contains important information about your library configuration. If the compact flash card is replaced, you will need to reconfigure your library. You should always replace the LCB and LCB compact flash card together.

Replacing the LCB and LCB Compact Flash Card

These instructions explain how to remove the existing LCB and existing LCB compact flash card and replace them with a new LCB and a new LCB compact flash card.

Required tools: None

> 📝 Note   Do not separate the old compact flash card from the library control blade (unless you are replacing the compact flash card only). Return the old LCB/ compact flash card as a pair to Dell.

1 If possible, save the library configuration.

2 Power off the library by pressing the power button on the front panel.

3 Disconnect all cables from the existing LCB. You may want to label each cable that is connected to the existing LCB to ensure that you can correctly reconnect them to the new LCB.

4 Remove the old LCB/compact flash card assembly from the library.

To remove the existing LCB, release both of the LCB latch hooks, and using the latch hooks as handles, pull the entire LCB toward you (see Figure 18 on page 103).

5 If the new LCB and compact flash card came in separate packages, insert the new compact flash card into the new LCB (or, if replacing the compact flash card only, remove the existing compact flash card and install the new one in the existing LCB). See Figure 18 on page 103.

Figure 18 LCB and Compact Flash Card
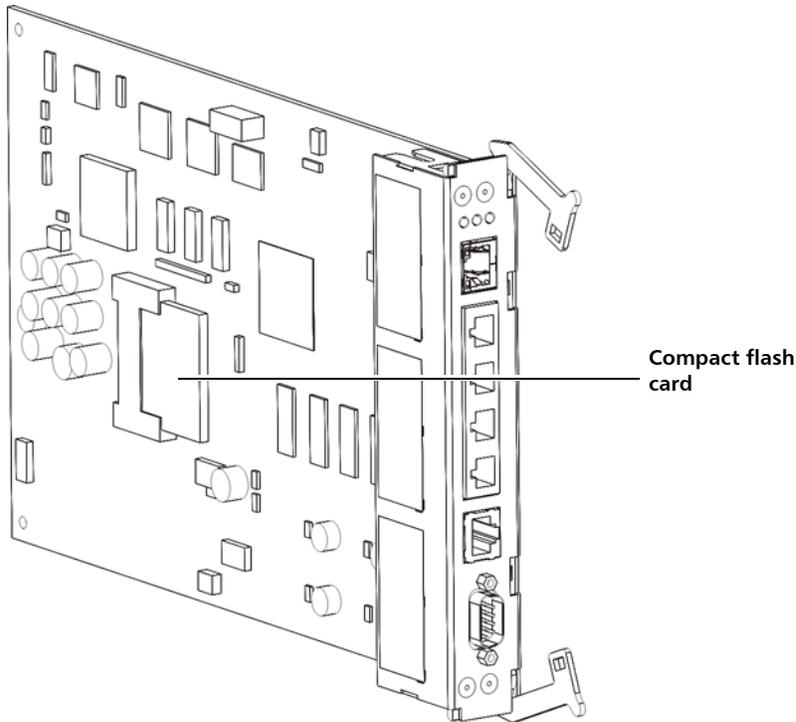
Compact flash card

6 Insert the new LCB/compact flash card assembly into library using the internal card guides to properly align the assembly with the backplane connector. Be sure that the LCB LEDs are located at the top of the LCB, and that the latch hooks are on the right side of the LCB. When sliding the new LCB into the slot, there should be no resistance.

⚠ **CAUTION**   Do not force the LCB into the slot or damage may occur.

7 After inserting the new LCB into the slot, secure it by depressing both of the LCB latch hooks into the blade. The LCB will fit snugly into its slot.

8 Reconnect all cables to the new LCB.

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

The green power light on the front panel turns on. The screen may remain dark for up to 5 minutes. Then an "Initialization in progress" screen appears. The initialization process can take up to 30 minutes depending on library configuration.
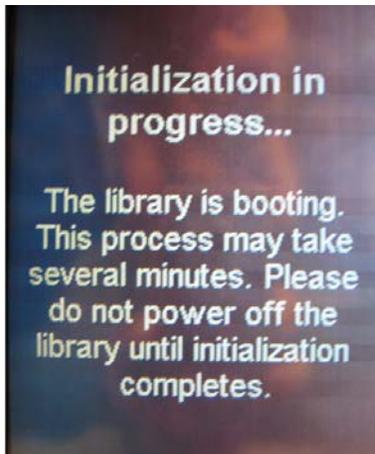
| ⚠ CAUTION | From this point forward until the process is complete, do NOT remove power from the library! Doing so may cause failure and cause LCB to become unusable. |

When initialization is complete, the screen will display the "Upgrade Notification: Compact Flash Replacement" screen shown below.
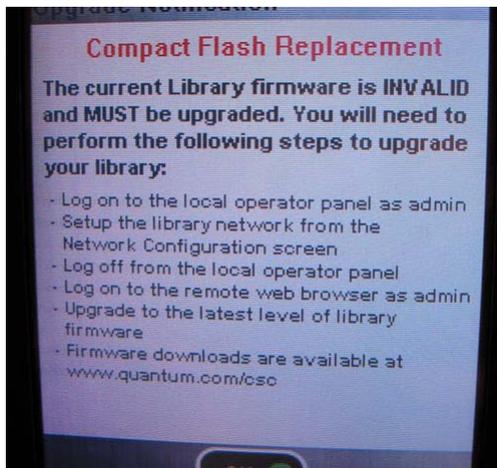
10 Click **OK**.

The login screen appears.

11 Enter the following default user name and password:

- User name: **admin**
- Password: **password**

12 Press **OK**.

The **Enable IPv6** screen appears.

13 Select the **Enable IPv6** check box if you are required to use IPv6, or leave the check box blank to not enable it.

14 Press **Next.**

The **Network Configuration** screen appears. The system defaults to DHCP. For IPv4 only, you can deselect the DHCP option and assign a static IP address. You cannot assign a static IP address for IPv6.

15 Accept the default settings by pressing **Apply**, or make any changes to the network settings, and then press **Apply**.

The progress window displays a "Success" message when complete.

16 Press **Close**.

The next screen lists one or more IP addresses assigned to the library.

17 Write down the IP addresses. You will need them to log in from your Web browser.

18 Click **Close**.

The system logs you out and you return to the login screen.

> 📝 Note   If you are a field engineer and are logging in using the Service Port, enable DHCP on your laptop, and the library will automatically assign you an IP. Then open a Web browser and enter **http://10.10.10.1** in the address bar.

> ⚠️ CAUTION   The installation is NOT complete at this point. Install current library firmware, following the steps below.

> ⚠️ CAUTION   Firmware Installation can take up to 1 hour to complete. DO NOT remove power from the library during this process.

19 Open a Web browser on the host PC and enter the following in the address bar:

http://<ipaddress>/

where **<ipaddress>** is one of the IP addresses assigned to the library that you wrote down earlier.

A screen appears, displaying the current version of library firmware.

20 Click the **Click here to upgrade your library's firmware** link.

The **Tools - Update Library Firmware** screen appears.

21 Click **Browse** to retrieve the .tgz firmware file from the location on your computer, then click **Apply**.

A dialog box appears, asking you to confirm if it is OK to reboot the library.

22 Click **OK**.

The screen displays "WORKING" in the Progress Window.

After the firmware has been transferred from the computer to the library, the login screen appears.

> ⚠️ CAUTION   The appearance of the login screen on the Web browser does NOT mean the firmware upgrade has been complete on the library; it is just an indication that the firmware image has been moved to the LCB/compact flash card. A 14U library with six tape drives installed can take up to 50 minutes to complete this process. Actual time may vary. You will not be able to log in until the firmware upgrade is complete.

> ⚠️ CAUTION   Firmware Installation can take up to 1 hour to complete. DO NOT remove power from the library during this process.

The library operator panel may display the following message; or it may blank out or change multiple times during the firmware upgrade process.

23 When the firmware upgrade is complete, the login screen appears on the operator panel.

24 Enter the following default user name and password:

- User name: **admin**
- Password: **password**

25 Press **OK**.

The **Setup Wizard** screen appears.

> 📝 **Note**   At this point the Scalar i500 Library is set up with factory default settings.

26 Reconfigure your library settings as they were before.

> ⚠️ **CAUTION**   Contact Dell Support before restoring the configuration. In general, it is recommended that you use the setup wizard to manually reconfigure the library. It is not recommended to use the "restore configuration" tool to restore the previous settings. Doing so will completely reinstall the former library firmware level and potentially any defective configuration settings encountered prior to installing the new LCB/compact flash card combo. If you do restore a previous configuration and downrev firmware, you will need to install the latest version of firmware again..

Adding, Removing, and Replacing Power Supplies

The switch on the rear of each power supply shuts down power at the input of the individual power supplies. The switch on the front of the 5U Library Control Module provides power to all 5U Library Control Module and 9U Expansion Module power supplies.

> ⚠️ **WARNING**   **USING THE WEB CLIENT TO SHUT DOWN THE LIBRARY DOES NOT TURN OFF LIBRARY POWER. LIBRARY POWER IS CONTROLLED AT THE INDIVIDUAL POWER SUPPLIES AND AT THE FRONT PANEL OF THE LIBRARY.**

Adding a Redundant Power Supply

These instructions explain how to add a second (redundant) power supply to a module. You may need to add a redundant power supply to the library to make sure that the library does not go down (and become inaccessible) if its original power supply happens to fail. The library automatically uses the redundant power supply if the first power supply fails.

> 📝 **Note**   The 5U Library Control Module and each 9U Expansion Module with drives must use at least one power supply. You can add a redundant power supply to each module.
>
> Installing one power supply in one module and another power supply in another module does not provide redundant power; the two power supplies must reside within the same module.

Required tools: None

1   Save the library configuration.

2   Locate the vacant power supply slot and remove the cover plate. Save the cover plate in case the redundant power supply needs to be removed at a later date.

3   Insert the new power supply into the vacant slot.

When inserting the power supply, make sure that you insert it correctly, with its on/off switch located at the bottom of the supply, below the handle. The power supply must be level to slide in smoothly.

4   Tighten the power supply's thumbscrews to secure the power supply to the library module.

5   Plug in the power supply cord.

6   Turn on the power supply's power, using the switch on the rear of the power supply.

7   Check the status of the power supply's LEDs. The top green LED and the blue LED should be solidly lit.

8   Power on the library.

9   Check the status of the power supply's LEDs. The two green LEDs should be solidly lit, and the blue LED should be off.

Permanently Removing a Redundant Power Supply

These instructions explain how to remove a redundant power supply from the 5U Library Control Module. You may need to remove the second power supply if it is no longer necessary for the library.

Required tools: None

1   Save the library configuration.

2   Access the back of the library, and locate the power supply that you want to replace.

3   Turn off the power supply's power, using the switch on the rear of the power supply.

4   Disconnect the power supply cord from the power supply and from its source.

5   Loosen the power supply's thumbscrews.

6   Remove the power supply by gripping the power supply handle and pulling it toward you.

7   Install a cover plate over the vacant power supply slot.

Removing and Replacing a Power Supply

These instructions explain how to remove a power supply and replace it with a new one. You may need to replace a power supply if there are problems with one that is currently in use.

If the library has a redundant power supply, you can replace the power supply without powering off the library. If the library has only one power supply, you must power off the library before performing this procedure.

Required tools: None

1   Save the library configuration.

2   If the library does not use a second (redundant) power supply, power off the library.

3   Access the back of the library, and locate the power supply that you want to replace.

4   Turn off the power supply's power, using the switch on the rear of the power supply.

5   Disconnect the power supply's power cord.

6   Loosen the power supply's thumbscrews.

7 Remove the power supply by gripping the power supply handle and pulling it toward you.

8 Insert the new power supply into the vacant power supply slot.

When inserting the power supply, make sure that you insert it correctly, with its on/off switch located at the bottom of the supply, below the handle. The power supply must be level to slide in smoothly.

9 Tighten the power supply's thumbscrews to secure the power supply to the library module.

10 Reconnect the power supply's power cord.

11 Turn on the power supply's power.

12 Check the status of the power supply's LEDs. The top green LED and the blue LED should be solidly lit.

13 Power on the library.

14 Check the status of the power supply's LEDs. The two green LEDs should be solidly lit, and the blue LED should be off.

Using the Rack-mount Kit to Install a Library in a Rack

The rack-mount kit secures your library within a rack. These instructions explain how to install your stand-alone library into a rack and how to install additional modules into an existing rack.

All libraries taller than 14U must be installed in a rack.The rack secures the bottom module, and all other modules are then secured to the bottom module.

Installing the modules into the rack requires at least two people.

⚠️ **WARNING**	**ALL LIBRARIES TALLER THAN 14U MUST BE INSTALLED IN A RACK HAVING A MAIN PROTECTIVE EARTHING (GROUNDING) TERMINAL, AND POWER MUST BE SUPPLIED VIA AN INDUSTRIAL PLUG AND SOCKET-OUTLET AND/OR AN APPLIANCE COUPLER COMPLYING WITH IEC 60309 (OR AN EQUIVALENT NATIONAL STANDARD) AND HAVING A PROTECTIVE EARTH (GROUND) CONDUCTOR WITH A CROSS SECTIONAL AREA OF AT LEAST 1.5 MM^2 (14 AWG).** **TO ENSURE PROPER AIRFLOW AND ACCESS SPACE, ALLOW 60 CM (24 INCHES) IN THE FRONT AND BACK OF THE LIBRARY.**
⚠️ **WARNING**	**UNDER NO CIRCUMSTANCES SHOULD A RACK BE MOVED WHILE LOADED WITH ONE OR MORE MODULES.**
⚠️ **WARNING**	**WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, A 5U LIBRARY CONTROL MODULE WEIGHS APPROXIMATELY 60 LBS (27.2 KG). A 9U EXPANSION MODULE, WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, EXCEEDS 65 LBS (29.5 KG).** **TO AVOID SERIOUS INJURY, AT LEAST TWO PEOPLE ARE REQUIRED TO SAFELY LIFT THE MODULES INTO POSITION.**

| Note | The rack-mount kit cannot be used with every type of rack. Racks with threaded rails or unique hole spacing, for example, may not support the rack-mount kit. In addition, the rack must have rail spacing (front to rear) of between 605 mm (23.8 in.) and 770 mm (30.3 in.). |

Rack-mount Kit Contents

You only need one rack-mount kit per library. The rack-mount kit allows you to secure the bottom module in the rack. It includes rack ears for additional security.

Table 7   Rack-mount Kit Contents
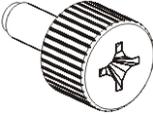
Component	Description	Quantity
	Small ferrule — Used in racks with round holes	10 (8 required; 2 spares)
	Large ferrule — Used in racks with square holes	10 (8 required; 2 spares)
	Thumbnut — Secures the rack shelves to the rack	8
	M5 thumbscrew — Secures the rack ears	4
	Rack ear, left — Holds the modules in the rack	1

Table 7   Rack-mount Kit Contents
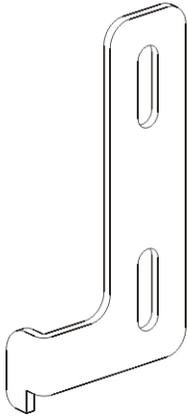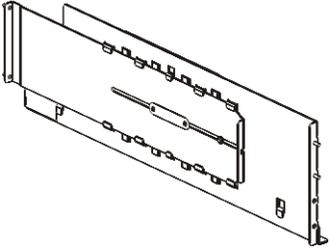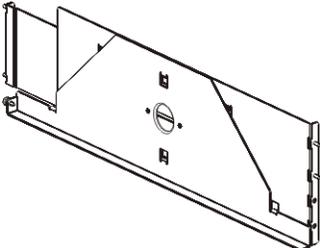
Component	Description	Quantity
	Rack ear, right — Holds the modules in the rack	1
	Rack shelf, left — Secures the modules in the rack	1
	Rack shelf, right— Secures the modules in the rack	1

Rack Ear Kit Contents

You need one rack ear kit for each module except the bottom module. Each rack ear kit contains the supplies to install right and left rack ears on one module.

Table 8   Rack Ear Kit Contents

Component	Description	Quantity Required
	Nut clip — Used in racks with square holes	4
	Cage nut — Used in racks with round holes	4
	M5 thumbscrew — Secures the rack ears	4
	Rack ear, left — Holds the modules in the rack	1
	Rack ear, right — Holds the modules in the rack	1
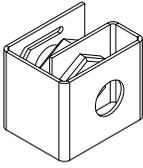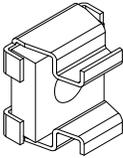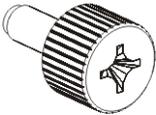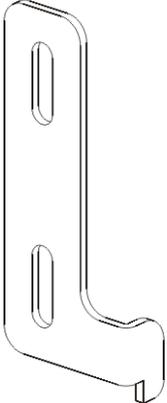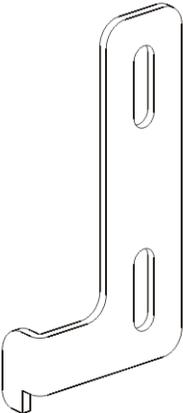
Preparing Rack-mount Kit for Installation

Required tools: None

1 Before beginning installation, verify the contents of the rack-mount kit (see [Table 7] on page 109) and the rack ear kit (see [Table 8] on page 111).

   • You only need one rack-mount kit per library. The rack-mount kit allows you to secure the bottom module in the rack. It includes rack ears for additional security.

   • You need one rack ear kit for each additional module. Each rack ear kit contains the supplies to install right and left rack ears on one module.

   • You must install one set of rack ears for each module in the rack.

2 Remove all rack hardware that may interfere with the installation of the rack-mount kit and the modules that you plan to add to the rack.

3 Consider removing the front and back doors of the rack to obtain full access to the mounting holes and other areas of the rack.

4 Determine the type of rack in which you plan to install the rack-mount kit. Different racks require different rack-mount parts. Although the rack-mount kit contains many parts, the parts you use depend on your rack's mounting holes.

   • If the rack has round mounting holes, use the small ferrules and the nut clips. (Nut clips come in the rack ear kit which you receive if your library consists of more than one control module.

   • If the rack has square mounting holes, use the large ferrules and the cage nuts. (Cage nuts come in the rack ear kit which you receive if your library consists of more than one control module.

   • If the rack has threaded (tapped M6) holes, do not use the ferrules, nut clips, or cage nuts. You will be able to screw the thumbscrews directly into the rack holes.

5 Determine where in your rack you want to install the rack-mount shelves.

Consider installing the shelves at a height that puts the base of the 5U Library Control Module anywhere between the 28U-32U alignment markers, which is usually a comfortable height for reading the operator panel. Remember, the 5U Library Control Module can be placed anywhere within the library configuration above, below, or between any 9U Expansion Modules.

Installing the Rack-mount Shelves

Required parts: Rack-mount shelves, (8) ferrules, (8) thumbnuts

1 If the rack-mount shelves are extended, collapse them to their smallest size. It is easier to fit and position the shelves within the rack when the shelves are collapsed.

   Note Extending the shelves can be difficult, but they are designed to be resized by hand. Do not use tools to resize the shelves, and never take them apart.

2 Place a ferrule on the end of each stud, and screw it on completely. The larger side of the ferrule should face the rack shelf, and the tapered end should face out. Be sure to use the proper size ferrule, as described in Preparing Rack-mount Kit for Installation on page 112.
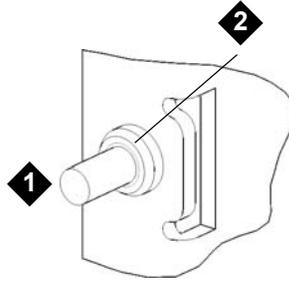
1	Ferrule
2	Stud

3 Install the rack-mount shelves into the rack so that they are level with one another.

    a. Position the shelf to the appropriate side of the rack (right or left) and align the shelf at the desired height.

    b. Install the shelf's rear studs in the rack's rear mounting holes.
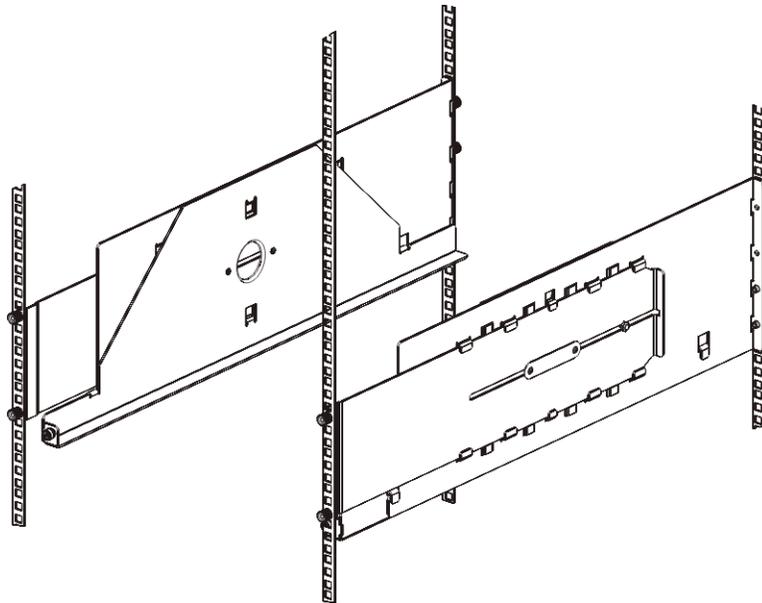
    c. Fasten a thumbnut to the end of each stud. Secure the rack tightly, so that the ferrule fits snugly within the hole in the rack.

d. Next, install the shelf's front studs in the rack's front mounting holes.
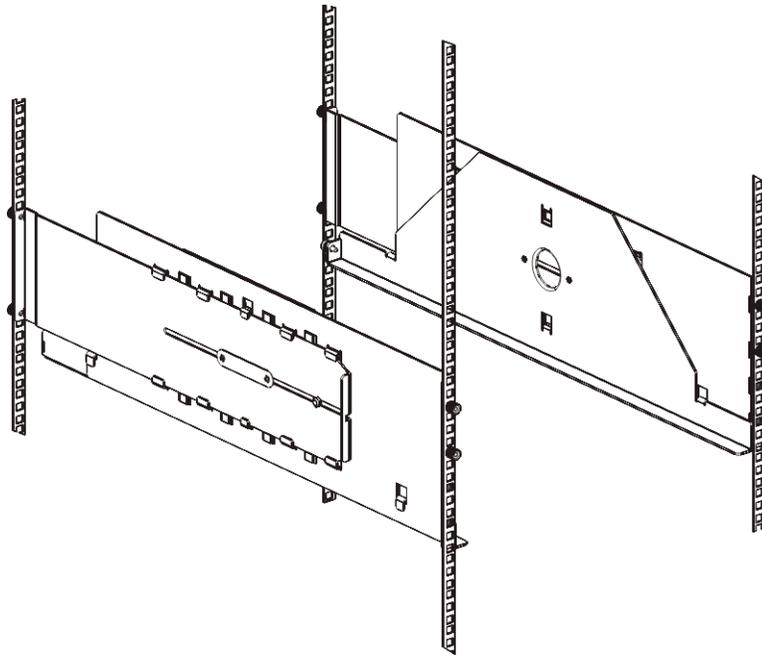
e. If the studs do not reach the mounting holes, pull the front of the shelf toward you to extend it to the necessary length. Hold the base of the shelf with one hand, and pull the extensible part of the shelf with your other hand.

📝 Note   Extending the shelves can be difficult, but they are designed to be resized by hand. Do not use tools to resize the shelves, and never take them apart.

f. Fasten a thumbnut to the end of each stud. Secure the rack tightly, so that the ferrule fits snugly within the hole in the rack.

4   Visually make sure that both shelves are level, and that they are aligned properly within the rack.

5   Make sure that all thumbnuts are fastened tightly. Some thumbnuts may have loosened during installation.

Preparing Modules for Rack Installation

1   Power off your library and disconnect all power cords, network data cables, and module-to-module cables.

2   Remove all tape cartridges, tape drives, and power supplies from the library modules. The modules are much easier to lift into the rack without the additional weight of these components.

WARNING	**WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, A 5U LIBRARY CONTROL MODULE WEIGHS APPROXIMATELY 60 LBS (27.2 KG). A 9U EXPANSION MODULE, WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, EXCEEDS 65 LBS (29.5 KG).**
	TO AVOID SERIOUS INJURY, AT LEAST TWO PEOPLE ARE REQUIRED TO SAFELY LIFT THE MODULES INTO POSITION.

3 Park the robot assembly in the 5U Library Control Module (Regardless of which module you are installing, the robot must be parked in the 5U Library Control Module before you begin moving the modules into the rack.):

   a. Open the I/E station and access doors of each module.

   b. Using your hands, gently lift the robot assembly into the 5U Library Control Module. The robot assembly should glide slowly and with some resistance.

CAUTION	**Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

   c. After raising the robot assembly to the approximate middle of the 5U Library Control Module, hold it in place with one hand and, using your other hand, move the parking tab to the "parked" position (**Model 1 parking tab**: swivel toward you; **Model 2 parking tab**: move in a counter-clockwise direction). The metal parking tab is located at the bottom of column 1.

   d. Gently release the robot assembly to rest on the parking tab.

Model 2 tab

Model 1 tab

Installing the Bottom Module in the Rack

Required parts: Rack ears, M5 thumbscrews

Explanation of parts: Each rack ear contains two elongated holes, enabling you to fasten it to the rack (using the M5 thumbscrews) in the most accessible mounting holes.

1 Place the desired module (whichever module you want to be the bottom module of the library) onto the rack-mount shelves. From the front of the rack, lift the module onto the shelf and gently slide it into the rack. Slide the module to the back of the rack, so that the front of the module is flush with the mounting holes.

2 From the back of the rack, secure the module to the rack-mount shelves by tightening the two silver thumbscrews that are attached to the rear of the rack-mount shelves.

3 Install the right rack ear. At the front of the library:

   a. Open the I/E station door. At the lower right corner of the module is a vertical slot. Insert the hinge of the right rack ear into the slot, and then position the holes of the rack ear flush with the rack rail.
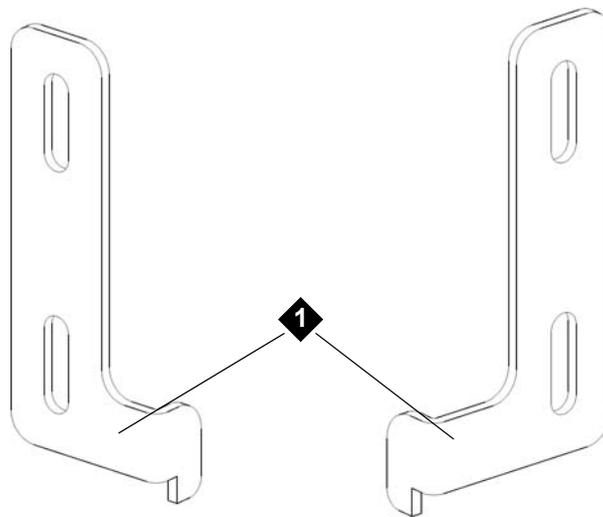
1	Hinge of rack ears

b. Using two M5 thumbscrews, fasten the rack ear to the rack. The thumbscrews should fasten completely and evenly.
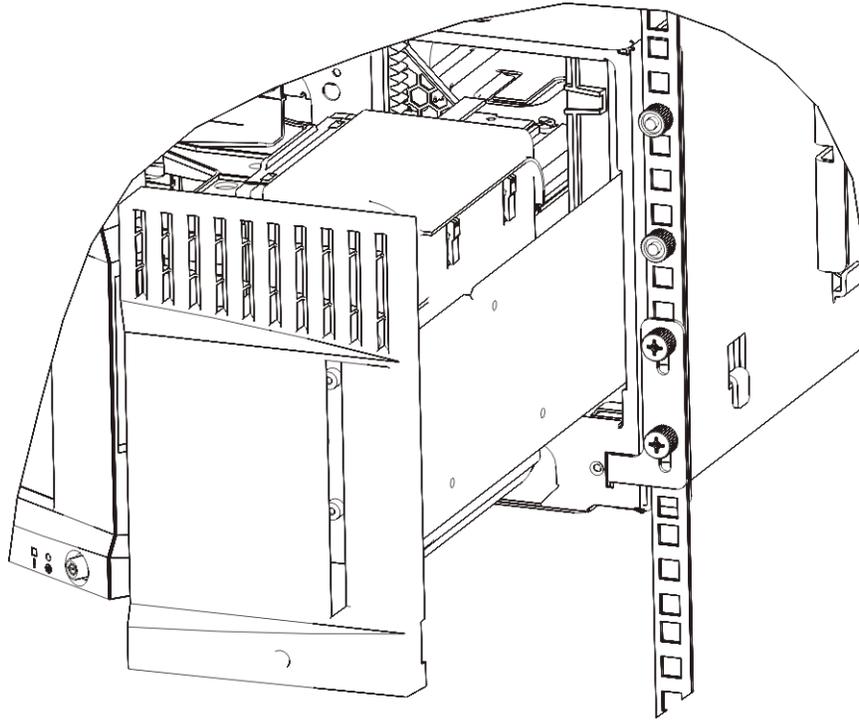
4 Install the left rack ear.

a. With the I/E station door open, open the left door (the access door) of the module and locate the slot in the lower left corner of the module. (The flexible door hinge allows the door to be pulled away from the module, providing access to the slot.)

✎ Note   You may need to pull the door toward you to access the slot.

b. Install the left rack ear in the same manner as the right rack ear.

c. Using two M5 thumbscrews, fasten the rack ear to the rack. The thumbscrews should fasten completely and evenly.
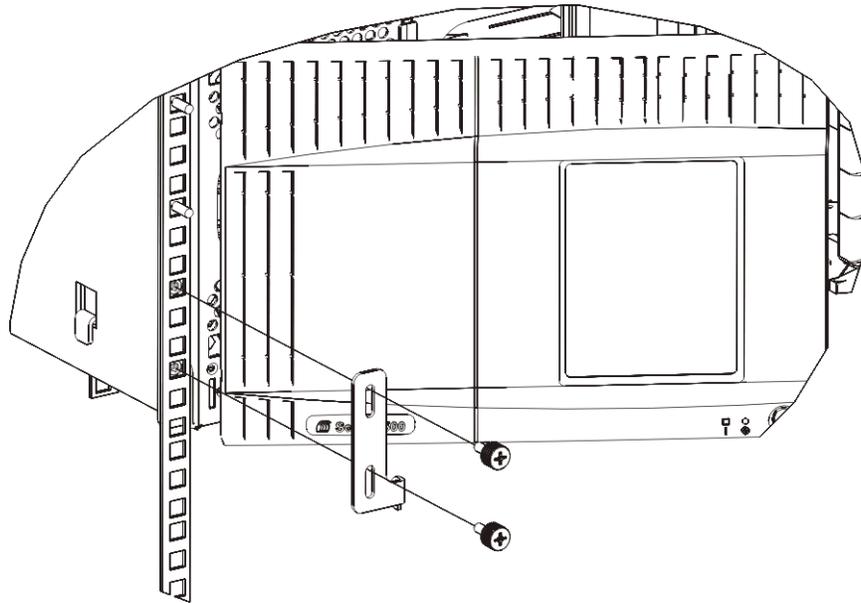
5 If you are only installing one module (a control module), unpark the robot assembly now. **If you are installing more modules, proceed to the next step and do not unpark the robot assembly yet.**

To unpark the robot assembly:

a. Gently raise the robot assembly so that it no longer rests on the parking tab.

⚠ CAUTION	**Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

b. With your free hand, move the parking tab to the "unparked" position so that it is removed completely from the interior of the module (**Model 1 parking tab:** swivel the parking tab away from you; **Model 2 parking tab**: move in a clockwise direction). When replaced correctly, the parking tab will not accidentally swivel into the path of the robot.

c. Gently release the robot assembly. It will lower to the bottom module of the library.

Model 2 tab

Model 1 tab

6 Close the module's doors.

7 Install the remaining modules of your library (if any), following the instructions in Installing Additional Modules Into the Rack on page 119.

8 Reinstall the tape drives, power supplies, and tape cartridges in the library.

9 Cable your library as necessary, following the instructions provided in Cabling the Library on page 22.

10 Power on the library.

Installing Additional Modules Into the Rack

All modules that you add to the rack must be positioned above the module that you previously installed, since the bottom module must be secured to the rack-mount shelves (unless you decide to uninstall the entire library from the rack and reconfigure it).

Required parts: Rack ears, (4) M5 thumbscrews, (4) nut clips (if needed) or (4) cage nuts (if needed)

Explanation of parts: Each rack ear contains two elongated holes, enabling you to fasten it to the rack using the M5 thumbscrews and either the nut clips or cage nuts (or neither if your rack has threaded holes), using the most accessible mounting holes.

1 If you are installing a module above a module that currently has a top cover, remove the top cover. Similarly, if the module you are installing has a bottom cover, remove the bottom cover before installing the module above another module in the rack. You need to make sure the library is "hollow" all the way through with just one bottom cover on the lowest module and one top cover on the top module. See Installing the New 9U Expansion Module on page 64.

2 Determine where in the rack to install the nut clips (or cage nuts).

Note   Consider using the following method to determine where to install the nut clips (or cage nuts), rather than adding the module to the rack first. If you add the module to the rack first, installing the nut clips (or cage nuts) can be difficult because rack space has become restricted.

- If you are adding a module above a previously racked 9U Library Expansion Module, count nine full units from the location of the 9U Library Expansion Module's rack ears, and prepare to install the nut clip (or cage nut) to that location on the rack.

  For example, if the 9U Library Expansion Module's rack ears are located at 1U and 2U, the nut clips (or cage nuts) should be installed at 10U and 11U.

  Next, determine which holes you must use within the 10U and 11U markers. Notice that each rack unit (U), as delineated by the alignment markers in the rack, contains three mounting holes.

  - If you are adding a module anywhere above the 5U Library Control Module, position the nut clip (or cage nut) at the middle hole in that unit.

  - If you are adding a module anywhere below the 5U Library Control Module, position the nut clip (or cage nut) at the upper hole in that unit.

- If you are adding a module directly above a previously racked 5U Library Control Module, count five full units from the location of the 5U Library Control Module's rack ears, and prepare to install the nut clip (or cage nut) to that location on the rack.

  For example, if the 5U Library Control Module's rack ears are located at 1U and 2U, the nut clips (or cage nuts) should be installed at 6U and 7U.

  Next, determine which holes you must use within the 6U and 7U markers. Notice that each rack unit, as delineated by the alignment markers in the rack, contains three mounting holes.

  - If you are adding a module anywhere above the 5U Library Control Module, position the nut clip (or cage nut) at the middle hole in that unit.

  - If you are adding a module anywhere below the 5U Library Control Module, position the nut clip (or cage nut) at the upper hole in that unit.

3   Install the nut clips (or cage nuts) to the desired location in the rack.

Installing nut clips:

     a. Hold the nut clip so that its semi-circle design faces outside the rack.

     b. Push the nut clip onto the rack's mounting holes so that the nut is behind the rack's holes. (After the nut clip is installed, you can slide it up and down the mounting holes, if necessary.)

Installing cage nuts:

     a. Hold the cage nut so that its hinges face outside the rack, and so that its hinges clasp the upper and lower portions of the square hole.

     b. Place the cage nut in the desired hole. Insert one hinge in the hole first, then pinch the cage nut and push it into the hole until it snaps into place. (You may want to use a screwdriver to help push the hinge into the hole.)

4   Prepare the module to be stacked in the rack.

     a. Power off the module and disconnect all power cords, network data cables, and module-to-module cables.

     b. Consider removing all tape drives, tape cartridges, and power supplies from the module. Modules are much easier to lift into the rack without the additional weight of the tape drives.

c. Open the module's access door and raise the guide pin by pulling it up and turning it slightly, as if it were a screw. Otherwise, the guide pin may scratch the front doors of the module on which you are stacking it.
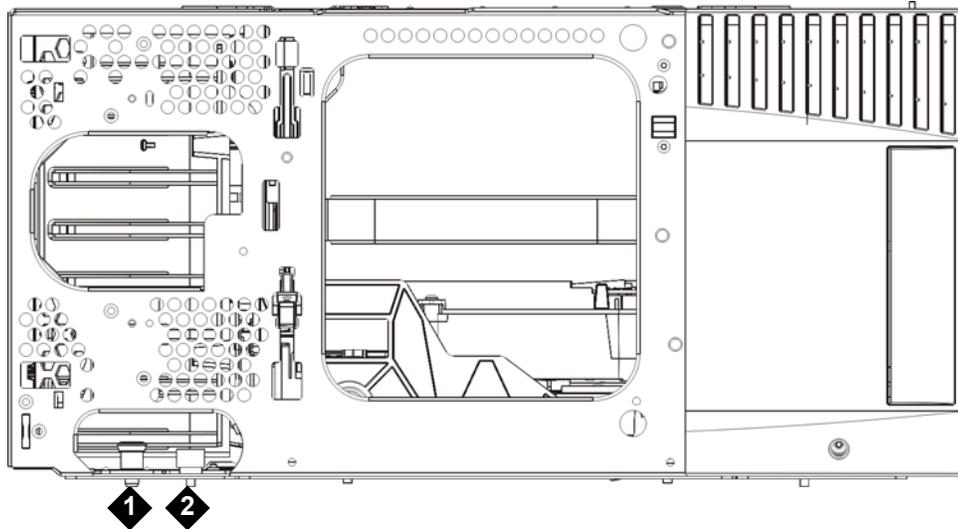
1	Guide pin
2	Thumbscrew

5 Lift the module, align it so that it is parallel with the module below it, and slide it into place.

6 Lower the module's guide pin by turning it and pushing it down.

7   Secure the module to the module beneath it by tightening the thumbscrews located at the base of the front and back of the module. Press down the thumbscrew, and then tighten it.
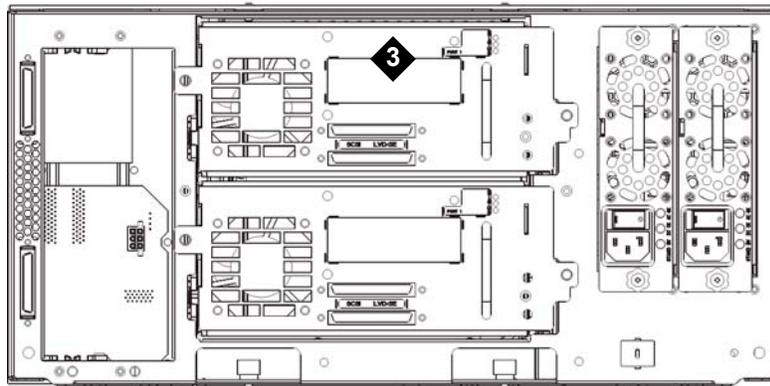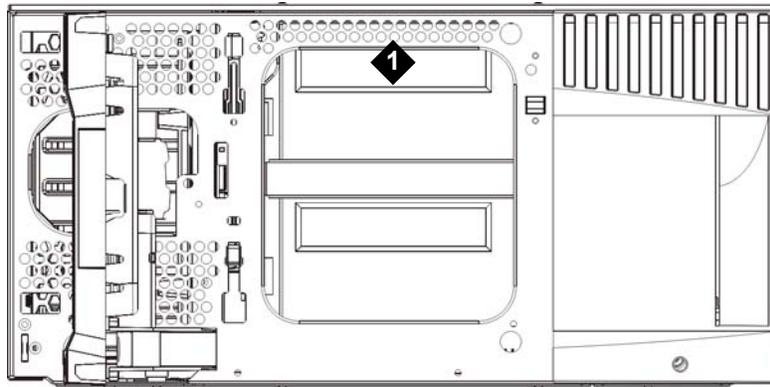
1	5U Library Control Module (front)
2	Thumbscrews
3	5U Library Control Module (rear)

8 Install the right rack ear. At the front of the library:

   a. Open the I/E station door. At the lower right corner of the module is a vertical slot. Insert the hinge of the right rack ear into the slot, and then position the holes of the rack ear flush with the rack rail.
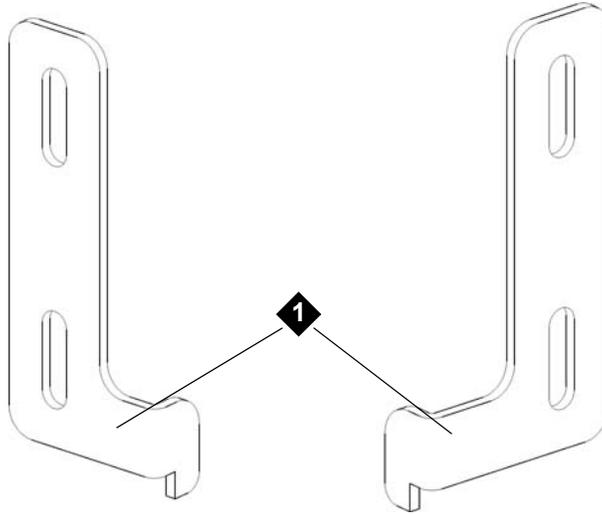
1	Hinge of rack ears

   b. Using two M5 thumbscrews, fasten the rack ear to the rack. The thumbscrews should thread through the nut clips (or cage nuts) and fasten completely and evenly.
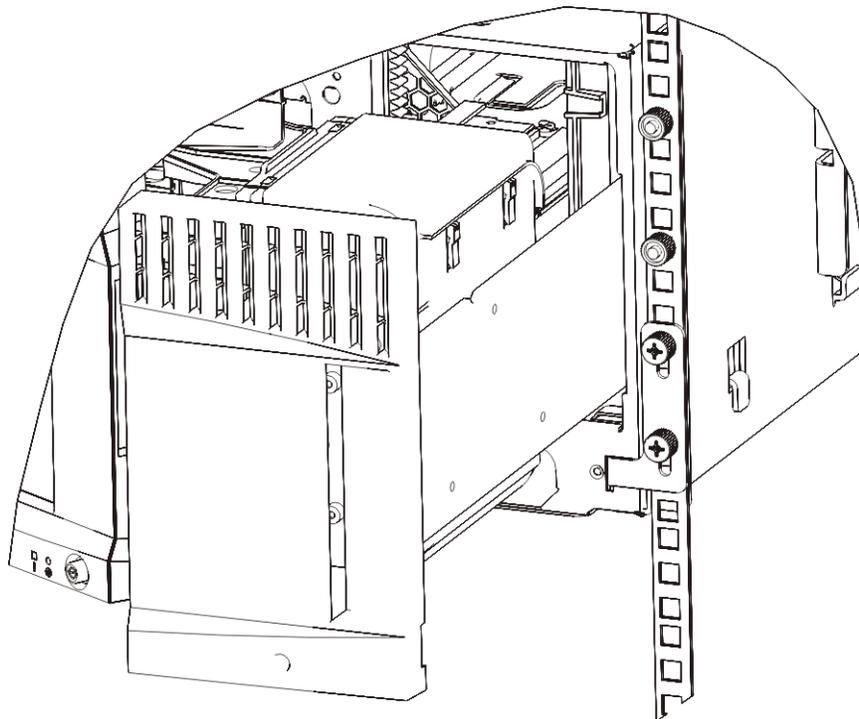
9 Install the left rack ear.

   a. With the I/E station door open, open the left door (the access door) of the module and pull the door toward you to access the slot located in the lower left corner of the module. (The flexible door hinge allows the door to be pulled away from the module, providing access to the slot.)

   > 📝 **Note**   You may need to pull the door toward you to access the slot.

   b. Install the left rack ear in the same manner as the right rack ear.

   c. Using two M5 thumbscrews, fasten the rack ear to the rack. The thumbscrews should thread through the nut clips (or cage nuts) and fasten completely and evenly.
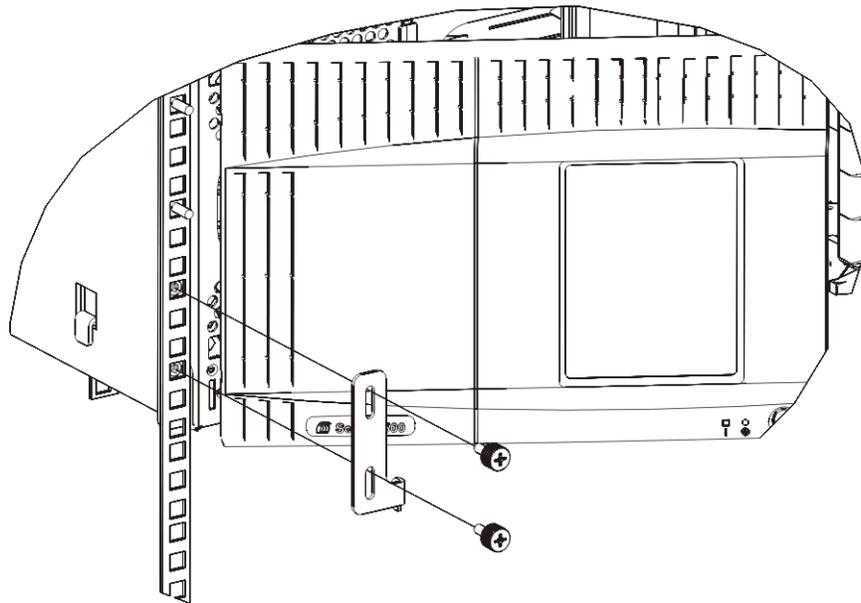
10 If the module you are installing is an expansion module, engage the Y-rails of the new module in your library configuration. Ensure that the Y-rails are properly aligned, and the thumbscrews are tightened.

1	Front Y-rail	**3**	Y-rail (this end up)
2	Rear Y-rail	**4**	Squeeze here to release

a. From the front of the library, open the I/E station and access doors of the 9U Expansion Module. Squeeze the handle of the Y-rail release mechanism, lift it out of its locked position, and slide it downward as far as it will go.

b. From the back of the library, find the rear Y-rail release mechanism, which is located in the interior of the right side of the module. Squeeze the handle of the Y-rail release mechanism, lift it out of its locked position, and slide it downward as far as it will go.

> ⚠ **CAUTION**   **Check to make sure that there is no gap between the top and bottom Y-rails on both the front and back of the library. If a gap exists, the library cannot mechanically initialize.**

Doing this aligns the Y-rails with the Y-rails of the module beneath it.

1	Y-rail in unlocked, functional position

11 Close the module's doors.

12 Repeat the above steps as necessary for each module you are installing.

13 Reinstall the tape drives to the library.

14 Cable your library as necessary, following the instructions provided in Cabling the Library on page 22.

15 Power on the library.

Adding, Removing, and Replacing Tape Drives

The tape drive enables you to connect the library to servers within your storage area network (SAN).

> **Note**   If you are installing multiple tape drives with the library powered on, follow the special instructions in the note in Step 3 below.

Adding a Tape Drive

These instructions explain how to add a tape drive to your library. You can add a tape drive while the library is powered on.

Required tools: None

1   Save the library configuration.

2   Detach the tape drive slot's cover plate. Loosen the cover plate's thumbscrews, and remove the plate.

    Store the cover plate in a separate cabinet. If you later decide to remove the tape drive, you will need to reinstall the cover plate.

3   Insert the tape drive into the drive slot. Using the guide rails on both the tape drive and in the tape drive slot, slowly slide the tape drive into the slot. The tape drive must be level to slide in smoothly.

> **Note**   **Special Instructions for Installing Multiple Tape Drives:**
> If you are installing multiple tape drives with the library powered on, do not push the drive in all the way yet. Instead, push it in almost all the way, leaving it out approximately 3 inches, so that it does not connect with the library's backplane. Then partially insert all of the other new tape drives in the same manner. When all the new tape drives are partially inserted, push them all the way in at the same time.

4   Tighten the tape drive's thumbscrews to secure the tape drive to the module.

    The thumbscrews must be aligned with the module's screw holes. If they are not aligned, the tape drive was not inserted correctly.

5   Power on the library (if it is not powered on already).

6   If the green LED is solidly lit for three seconds and then blinks twice, wait 10-15 minutes while the universal drive sled (UDS) firmware upgrades.

    There are two types of firmware related to the tape drive: firmware for the tape drive itself, and firmware for the UDS that surrounds the tape drive. The UDS firmware is part of the library firmware. The library automatically upgrades the UDS firmware if the firmware on the newly inserted UDS is different than the library's current UDS firmware. Firmware upgrades may take about 15 minutes.

7   Connect the host interface cables to the tape drive.

8   Take the tape drive online.

    a. From the **Operations** menu, select **Drive > Change Mode**.

        The **Change Drive Mode** screen appears.

    b. Locate the tape drive that you want to take online.

    c. In the **New** column, click **Offline** to change the button status to **Online**.

9   Check the tape drive's LEDs to make sure that the drive functions correctly (see Tape Drive LEDs on page 430). If the blue or amber LED stays on solid, reseat the tape drive.

10 Add the new tape drive to an appropriate partition. You cannot use the tape drive until it is assigned to a partition.

11 If necessary, upgrade tape drive firmware. The library can use the tape drive immediately after the firmware is upgraded. For information on updating firmware, see the *Dell PowerVault ML6000 Tape Library User's Guide*.

12 Due to the way the library logically addresses its tape drives internally (see Understanding Logical Element Addressing on page 543), adding a tape drive to the library may change the tape drive ordering, and this can affect proper communication to a controlling host. Because of this, you must refresh the configuration of any backup application that manages the library to reflect the adjusted tape drive positions and the presence of the new drive. In addition, you may need to reboot the host server(s) or rescan the bus to detect the changes.

Permanently Removing a Tape Drive

These instructions explain how to remove a tape drive that you do not intend to replace with another one. You may want to permanently remove a tape drive from your library if you are decreasing the size of your SAN or reducing the number of partitions in your library.

You can remove a tape drive while the library is powered on. However, do not remove a tape drive that is currently in use.

> **Note** It is normal to receive RAS ticket T021 when you remove a tape drive while the library is powered on.

Required tools: None

1 Prepare host applications for tape drive removal.

2 Save the library configuration.

3 If there is a tape cartridge in the target tape drive, use the Web client to unload it.

4 Using the Web client, delete the partition that uses the target tape drive. Then re-create the partition, if desired, using another tape drive.

5 Disconnect the host interface cables from the tape drive that you want to remove.

6 From the back of the library, loosen the tape drive's thumbscrews.

7 Remove the tape drive by gripping the tape drive handle and pulling the entire tape drive toward you.

8 Install a cover plate over the vacant tape drive slot.

If you cannot find a cover plate, order one. It is important that all vacant slots have a cover plate to keep unwanted materials out of the library.

> ⚠ **WARNING** **RUNNING THE LIBRARY WITHOUT A COVER PLATE CAN BE DANGEROUS. DOING SO ALSO CAUSES THE LIBRARY TO RUN AT A REDUCED SPEED.**

9 Due to the way the library logically addresses its tape drives internally (see Understanding Logical Element Addressing on page 543), permanently removing a tape drive from the library may change the tape drive ordering, and this can affect proper communication to a controlling host. Because of this, you must refresh the configuration of any backup application that manages the library to reflect the adjusted tape drive positions and the presence of the new drive. In addition, you may need to reboot the host server(s) or rescan the bus to detect the changes.

Removing and Replacing a Tape Drive

These instructions explain how to remove a tape drive and replace it with a new one. You may need to replace a tape drive if you are experiencing problems with one that is currently in use.

You can remove a tape drive while the library is powered on. However, do not remove a tape drive that is currently in use.

The new tape drive replaces the old tape drive in the partition. You do not need to delete the old tape drive or add the new tape drive to the partition, unless the replacement tape drive is of a different type (generation or interface) than the original. If the original tape drive is in a partition, and the replacement tape drive is of a different type, the library generates a RAS ticket and will not activate the tape drive. If this happens, you must either replace the tape drive with one of the same type, or delete the old tape drive from the partition and then add the new tape drive to the partition (**Setup > Partitions)**.

> ✏️ **Note**   It is normal to receive RAS ticket T021 when you remove a tape drive while the library is powered on.

Required tools: None

1   Prepare host applications for tape drive removal.

2   Save the library configuration.

3   If there is a cartridge in the tape drive, use the Web client to unload it.

4   Using the Web client, take the tape drive offline. When the tape drive is ready for removal, its blue LED will be solidly lit.

    a.   From the **Operations** menu, select **Drive > Change Mode**.

       The **Change Drive Mode** screen appears.

    b.   Locate the tape drive that you want to take offline.

    c.   In the **New** column, click **Online** to change the mode to **Offline**.

5   Disconnect the host interface cables from the tape drive that you want to remove.

6   From the back of the library, loosen the tape drive's thumbscrews.

7   Remove the tape drive by gripping the tape drive handle and pulling the entire tape drive toward you.

8   Add the new tape drive in the vacant slot. Using the guide rails on both the tape drive and the tape drive slot, slowly slide the tape drive into the slot. The tape drive must be level to slide in smoothly.

9   Tighten the tape drive's thumbscrews to secure the tape drive to the module.

The thumbscrews must be aligned with the module's screw holes. If they are not aligned, the tape drive was not inserted correctly.

10   Power on the library (if it's not powered on already) and wait for initialization to complete.

11   If the green LED is solidly lit for three seconds and then blinks twice, wait 10-15 minutes while the universal drive sled (UDS) firmware upgrades.

There are two types of firmware related to the tape drive: firmware for the tape drive itself, and firmware for the UDS that surrounds the tape drive. The UDS firmware is part of the library firmware. The library automatically upgrades the UDS firmware if the firmware on the newly inserted UDS is different than the library's current UDS firmware. Firmware upgrades may take about 15 minutes.

12   Connect the host interface cables to the tape drive.

13 Take the tape drive online.

    a. From the **Operations** menu, select **Drive > Change Mode**.

       The **Change Drive Mode** screen appears.

    b. Locate the tape drive that you want to take online.

    c. In the **New** column, click **Offline** to change the mode to **Online**.

14 Check the tape drive's LEDs to make sure that the drive functions correctly (see Tape Drive LEDs on page 430). If the blue or amber LEDs stays on solid, reseat the tape drive.

15 If necessary, upgrade tape drive firmware. The library can use the tape drive immediately after the drive firmware is upgraded. For information on upgrading firmware, see the *Dell PowerVault ML6000 Tape Library User's Guide*.

16 When swapping out a tape drive, if the **Logical SN Addressing** feature is enabled, the library reports a logical tape drive serial number to the host that remains with the slot, so a replacement tape drive in the same slot reports the same logical serial number and the host recognizes it immediately. If **Logical SN Addressing** is disabled, the library reports the actual tape drive serial number to the host. This means that a swapped tape drive will not be registered by the host unless you refresh the configuration of any backup application that manages the library. In addition, you may need to reboot the host server(s) or rescan the bus to detect the changes.

Adding, Removing, and Replacing FC I/O Blades

This section describes adding, removing, and replacing FC I/O blades. The FC I/O blades support connections to LTO-3, LTO-4, LTO-5, and LTO-6 FC tape drives.

> ⚠️ **CAUTION**   **LTO-5 and LTO-6 Fibre Channel tape drives can be configured for speeds of up to 8 Gb/s. If they are configured for 8 Gb/s, you should connect them directly to a host or switch, and not to an FC I/O blade, because the FC I/O blade only allows speeds up to 4 Gb/s. If you connect an LTO-5 or LTO-6 Fibre Channel tape drive to an FC I/O blade, the speed will autonegotiate to 4 Gb/s.**

Details about FC I/O blades include:

- You must be running 400-level code or later to use FC I/O blades.

- Each expansion module can support up to two I/O blades and two fan blades.

- A maximum of four FC I/O blades can be present in any library configuration.

- A maximum of four FC drives can be connected to one FC I/O blade.

- FC I/O blades cannot be installed in control modules. However, FC tape drives in the control module can be connected to FC I/O blades in an expansion module.

- Each FC I/O blade is accompanied by a fan blade that cools the blade. The fan blade is installed to the right of the FC I/O blade in the expansion module. Each expansion module has four bays and can accommodate two FC I/O blades and two fan blades. Figure 19 shows the FC I/O blade and fan blade installed in the expansion module. For instructions on installing the fan blade fan, see Adding, Removing, and Replacing the FC I/O Fan Blade on page 137.

- The recommended order of installing the FC I/O blade and fan blade in any expansion module is starting from the bottom two bays and moving up.

Figure 19 FC I/O Blade and Fan Blade Bays in Expansion Module
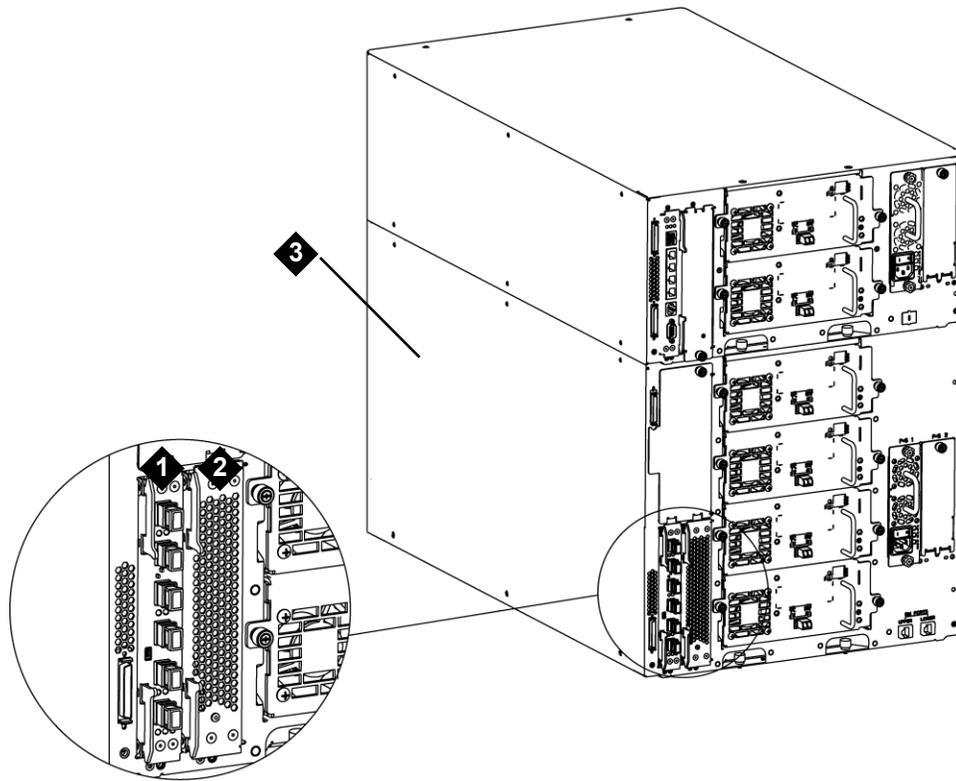
1	FC I/O blade
2	Fan blade
3	Expansion module

Read This First: Complete Installation Steps

When installing an FC I/O blade, you must follow the installation steps in the order shown below, or communication with the FC I/O blade and tape drives in the library will not work properly.

> ⚠️ **CAUTION** If you are adding a new FC I/O blade or completely removing an FC I/O blade, be sure to read the section Control Paths and FC I/O Blades on page 133. If you do not configure control paths correctly, you will experience communication problems with tape drives, partitions, and the media changer (robot).

You may perform the following steps with the library powered on.

1 Ensure that you are running the proper level of firmware. You must be running 400-level code or later to use I/O blades. See the User's Guide for instructions on upgrading firmware.

2 **Save the library configuration** (from the Web client, select **Tools > Save/Restore Configuration**).

3 **Connect the Ethernet cable from the Library Control Blade to the Expansion Module(s).** For each FC I/O blade installed in an expansion module, connect the expansion module containing the FC I/O blade(s) to a port in the Ethernet hub on the LCB (see #5 in Figure 11 on page 36).

⚠ CAUTION	If the Ethernet cable between the LCB and EM is not connected when power is applied to the blade, the blade will hang in the "Booting" state.

- If the I/O blade is installed in the bottom bay of the expansion module, connect one end of an Ethernet cable to the Ethernet port labeled **LOWER** in the lower right corner of the expansion module. Connect the other end of the cable to a port in the Ethernet hub on the LCB.

- If the I/O blade is installed in the upper bay of the expansion module, connect one end of an Ethernet cable to the Ethernet port labeled **UPPER** in the lower right corner of the expansion module. Connect the other end of the cable to a port in the Ethernet hub on the LCB.

4 **Remove the control path from tape drives that you plan to connect to an FC I/O blade.** You must not allow an FC tape drive to serve as control path if it is connected to an FC I/O blade. If you do, the control path will be filtered out by the I/O blade and will not be visible to the host.

In addition, if a Fibre Channel tape drive is currently serving as the control path for a partition and you plan to connect that tape drive to an FC I/O blade, you must remove the control path from that tape drive. To remove the control path from a tape drive:

   a. Select **Setup > Control Path** from the operator panel or the Web client.

   b. If you have more than one partition, select the appropriate partition and click **Next**.

   c. Clear the control path selection on any FC tape drive that you plan to connect to an FC I/O blade.

5 **Add or replace the fan blade(s)** following the appropriate instructions in Adding, Removing, and Replacing the FC I/O Fan Blade on page 137. The fan blade is required to prevent overheating of the FC I/O blade.

6 **Add or replace the FC I/O blade(s)** following the appropriate instructions in Adding, Removing, and Replacing FC I/O Blades on page 130. If you are installing two FC I/O blades in an expansion module, install the lower one first.

7 Make sure that cover plates are installed over any unused bays in the expansion module.

8 **Connect the library and tape drive cables to the FC I/O blade** (see Cabling Libraries with Fibre Channel Tape Drives Connected to Fibre Channel I/O Blades on page 34). See also If you need to add 9U expansion modules to the 5U library control module, remove the module terminator from the 5U library control module terminator connection that is closest to the 9U expansion module. on page 38.

9 **Configure/reconfigure library partitions** if needed (from the Web client, select **Setup > Partitions**). See the User's Guide for complete instructions.

10 **Configure control paths** if needed. The library assigns control paths for new partitions when they are created. Ensure that each partition has only one control path. Also, ensure that you do not select an FC tape drive as the control path if it is connected to an FC I/O blade. See Control Paths and FC I/O Blades **on page 133** for more important information about control paths. To modify the control path, select **Setup > Control Path** from the operator panel or Web client.

11 **Configure host mapping** (optional). If you have more than one FC I/O blade in the library, each FC I/O blade will present each partition that does not have a tape drive as the control path as a target device to the host. Thus, the host may see the same partition multiple times. To minimize confusion, configure host mapping so that each host sees each device only once. See the User's Guide for complete information and instructions.

To configure host mapping:

a. From the operator panel or Web client, select **Setup > I/O Blades > FC I/O Blade Control** and enable host mapping.

b. From the operator panel or Web client, select **Setup > I/O Blades > Host Mapping**.

12 **Configure host port failover** on the FC I/O blade (optional). From the Web client, select **Setup > I/O Blades > Host Port Failover**. To enable host port failover, you must configure target ports 1 and 2 on the I/O blade as point-to-point connections (**Setup > I/O Blades > Port Configuration**). See the User's Guide for complete instructions.

13 Save the library configuration (from the Web client, select **Tools > Save/Restore Configuration**).

Control Paths and FC I/O Blades

A **control path** is the connection between a partition and host application. The control path connection is made through a designated tape drive or through a Fibre Channel (FC) I/O blade.

Only one tape drive can be selected as the control path per partition. In the event that the tape drive control path connection to the host application fails, you can manually select a different control path tape drive for the partition.

If I/O blades are installed in the library, you can configure host port failover.

When you create a partition, the library automatically assigns control paths. The following table describes how the library assigns control paths, and what you need to know if you want to change the control path.

If the library contains:	And the partition contains:	Then the default control path for the partition is:	If you want to change the control path, note the following:
No FC I/O blades	Any combination of tape drive types (FC, SAS, or SCSI)	The first tape drive assigned to the partition	You must select a tape drive as the control path.
One or more FC I/O blades	At least one FC tape drive	The FC I/O blade	It is recommended that you allow the FC I/O blade to be the control path for the partition. Using the FC I/O blade as the control path allows you to use the LUN mapping and host port failover features. You may select a tape drive as the control path if the tape drive is not connected to an I/O blade.
One or more FC I/O blades	No FC tape drives	The first tape drive assigned to the partition	You must select a tape drive as the control path.

You can change the control path tape drive at any time by selecting **Setup > Control Path** from either the operator panel or the Web client.

⚠ **CAUTION** **Do not select an FC tape drive as control path if it is connected to an FC I/O blade. The control path will be filtered out by the I/O blade and will not be visible to the host.**

Adding an FC I/O Blade

These instructions explain how to add an FC I/O blade to your library. You can add an FC I/O blade while the library is powered on.

Required tools: None

1 Access the back of the expansion module.

📝 Note   The recommended order of installing the FC I/O blade and fan blade in an expansion module is starting from the bottom bay and moving up.

2 Remove the cover plate from the appropriate bay.

3 Press up and out to open the latch hooks on each side of the I/O blade.
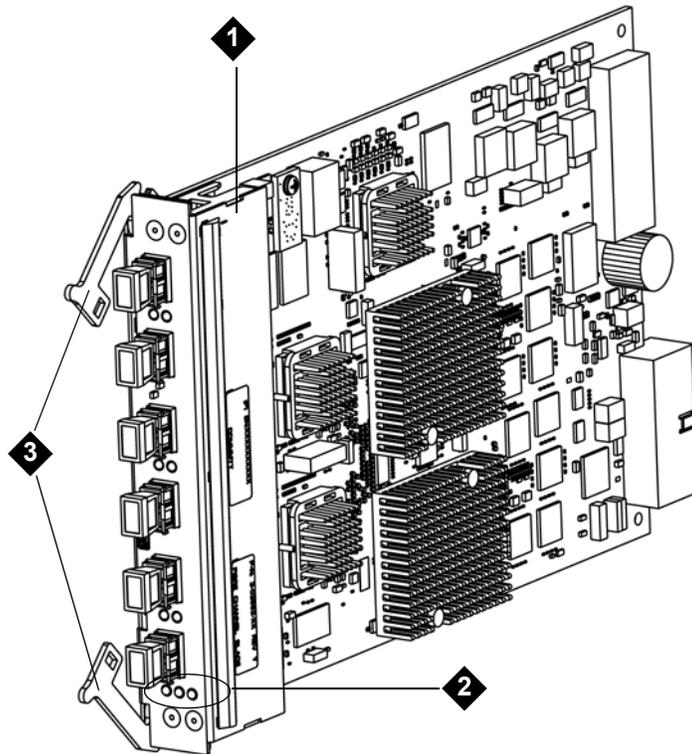
1	I/O blade
2	LEDs
3	Latch hooks, open

4 Carefully align the FC I/O blade with the guide slots in the bay. The status LEDs must be at the bottom.

⚠ **CAUTION**   **Do not force the blade into the bay. This can cause the pins to bend.**

5 Evenly apply pressure to both sides of the blade, and slide it into the expansion module until the latch hooks begin to move the middle of the blade. Push the latch hooks the middle of the blade and into the locked position. You will feel the blade pins connect with the expansion module's backplane as the blade locks into place.

> **Note** The LEDs for the FC I/O blade are on the bottom of the blade when the blade is correctly installed in the expansion module.

6 When you are ready to cable the blade, remove the necessary number of the black rubber protective covers from the ports on the FC I/O blades.
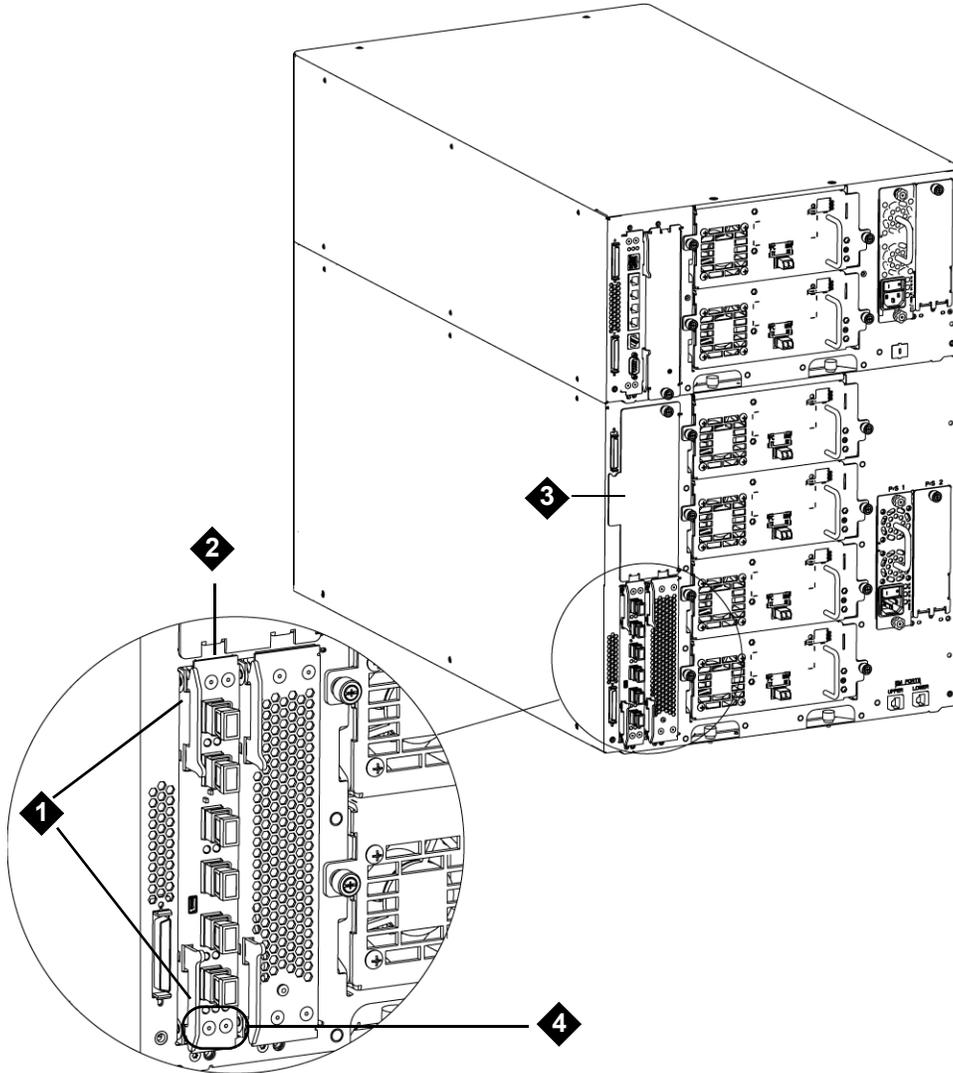
1	Latch hooks, locked	**3**	Cover plate on empty bay
2	FC I/O blade	**4**	FC I/O blade LEDs

7 Make sure that cover plates are installed over any unused bays in the expansion module.

> ⚠ **CAUTION** **Bays that are not populated with blades must contain a cover plate. If the cover plate is not installed, FC I/O blade temperature errors will occur.**

8   Cable the library as described in <u>Cabling Libraries with Fibre Channel Tape Drives Connected to Fibre Channel I/O Blades</u> on page 34.

9   Save the library configuration. See <u>Saving and Restoring the Configuration</u> on page 12.

Removing an FC I/O Blade

These instructions explain how to remove an FC I/O blade from your library. You can remove an FC I/O blade while the library is powered on.

Required tools: None

1   Remove the FC I/O blade from the system view. From the Web client, select **Setup > Blade Control > Remove**. This removes the FC I/O blade from the system and powers it off.

> **Note**   If you do not remove the FC I/O blade from the system view, the library will generate a RAS ticket when you remove the I/O blade. If you do not want the library to generate a RAS ticket, you can power down the I/O blade before removing it. See the User's Guide for more information. Refer to "Controlling FC I/O Blade Power" in the *ML6000 User's Guide.*

2   Access the back of the expansion module containing the I/O blade.

3   Tag and disconnect all FC cables from the FC I/O blade.

> **⚠ CAUTION**   **Handle the FC cables with care. They will be damaged if they are bent at more than a four-inch arc.**

4   Lift the latch hooks out of the locked position and push them up. You will feel the FC I/O blade unplug from the expansion module's backplane.

5   Continue lifting on the latch hooks until the blade is totally unplugged from the backplane.

6   Slide the FC I/O blade out of the expansion module.

7   Make sure that cover plates are installed over any unused bays in the expansion module.

8   If you are permanently removing the I/O blade, you will need to configure the library to stop monitoring the I/O blade. See the library Users Guide for more information.

9   Save the library configuration. See <u>Saving and Restoring the Configuration</u> on page 12.

Replacing an FC I/O Blade

These instructions explain how to replace an FC I/O blade in your library. You can remove and replace a FC I/O blade while the library is powered on.

Required tools: None

1   Remove the FC I/O blade from the system view. From the Web client, select **Setup > Blade Control > Remove**. This removes the FC I/O blade from the system and powers it off.

> **Note**   If you do not remove the FC I/O blade from the system view, the library will generate a RAS ticket when you remove the I/O blade. If you do not want the library to generate a RAS ticket, you can power down the I/O blade before removing it. See the User's Guide for more information. Refer to the section on Controlling FC I/O Blade Power in the *ML6000 User's Guide*.

2 Access the back of the expansion module.

3 If you have not already done so, remove the old FC I/O blade, following the directions in <u>Removing an FC I/O Blade</u> on page 136.

4 Press up and out to open the latch hooks on each side of the replacement FC   I/O blade.

5 Carefully align the FC I/O blade with the guide slots in the bay. The status LEDs must be at the bottom.

> ⚠️ **CAUTION** **Do not force the blade into the bay. This can cause the pins to bend.**

6 Evenly apply pressure to both sides of the blade, and slide it into the expansion module until the latch hooks begin to move toward the middle of the blade. Push the latch hooks toward the middle of the blade and into the locked position. You will feel the blade pins connect with the expansion module's backplane as the blade locks into place.

> 📝 Note   The LEDs for the I/O blade are on the bottom of the blade when the blade is correctly installed in the expansion module.

7 Remove and discard the necessary number of the black rubber protective covers from the ports on the FC I/O blades.

8 Reconnect the FC cables to the appropriate FC ports on the FC I/O blade.

> ⚠️ **CAUTION** **Fibre optical cables will be damaged if they are bent at more than a four-inch arc.**

9 Save the library configuration. See <u>Saving and Restoring the Configuration</u> on page 12.

> 📝 Note   After you replace the FC I/O blade, the library ensures that the FC I/O blade is loaded with the proper firmware. This firmware is based on the currently installed level of library firmware. If the autoleveling process fails, the FC I/O blade becomes inoperable, and the library creates a ticket to report the issue. For information about LED behaviors on blades during autoleveling operations, see <u>Blade Status LEDs</u> on page 427.

Adding, Removing, and Replacing the FC I/O Fan Blade

Each FC I/O blade is cooled by a fan blade. The fan blade is always installed in the bay to the right of the FC I/O blade. Each expansion module has four bays and can accommodate two FC I/O blades and two fan blades.

The recommended order of installing the FC I/O blade and fan in the expansion module is starting from the bottom two bays and moving up.

<u>Figure 19</u> on page 131 shows the FC I/O blade and I/O blade fan installed side-by-side in the expansion module.

Adding an FC I/O Fan Blade

These instructions explain how to add an I/O fan blade to your library. You can add an I/O fan blade while the library is powered on.

Required tools: None

1 Access the back of the expansion module.

2 Remove the cover plate from the bay to the right of the bay that holds the FC I/O blade.

> **Note** The recommended order of installing the FC I/O blade and fan blade in an expansion module is starting from the bottom two bays and moving up.

3 Press up and out to open the latch hooks on each side of the fan blade. The LED must be at the bottom of the blade.
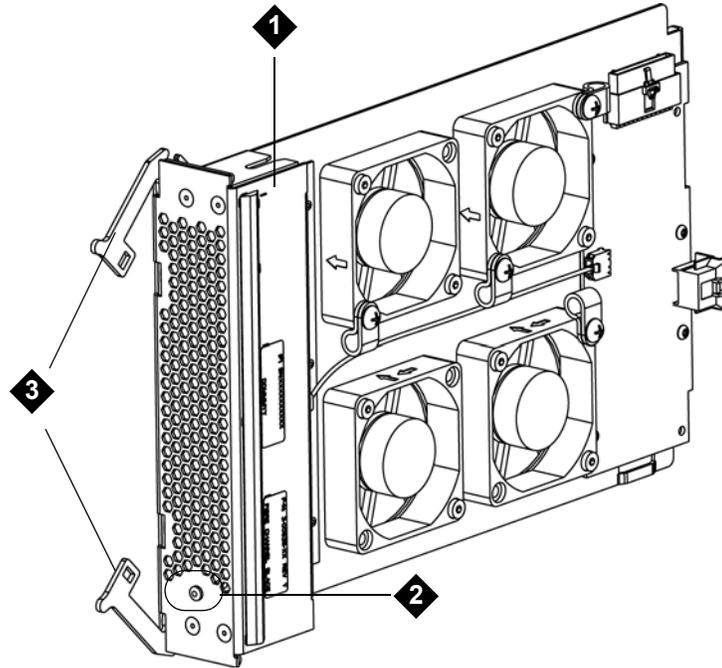
1	Fan blade
2	LED
3	Latch hooks, open

> ⚠ **CAUTION** **Forcing the blade into the bay can cause the pins to bend.**

4 Evenly apply pressure to both sides of the fan blade, and slide it into the expansion module until the latch hooks begin to move the middle of the blade. Push the latch hooks the middle of the blade and into the locked position. You will feel the blade pins connect with the expansion module's backplane as the blade locks into place.

> **Note** The LED for the fan blade is on the bottom of the blade when the blade is correctly installed in the expansion module.

5 Save the library configuration. See Saving and Restoring the Configuration on page 12.

Removing an FC I/O Fan Blade

These instructions explain how to remove a fan blade from your library. You can remove an I/O fan blade while the library is powered on.

> ⚠ **CAUTION** **Do not permanently remove an I/O fan blade unless you also permanently remove the FC I/O blade to which it is associated.**

Required tools: None

1 Access the back of the expansion module containing the I/O fan blade.

2 Lift the latch hooks out of the locked position and push them up. You will feel the I/O fan blade unplug from the expansion module's backplane.

3 Continue lifting on the latch hooks until the blade is totally unplugged from the backplane.

4 Slide the fan blade out of the expansion module.

5 If you are permanently removing the fan blade, place a cover on the empty bay.

6 Save the library configuration. See Saving and Restoring the Configuration on page 12.

Replacing an FC I/O Fan Blade

These instructions explain how to replace a fan blade in your library. You can remove and replace the fan blade while the library is powered on.

Required tools: None

1 Access the back of the expansion module.

2 If you have not already done so, remove the old I/O fan blade, following the directions in Removing an FC I/O Fan Blade on page 139.

3 Press up and out to open the latch hooks on each side of the replacement fan blade.

4 Carefully align the fan blade with the guide slots in the bay. The status LED must be at the bottom.

> ⚠ **CAUTION** **Do not force the blade into the bay. This can cause the pins to bend.**

5 Evenly apply pressure to both ends of the I/O fan blade, and slide it into the expansion module until the latch hooks begin to move the middle of the blade. As you push in on the blade, you will feel the blade pins connect with the expansion module's backplane.

6 Push the latch hooks into the locked position.

7 Save the library configuration. See Saving and Restoring the Configuration on page 12.
   - 66LTO-5 and LTO-6 tape drives are configured with 8Gb/s serial transfers. These drives support auto-negotiation to 8Gb/s, 4Gb/sec, and 2Gb/s. LTO-5 tape drives will not support speeds of less than 2Gb/s.

Preparing the Library for Moving or Shipping

Before you move or ship your library, follow these steps:

⚠ CAUTION	**When moving the library: You must install the orange robot restraint assembly to protect the robot against damage. It is recommended that you use the original shipping carton and packaging materials to further protect your library.**

⚠ CAUTION	**When shipping the library: Use the shipping carton, packaging materials, and the orange robot restraint assembly that originally came with the library. This will help protect your library against damage. If the original packaging is not available, contact Quantum for a Repackaging Kit and follow the enclosed instructions.**

1 Save the library configuration (see <u>Saving the Configuration</u> on page 13).

2 Shut down the library using the local operator panel (**Operations > System Shutdown**). This lowers the robot to the "shipping" position on the floor of the library.

3 Follow instructions on the operator panel screen.

4 Turn off library power by pressing the power button on the front panel.

5 Turn off the power to each power supply on the back of the library.

6 Install the orange robot restraint assembly that secures the robot to the floor of the library. The robot restraint assembly was part of the packaging that originally came with the library.

7 Remove all cords and cables from the rear of the library.

8 Remove all tape cartridges from the library.

9 Remove the tape drives from the library to decrease the weight when lifting the modules.

⚠ WARNING	**WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, A 5U LIBRARY CONTROL MODULE WEIGHS APPROXIMATELY 60 LBS (27.2 KG). A 9U LIBRARY EXPANSION MODULE, WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, EXCEEDS 65 LBS (29.5 KG).** **TO AVOID SERIOUS INJURY, AT LEAST TWO PEOPLE ARE REQUIRED TO SAFELY LIFT THE MODULES.**

10 Remove one module at a time from the rack. Retain the rack-mounting hardware and shelves for use in the new location.

11 Place the module in the bottom of the shipping carton.

12 Reinstall the tape drives in the module.

13 Complete the packing. For further details, see the *Unpacking Instructions*.

General Service and Replacing FRUs

When servicing the Dell PowerVault ML6000, test the library both before and after you service it. Test the library before you service it to assess the overall health of the library. Test the library after you service it to ensure that the library is fully functional and that it works as expected.

Become familiar with the contents of this manual and the *Dell PowerVault ML6000 Tape Library User's Guide*, and follow the guidelines provided in this chapter, as necessary.

Before You Start

Before installing, adding, removing, or replacing any library parts, become familiar with the following information.

Required Library State

Adding, removing, or replacing library components usually requires you to power off the entire library. However, there are a few components that you can service without powering off the library. In those cases you may be able to leave some or all partitions online.

Use Table 9 to determine the state that the library must be in before you service each part.

Table 9   Library Components: Required Library State

Part	Required Library Status
5U Library Control Module	Power off
9U Library Expansion Module	Power off
Library Control Blade (LCB)	Power off
LCB Compact Flash Card	Power off
Redundant Power Supply	On/Normal
Tape Drive	On/Normal
Front Bezels	On/Normal
Drive Power Fuse (DSIB Fuse)	Power off
FC I/O Blades	On/Normal

Table 9   Library Components: Required Library State (Continued)

Part	Required Library Status
I/O Fan Blades	On/Normal
I/E Station Lock Assembly	Power off
I/E Station Slide Assembly	Power off
I/E Station Safety Doors	Power off
Operator Panel (LCD Front Panel Display)	Power off
Picker Assembly	Power off
Y-Carriage Assembly	Power off
Y-Motor	Power off
Cable Spool	Power off

Required Tools

Installing, adding, removing, and replacing customer replaceable units (CRUs) and field replaceable units (FRUs) for the Dell PowerVault ML6000 tape library may require the following tools:

- Flathead screwdriver
- Phillips #2 screwdriver
- T10 TORX screwdriver with a static safe handle

General Service Guidelines

⚠️ **WARNING**   **ALL LIBRARIES TALLER THAN 14U MUST BE INSTALLED IN A RACK HAVING A MAIN PROTECTIVE EARTHING (GROUNDING) TERMINAL, AND POWER MUST BE SUPPLIED VIA AN INDUSTRIAL PLUG AND SOCKET-OUTLET AND/OR AN APPLIANCE COUPLER COMPLYING WITH IEC 60309 (OR AN EQUIVALENT NATIONAL STANDARD) AND HAVING A PROTECTIVE EARTH (GROUND) CONDUCTOR WITH A CROSS SECTIONAL AREA OF AT LEAST 1.5 MM^2 (14 AWG).**

TO ENSURE PROPER AIRFLOW AND ACCESS SPACE, ALLOW 60 CM (24 INCHES) IN THE FRONT AND BACK OF THE LIBRARY.

⚠️ **WARNING**   **UNDER NO CIRCUMSTANCES SHOULD A RACK BE MOVED WHILE LOADED WITH ONE OR MORE MODULES.**

	WARNING	WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, A 5U LIBRARY CONTROL MODULE WEIGHS APPROXIMATELY 60 LBS (27.2 KG). A 9U LIBRARY EXPANSION MODULE, WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, EXCEEDS 65 LBS (29.5 KG).
		TO AVOID SERIOUS INJURY, AT LEAST TWO PEOPLE ARE REQUIRED TO SAFELY LIFT THE MODULES INTO POSITION.

Servicing a library typically includes the following steps:

1   Use the Web client when servicing the library. You must use the remote Web client to perform some tasks, such as to save and restore customer library configurations. This functionality is not available from the library's operator panel.

    a. Connect your laptop to the service port located on the back of the LCB using a crossover cable. If this cable does not work with your laptop, use a straight cable to connect to the service port. The service port on the library is running DHCP.

    b. Once you connect your laptop to the service port, the library assigns IP address 10.10.10.100 via DHCP.

        If the library does not assign an IP address, run the **ipconfig /release** and **ipconfig /renew** commands from the Windows command prompt.

        If the library still does not assign an IP address, set the static IP address **10.10.10.100** and subnet mask **255.255.255.0** on your laptop.

    c. Once an IP address is assigned, open a Web browser. Supported browsers include Microsoft® Internet Explorer version 6.0 and above, and Firefox, version 1.0.6 and above. Access IP address **10.10.10.1**.

    d. The library login page appears and is ready for you to log on to the library.

2   Log on to the library using your service name and password. Logging on gives you full control over the library. See "Logging in with Service Privileges" on page 6.

    > **Note**   Security settings must be set to low on computers running Windows XP, or the snapshot download to the service team laptop will not work.

3   If the I/E station door is locked, use the remote Web client to unlock it. From the **Operations** menu, select **I/E Station Lock/Unlock**.

4   Take a snapshot of the current status of the library.

5   Save the library configuration in case you need to restore it later. For details, see Saving and Restoring the Configuration on page 12.

    > **Note**   You may not always be able to save the library configuration, such as when the library's only power supply has failed. In this case, you must rely on the last saved library configuration.

6   Thoroughly examine all available reports and indicators, because the problem may be larger than it initially seems. Assess the status of the library using the following tools.

    •   RAS tickets

    •   LEDs

    •   Installation Verification Test (IVT) and service tests

Note   IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).

- If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
- If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

7 Create a list of parts that you need to add, remove, or replace, and determine the order in which you plan to service them.

8 Order any necessary parts. Table 10 on page 145 contains a complete listing of all CRUs and FRUs.

Do not order replacement parts unless the existing parts fail to respond to all troubleshooting attempts.

9 Review the cabling connections for each module. If you need to disconnect the cables to remove or replace a FRU, consider labeling the cables so you can reconnect them correctly.

10 When you are ready to service the library, determine which partitions you will need to take offline, if any.

11 Contact the library administrator to schedule a time to take the partitions offline, if necessary. Before taking the library offline, ask the administrator to complete or cancel any jobs that are in the queue.

12 Power off the library or take just the affected partitions offline, as suggested by Table 9 on page 141.

13 Add, remove, and replace each part, as necessary.

Consider testing the library after servicing each part (for details, refer to the next step). Doing this can greatly reduce the time it may take to troubleshoot the library if a problem occurs.

14 After servicing the library (and preferably after servicing each part), power on the library and test it thoroughly. Using the remote Web client, run the Installation Verification Test to ensure that the entire library functions as expected. For details, see Using the Installation Verification Test on page 16.

15 When you finish adding, removing, and replacing all necessary parts, return all partitions to online.

16 Close all relevant RAS tickets.

17 Verify that the host applications can communicate with the library.

18 Save the library configuration. For details, see Saving and Restoring the Configuration on page 12.

CRU and FRU Listings

Each electrical and non-static mechanical components of the library is either a CRU or a FRU. A CRU is a component that customers can remove or replace themselves, whereas a FRU is a component that only service personnel should remove or replace. When servicing a FRU, you may also need to service a CRU.

Table 10 lists the library's CRUs and FRUs, and the page on which the part is discussed.

Table 10   CRUs and FRUs

Part Name	CRU/FRU	Reference Information
5U Library Control Module	CRU	Installing a Stand-Alone 5U Library Control Module on page 46 Replacing a 5U Library Control Module on page 84
9U Expansion Module	CRU	Installing a New Multi-Module Library Configuration on page 47 Adding 9U Expansion Modules to an Existing Library on page 56 Permanently Removing 9U Expansion Modules From an Existing Library on page 75 Replacing a 9U Expansion Module on page 92
Cable Spool	FRU	Removing and Replacing the Cable Spool on page 181
FC I/O Blade	CRU	Adding, Removing, and Replacing FC I/O Blades on page 130
FC I/O Fan Blade	CRU	Adding, Removing, and Replacing the FC I/O Fan Blade on page 137
Front Bezels	FRU	Removing and Replacing Front Bezels on page 146
Drive Power Fuse	FRU	Removing and Replacing the Drive Power Fuse on page 148
I/E Station Lock Assembly	FRU	Removing and Replacing the I/E Station Lock Assembly on page 150
I/E Station Safety Door (5U)	FRU	Removing and Replacing the I/E Safety Door from a 5U Library Control Module on page 155
I/E Station Safety Door (9U)	FRU	Removing and Replacing the I/E Station Safety Door from a 9U Library Expansion Module on page 158
I/E Station Slide Assembly	FRU	Removing and Replacing the I/E Station Slide Assembly on page 151
Library Control Blade and Compact Flash Card	CRU	Removing and Replacing the Library Control Blade and LCB Compact Flash Card on page 102
Module Terminators	CRU	Cabling the Library on page 22
Module-to-Module Cables	CRU	Cabling the Library on page 22
LCD Front Panel Display (Operator Panel)	FRU	Removing and Replacing the Operator Panel (LCD) on page 162
Picker Assembly (Model 1)	FRU	Removing and Replacing the Model 1 Picker Assembly from the Y-Carriage Assembly Inside the Library on page 176
Power Supply	CRU	Adding, Removing, and Replacing Power Supplies on page 106
Rack-mount Kit	CRU	Using the Rack-mount Kit to Install a Library in a Rack on page 108

Table 10   CRUs and FRUs (Continued)

Part Name	CRU/FRU	Reference Information
Robot Assembly (Model 2) (includes Model 2 Picker Assembly, Y-Carriage Assembly, and Robot Controller Board)	FRU	Removing and Replacing the Robot Assembly on page 164
Tape Drive	CRU	Adding, Removing, and Replacing Tape Drives on page 127
Y-Carriage Assembly (Model 1)	FRU	Removing and Replacing the Model 1 Y-Carriage Assembly on page 179

Removing and Replacing Front Bezels

The front bezels are the design panels on the front of both the 5U Library Control Module and the 9U Expansion Modules. The front bezels help to differentiate the Dell PowerVault ML6000 from other libraries and protect the interior components of the library.

These instructions explain how to replace the front bezels of the library. You may need to replace the front bezels if they are damaged.

Bezels can be replaced on both the I/E station door and the access door.

Required tools: T10 TORX screwdriver, for removing and replacing the screws on the back of the I/E station door and the access door

> **Note**   Replacing the bezels on the access door requires you to open the access door, which temporarily disables the robot assembly.

Replacing Front Bezels of the I/E Station

1   Open the I/E station door.

2   Remove the tape cartridges from the I/E station to access the screw located on the back of the I/E station door.

> **⚠ CAUTION**   **The library will not be able to locate tapes that are removed from one partition and returned to a different partition. The tapes must be returned to the same partition they were removed from. Since the library assigns slots to a partition, you must create a map to locate each tape or create a map of tape slots that belong to each partition.**

3   Using the screwdriver, remove the screw located on the back of the I/E station door. Set the screw aside.

4   Hold the I/E station slide assembly in place with one hand. Using your other hand, pull the I/E station door directly up to disengage the bolts, and then pull the door toward you.

5   Set aside the old front bezels.

6 Secure the new front bezels to the I/E station.

Align the holes with the bolts. Hold the I/E station slide assembly in place with one hand. Using your other hand, hang the door on the bolts and push the I/E station door directly down to secure the door on the bolts.

7 Using the screwdriver, tighten the screw (which you removed earlier) to the back of the I/E station door.

8 Replace the tape cartridges into the same locations that you removed them from.

9 Close the I/E station door.

Replacing Front Bezels of the Access Door

1 Open the module's I/E station and access doors.

> 📝 Note   When you open the access door, the library becomes disabled (the robot assembly does not function). When you later close the access door, the library will function normally.

2 Remove the operator panel. For details, see <u>Removing and Replacing the Operator Panel (LCD)</u> on page 162.

3 Using the screwdriver, remove the screws located on the back of the access door. Set the screws aside.
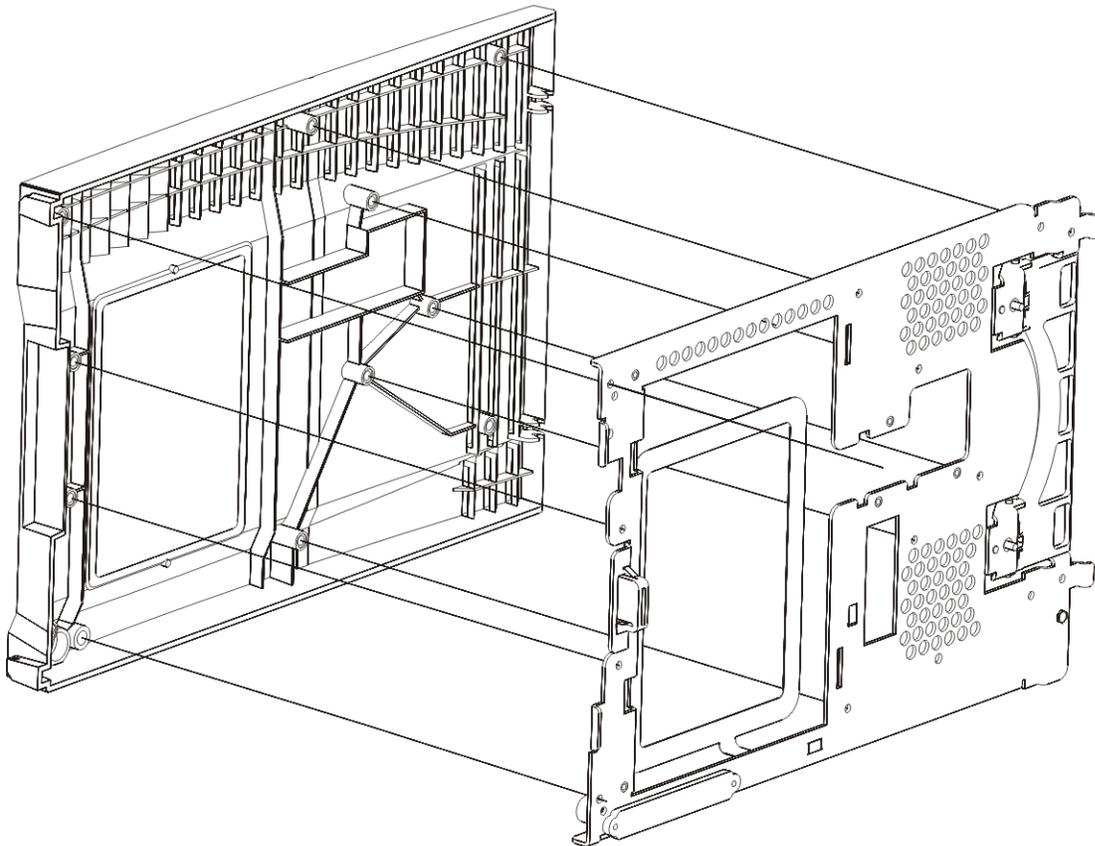
4 Set aside the old front bezels.

5   Secure the new front bezels to the access door.

Align the screwholes. Using the screwdriver, tighten all screws to the back of the access door.

6   Reinstall the operator panel. For details, see [Removing and Replacing the Operator Panel (LCD)](#) on page 162.

7   Close the access door.

8   Close the I/E station door.

9   Power on the library.

Removing and Replacing the Drive Power Fuse

Each module contains a single, replaceable, drive fuse located on the module's Drive Sled Interconnect Board (DSIB) for the overall drive power bus. This device protects the core library hardware components from an electrical short or over-current problem in one or multiple tape drives. In the event a fuse fails (blows), you need to replace it with a similar fuse type:

Control module fuse – 4A, 125 VDC, Type 3AB

Expansion module fuse – 7A, 125 VDC, Type 3AB

Required tools:

- Phillips #2 screwdriver

- 7/32" socket wrench or T10 Torx screwdriver for removing the fuse cover. (Which tool you need depends on whether your fuse cover is secured with cap screws or Torx screws.)

- Fuse puller

Note   To have adequate access to the drive fuse, you must remove all power supplies, and any cover plates from the affected module, as well as the fuse cover. You may also have to pull off the side cover panel of the library to access the fuse cover's screws.

Note   If the library is rackmounted, you must remove it from the rackmount to allow sufficient clearance in replacing the drive fuse.

⚠ WARNING   **WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, A 5U LIBRARY CONTROL MODULE WEIGHS APPROXIMATELY 60 LBS (27.2 KG). A 9U EXPANSION MODULE, WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, EXCEEDS 65 LBS (29.5 KG).**

TO AVOID SERIOUS INJURY, AT LEAST TWO PEOPLE ARE REQUIRED TO SAFELY LIFT THE MODULES INTO POSITION.

To replace a drive fuse, follow these steps:

1   Review the RAS ticket details to determine which module contains the blown fuse.

2   Power off the library using the front power switch.

3   Turn off all power supplies in the module in which you need to replace the drive fuse, and disconnect the power supply cord(s).

4 Remove all power supplies from the affected module and set aside.

5 Remove any cover plates from empty power supply slots and set aside.

6 Using a socket wrench or Torx screwdriver, reach through the power supply opening and remove the two screws that attach the fuse cover to the DSIB board, removing the fuse cover. If it is not possible to access the screws, you may need to remove the library side cover panel as well.

7 Using a fuse puller, carefully pull the failed fuse from its two fuse clips, which are attached to the DSIB board, located to the left of the power supply area of the module. See Figure 20 and Figure 21 for fuse location.

8 Replace the drive fuse with one of the same amperage and type for the module (see information above). Firmly press the new fuse into the two fuse clips. The fuse will snap into the fuse clips when it is secured.

Figure 20   DSIB Fuse Location, Control Module

Figure 21 DSIB Fuse Location, Expansion Module

9 Reattach the fuse cover to the DSIB board by using a screwdriver to tighten the cover's two screws.

10 Replace the side cover panel of the library, if necessary.

11 Replace all power supplies and cover plate(s) you removed previously, and reconnect all power supply cord(s).

12 Turn on all power supplies in the module in which you replaced the drive fuse.

13 Power on the library using the front power switch.

Removing and Replacing the I/E Station Lock Assembly

Each module's I/E station must be locked for the library to function properly. When the library is busy performing a task, such as retrieving a cartridge, the library locks all I/E station doors. The doors cannot be opened until the library is no longer busy. If the library detects that an I/E station door is either open or unlocked, the library cannot operate normally.

The I/E station lock assembly contains the lock sensor and lock solenoid.

These instructions explain how to replace an I/E station lock assembly with a new one. You may need to replace an I/E station lock assembly if there are problems with the current one.

Required tools: Flathead, Phillips #2, or T10 Torx screwdriver for removing and replacing the lock assembly.

> ✎ Note   The type of screws depends on the version of lock assembly to be replaced. An additional fastener set is provided with the new lock assembly.

1 Take all affected partitions offline. For details about taking partitions offline, see Taking the Library Online/Offline on page 13.

2 Open the I/E station and access doors of the modules.

3 Remove the I/E station slide assembly. See Removing and Replacing the I/E Station Slide Assembly on page 151.

4 Remove the mounting screw that attaches the lock assembly to the I/E station, and set it aside. The mounting screw is located at the front of the module, near the I/E station door.

5 Disconnect the I/E station cable from the lock assembly.
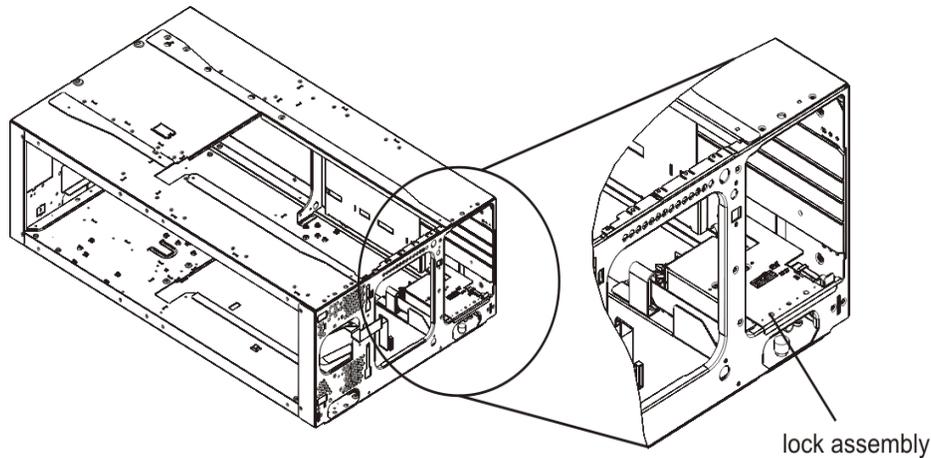
lock assembly

6 Remove the lock assembly and replace it with the new one.

7 Connect the I/E station cable to the new lock assembly.

> Note   When installing the lock assembly, be careful not to damage any of the cables or connector pins.

8 Insert the back end of the lock assembly into the appropriate slot at the bottom of the module and align its front screw hole with the screw hole at the front of the I/E station door.

9 Secure the lock assembly into place, using the screw that you removed earlier.

10 Replace the I/E station slide assembly. See Removing and Replacing the I/E Station Slide Assembly on page 151.

11 Close the access and I/E station doors.

12 Take the affected partitions back online.

Removing and Replacing the I/E Station Slide Assembly

The I/E station slide assembly enables you to open and close the I/E station door, and to slide the I/E station in and out of its module.

Removing and Replacing the I/E Station Slide Assembly (5U Library Control Module)

These instructions explain how to remove an I/E station slide assembly from a 5U Library Control Module and replace it with a new I/E station slide assembly. You may also need to replace an I/E station slide assembly if there are problems with the current one.

Required tools: None

1 Take the affected partitions offline.

2 Remove the right-hand front bezel, which is attached to the I/E station. See Removing and Replacing Front Bezels on page 146 for instructions on removing the front bezels of the library.

3 Open the I/E station and access doors of the 5U Library Control Module.

4 Remove I/E station from the 5U Library Control Module.

   Slide the I/E station toward you as far as it will go. Then reach through the access door, and using your fingers, lift the silver roller that is located above the slide assembly. Hold up the roller while you pull the upper slide out a little. Then pull the I/E station slide assembly entirely out of the 5U Library Control Module.

5 Remove the tape magazine from the I/E station slide assembly.

   Grip the middle of the tape magazine, several slots lower than where the barcode is located, and pull the magazine out of its container.

6 Insert the tape magazine into the new slide assembly, with the barcode at the top. Push the tape magazine all the way into its container.

7 Slide the slide assembly into the 5U Library Control Module. The slide assembly should slide in easily.

8 Close the I/E station door.

9 Replace the front bezel. See Removing and Replacing Front Bezels on page 146 for instructions on replacing the front bezels of the library.

10 Take the affected partitions back online.

Removing and Replacing the I/E Station Slide Assembly (9U Library Expansion Module)

These instructions explain how to remove an I/E station slide assembly on a 9U Expansion Module and replace it with a new I/E station slide assembly. You may need to replace an I/E station slide assembly if there are problems with the current one.

The 9U Expansion Module slide assembly unit comes in three parts: two individual slide assemblies (each of which looks similar to the slide assembly for the 5U Library Control Module) and a metal brace. You will need to secure the metal brace to the two slide assemblies, thereby converting the 9U Expansion Module slide assembly to a single unit. For ease of installation, do not secure the metal brace until later in the procedure.

Required tools: Phillips #2 screwdriver, to secure the metal brace

1 Take the affected partitions offline.

2 Remove the right-hand front bezel, which is attached to the I/E station. See Removing and Replacing Front Bezels on page 146 for instructions on removing the front bezels of the library.

3 Open the I/E station and access doors of the 9U Expansion Module.

4 Remove I/E station door from the 9U Expansion Module.

Slide the I/E station toward you as far as it will go. Then reach through the access door, and using your fingers, lift the silver pin that is located above the slide assembly. Hold up the upper pin while you pull the upper slide out a little. Then lift the lower pin to pull the I/E station slide assembly entirely out of the 9U Expansion Module.

5   Remove the tape magazines from the I/E station slide assembly.

Grip the middle of each tape magazine, several slots lower than where the barcode is located, and pull the magazine out of its container. Set the tape magazines aside.

6   Set aside the slide assembly.

7   Insert the tape magazines into the new slide assembly units, with the barcode at the top. Push the tape magazines all the way into the container.

8   Insert the two individual slide assembly units into the 9U Expansion Module. The slide assembly units should slide in easily.

9   Secure the metal brace to the two individual slide assembly units.

Using the screwdriver, first install a screw in the bottommost screw hole in the brace. Then install a screw in each remaining screw hole, working from the bottom up.
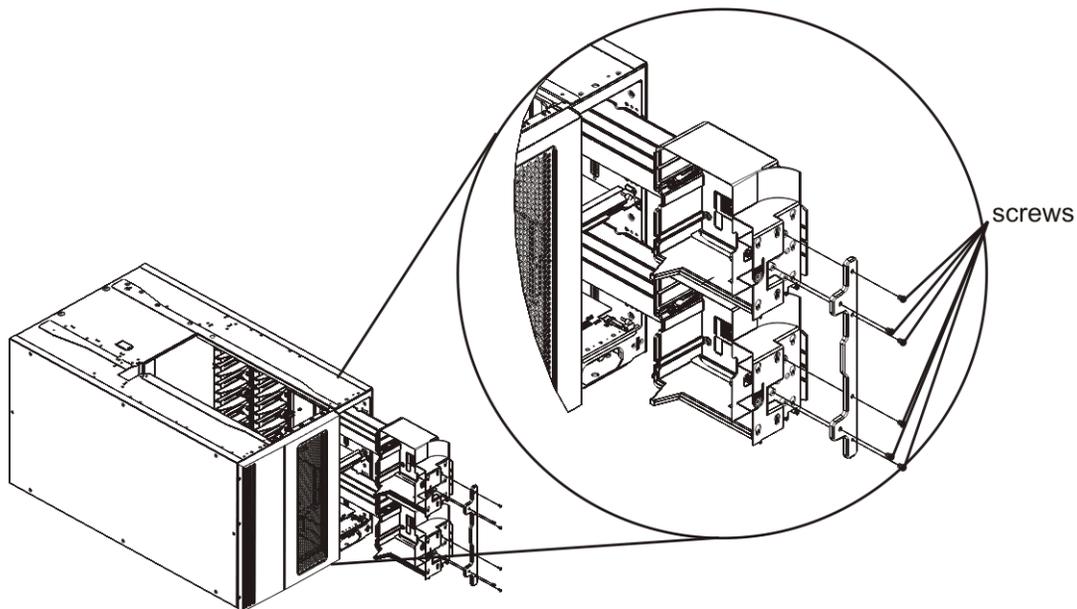
10   Ensure that the slide assembly is inserted completely into its slot, so that the door can close easily.

11   Close the I/E station door.

12   Replace the front bezel. See Removing and Replacing Front Bezels on page 146 for instructions on replacing the front bezels of the library.

13   Take the affected partitions back online.

Removing and Replacing the I/E Station

Removing the I/E Station

1 Take the affected partitions offline. For details about taking partitions offline, see

2 Open the I/E station and access doors of the 5U Library Control Module.

3 Slide the I/E station toward you as far as it will go. Then reach through the access door and push up on the silver roller located above the slide assembly. Pull the I/E station toward you until the roller is disengaged from the notch in the I/E station slide.

> **Note** The I/E station in a 9U Library Expansion Module has two slides and two silver rollers. Push up on the upper roller while you pull out on the upper part of the I/E station so that the roller is lodged outside of the notch on the I/E station slide. You may need to push down on the I/E station door to help hold the roller in place. Then push up on the lower roller to release the I/E station.
>
> You may also be able to push up on both rollers at the same time to release the I/E station.
>
> If necessary, you can push the silver rollers up far enough to latch in the cutout hole in the side frame. Ensure that they are unlatched when the I/E station is reinstalled.

4 Supporting the I/E station from underneath, remove the I/E station completely from the library.

5 Place the I/E station in a safe location.

Replacing the I/E Station

1 Supporting the I/E station from underneath, slide the I/E station into the glide slots in the library.

2 Slightly tilt the I/E station slide(s) down as they contact the roller(s) so that they slide in under the rollers. If they don't, you may need to push up on the roller(s).

3 Push the I/E station in until the roller locks into the notch in the slide assembly.

4 Close the access door.

5 Close the I/E station door.

6 Bring the affected partitions back online.

Removing and Replacing the I/E Safety Doors

The I/E safety doors provide a barrier to the inside of the library through the I/E station when the I/E station door is open.

Removing and Replacing the I/E Safety Door from a 5U Library Control Module

The I/E safety door assembly for the 5U Library Control Module consists of the following parts:

- Plastic door

- Spring

Required tools: None

1 Power off the library by pressing the power button on the front panel.

When the library is powered off, the robot assembly slowly falls to rest in the bottom module of the library.

2 Remove the I/E station (see).

3   Unhook the front spring wire from the tab on upper left of the safety door.
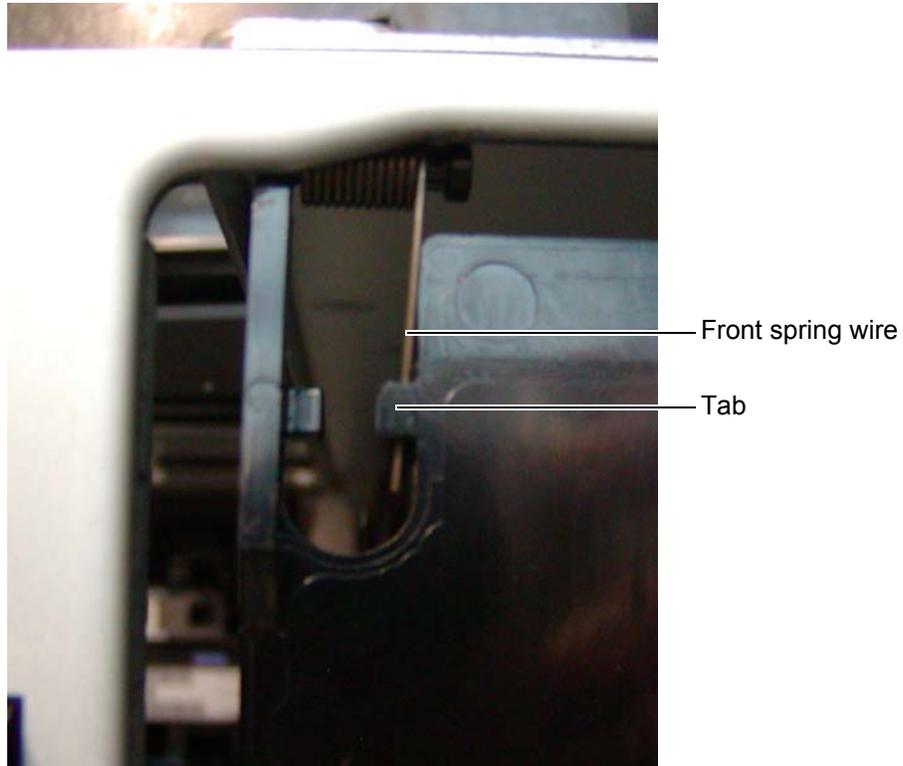
Front spring wire

Tab

4   Remove the right pivot pin from the right pivot hole by pushing the tab to the left. (The tab is located on the upper right of the safety door.).

Right pivot hole

Right pivot pin

Tab

5   Remove the left pivot pin from the left pivot hole by pushing the flexible piece of the safety door just beneath the left pivot pin toward the right.

Front spring wire

Press here
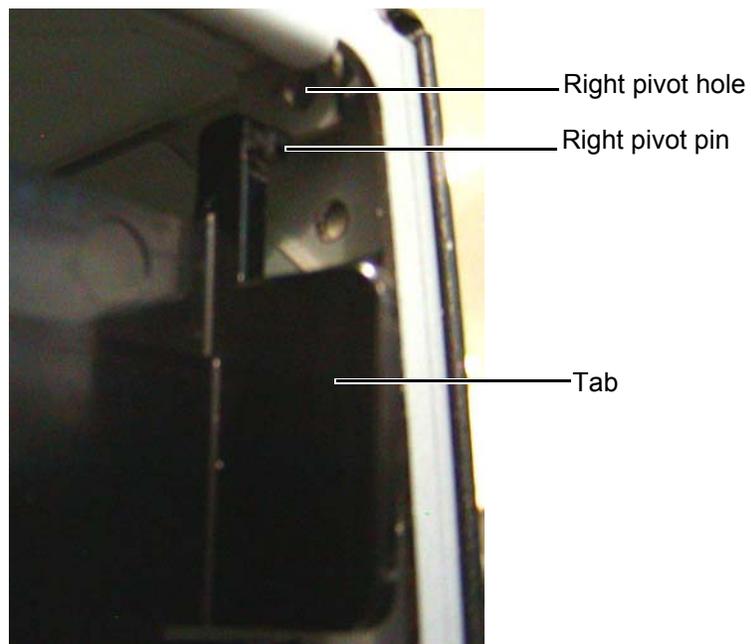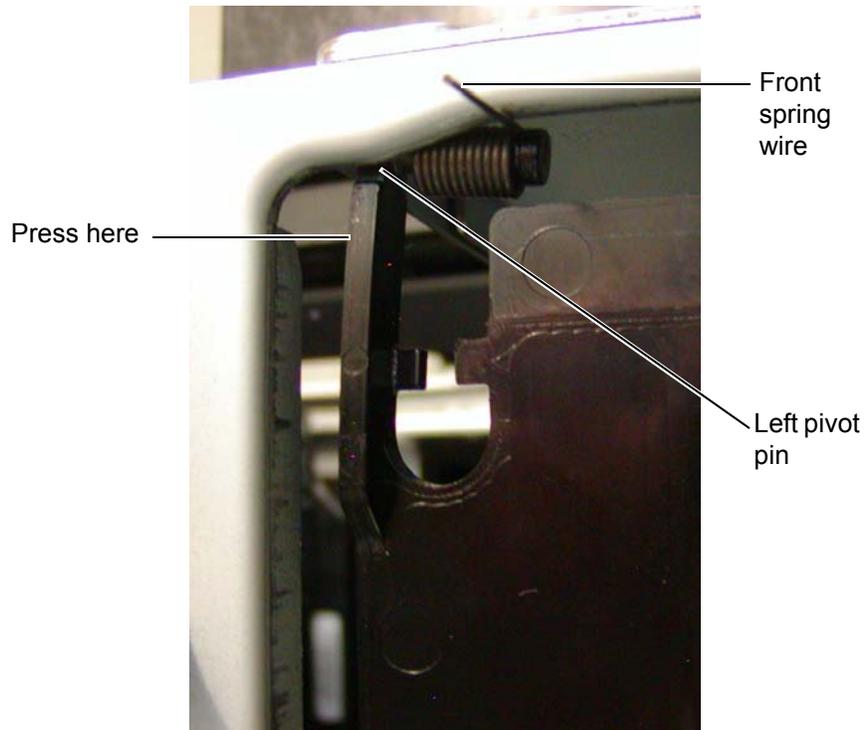
Left pivot pin

6   Remove the safety door from the library.

7   To replace the safety door, place the spring on the left pivot pin, and perform the above steps in the reverse order. When installing the safety door, position the spring as shown below.

Front spring wire

Rear spring wire
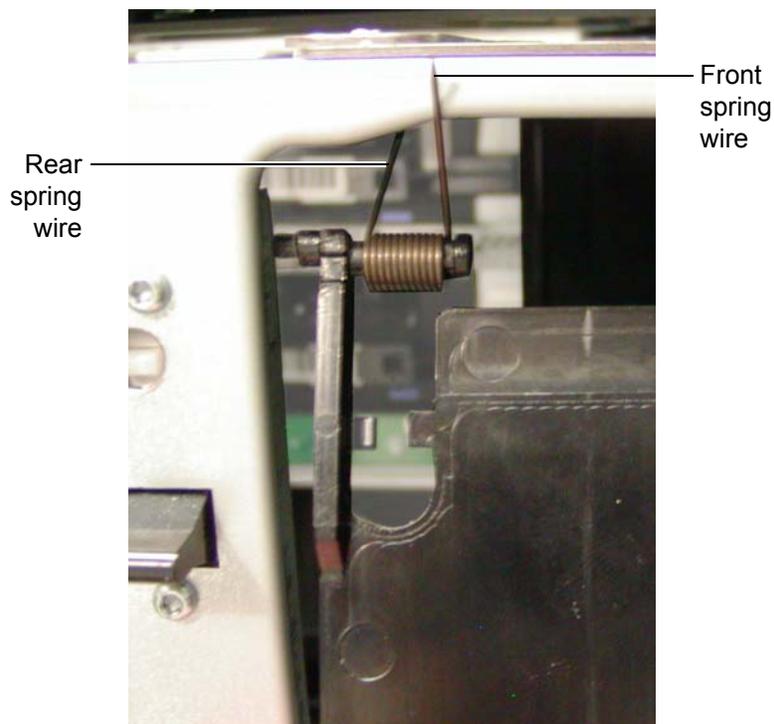
8   Replace the I/E station (see Replacing the I/E Station on page 154).

9   Power on the library.

Removing and Replacing the I/E Station Safety Door from a 9U Library Expansion Module

The I/E safety door assembly in a 9U Library Expansion Module consists of the following parts:

- Top door

- Bottom door

- Spring

- Plastic link that connects the two doors

> **Note**   In the most recent version of the library, only the bottom safety door contains a spring. In some older versions of the library, the top door contains a spring; and in other versions, both doors contain a spring. If you have an older version, adjust the instructions accordingly, making sure to unlatch all spring wires from their respective tabs and notches before removing the safety doors, and making sure to secure all spring wires when installing the doors.

Required tools: None

1   Power off the library by pressing the power button on the front panel.

When the library is powered off, the robot assembly slowly falls to rest in the bottom module of the library.

2   Remove the I/E station (see Removing the I/E Station on page 154).

3 On the top door, remove the right pivot pin from the right pivot hole by pushing the tab to the left. (The tab is located on the upper right of the safety door.)

Right pivot hole

Right pivot pin

Tab
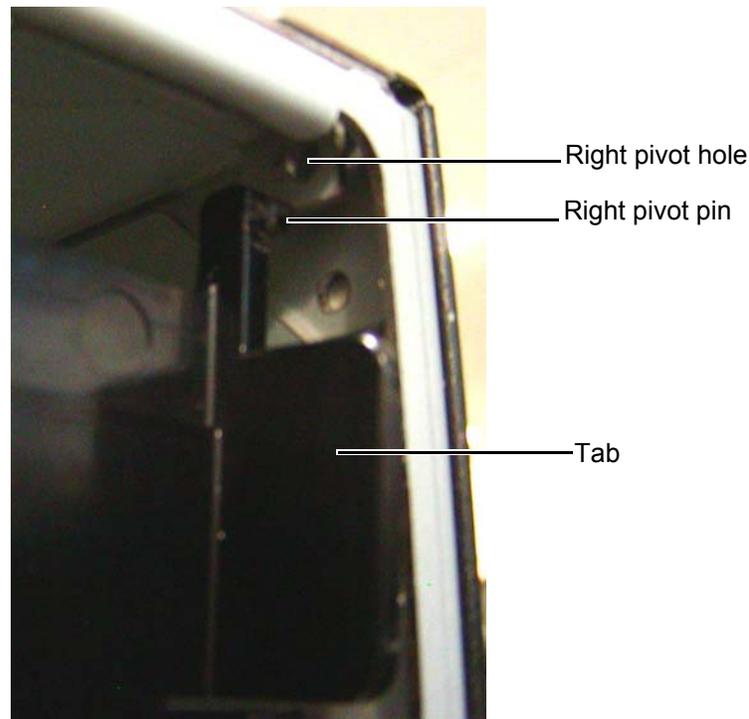
4 On the top door, remove the left pivot pin from the left pivot hole by pushing the flexible piece of the safety door just beneath the left pivot pin toward the right.

> **Note** If the top door has a spring, remove it as described in steps <u>Step 6</u> and <u>Step 7</u> on page 160. On very old libraries, there may not be a notch for the rear spring wire like the one shown in <u>Figure 22</u> on page 160, but there may be a small hole in the horizontal metal frame which holds the wire. Remove the wire from the hole and make sure, when reinstalling, to push the wire back into the hole.

Press here ———————————— Left pivot pin
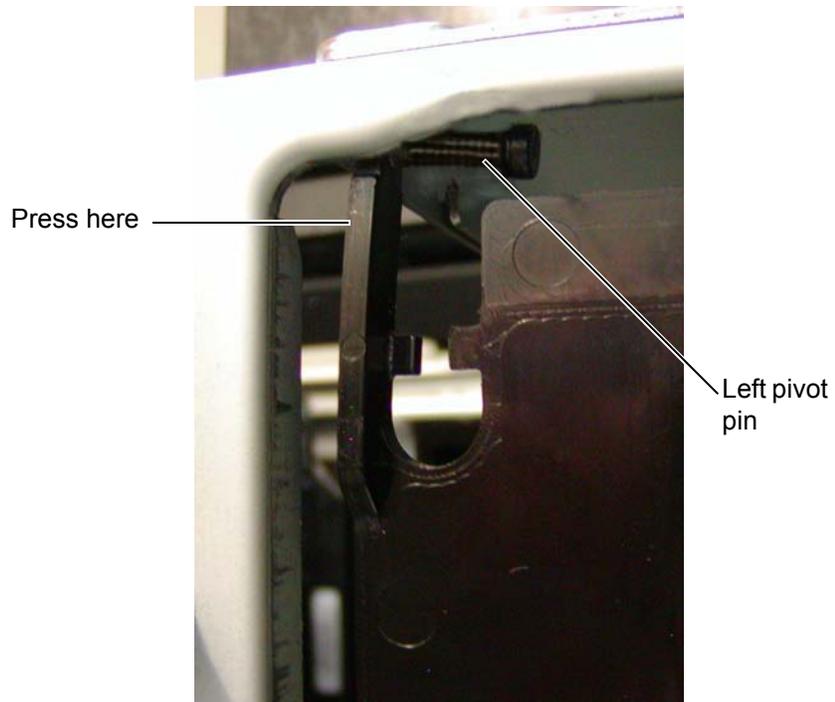
5 Gently set the top door down inside the library, taking care not to damage the plastic link that connects the two doors.

6 On the bottom door, unhook the front spring wire from the tab (see Figure 22).

7 Unhook the rear spring wire from the notch in the frame (see Figure 22).

Figure 22   Bottom Door
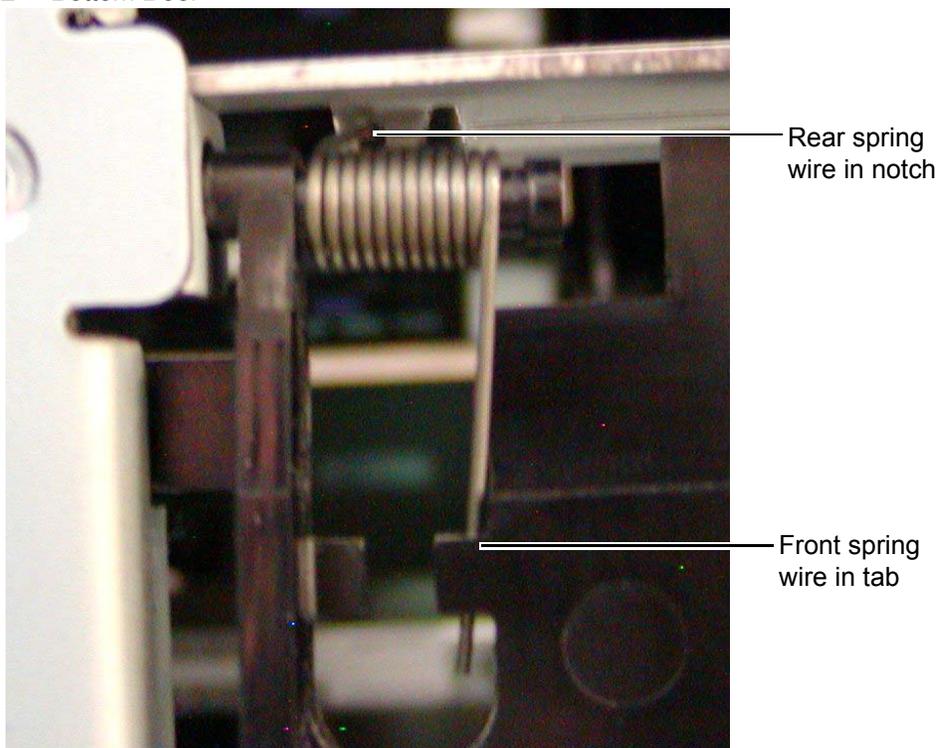
Rear spring wire in notch

Front spring wire in tab

8 On the bottom door, remove the right pivot pin from the right pivot hole by pushing the tab to the left. (The tab is located on the upper right of the safety door.)

Right pivot hole

Right pivot pin

Tab

9 On the bottom door, remove the left pivot pin from the left pivot hole by pushing the flexible piece of the safety door just beneath the left pivot pin toward the right.

Front spring wire

Press here
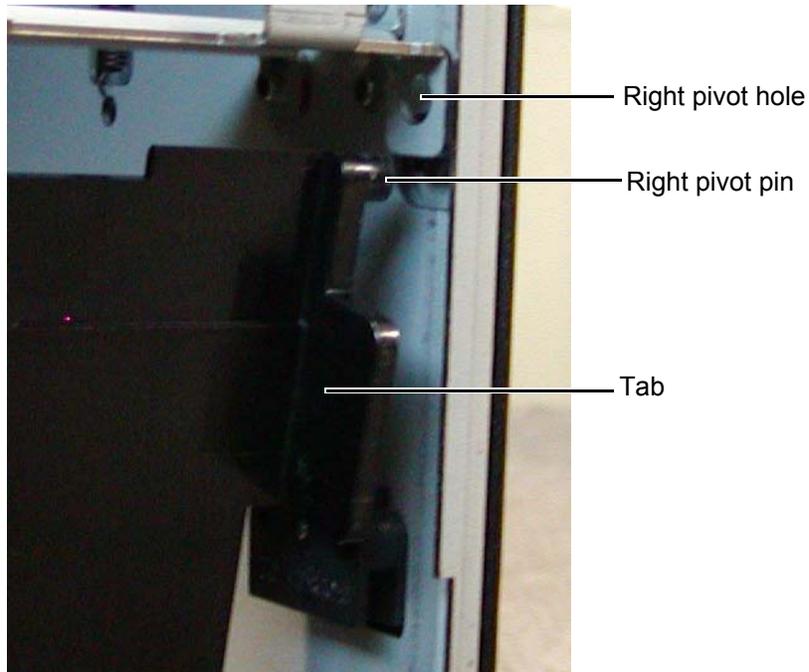
Left pivot pin
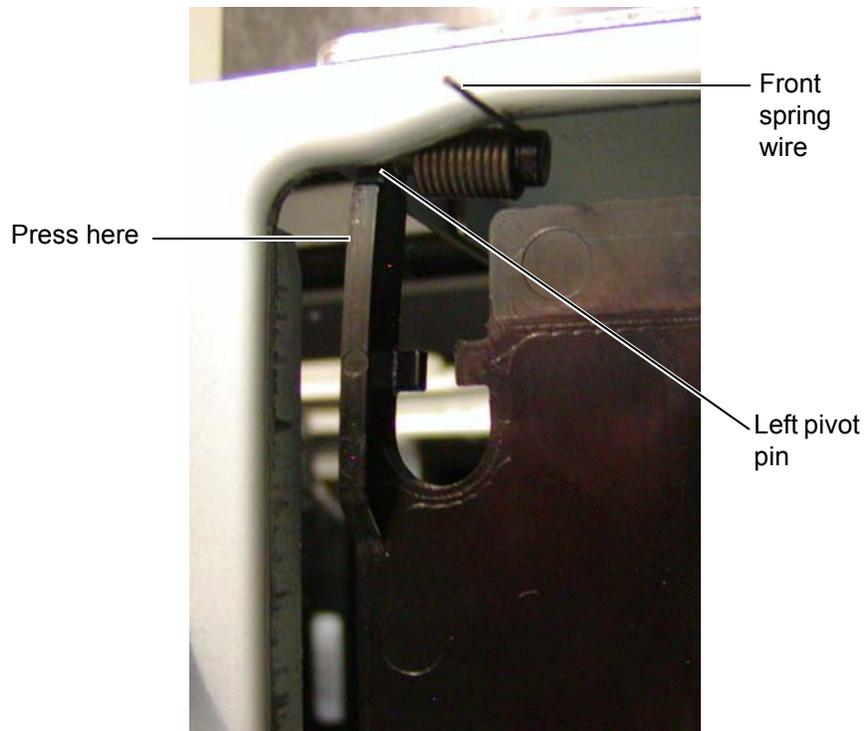
10 Remove the entire safety door assembly from the library through the library front access door.

11 Build the new safety door assembly to match the one you removed, by snapping the link into position on the left side of each door. Place the spring on the left pivot pin of the bottom door (or whichever pin it was on originally). If your library configuration used two springs, reuse one of the springs from the old door assembly.

12 Install the new safety door assembly by following the instructions above in reverse. Install the bottom door first. When installing, position the spring as shown below. When installing the top door, you can push open the bottom door to assist you in placing the top left pivot pin into position.
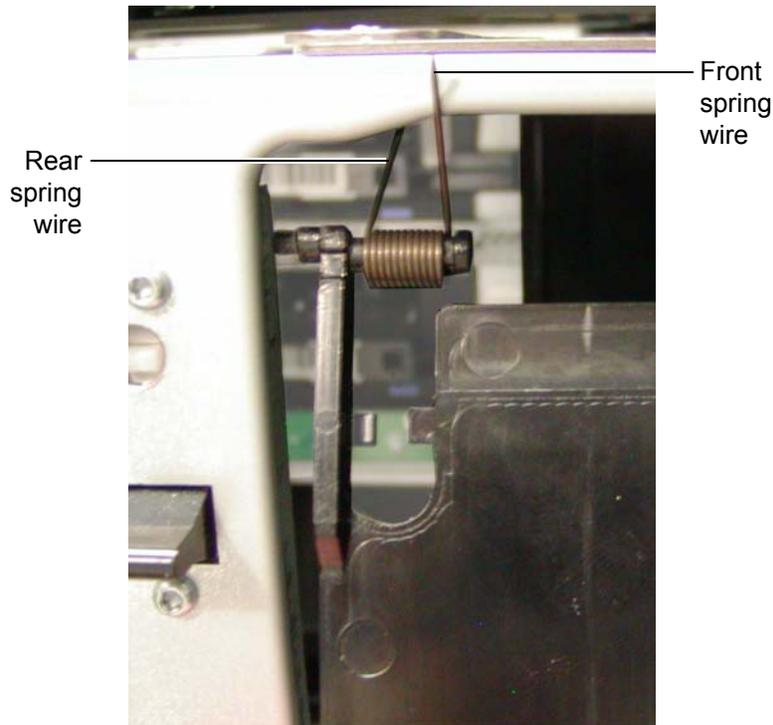
13 Replace the I/E station (see Replacing the I/E Station on page 154).

14 Power on the library.

Removing and Replacing the Operator Panel (LCD)

The operator panel enables you to control the library using the LCD screen located on the face of the 5U Library Control Module. Each library contains one operator panel.

These instructions explain how to replace an operator panel with a new one. You may need to replace an operator panel if there are problems with the current one.

Required tools: T10 TORX screwdriver, to detach and reattach the operator panel

1 Power off the library.

2 Open the I/E station door of the 5U Library Control Module.

Opening the I/E station door enables you to open the access door, to which the operator panel is attached.

3 Open the access door of the 5U Library Control Module. The operator panel is located on the back of this door.

4 Using your hands, remove the black cover plate on the back of the access door by squeezing it slightly on both sides and pulling it toward you. Set it aside.

5 Remove the four cables that are attached to the operator panel.

6 Using the screwdriver, remove the two screws that secure the operator panel to the access door.

> ⚠ **CAUTION**   **When removing the final screw, hold the operator panel to ensure it doesn't fall and become damaged.**
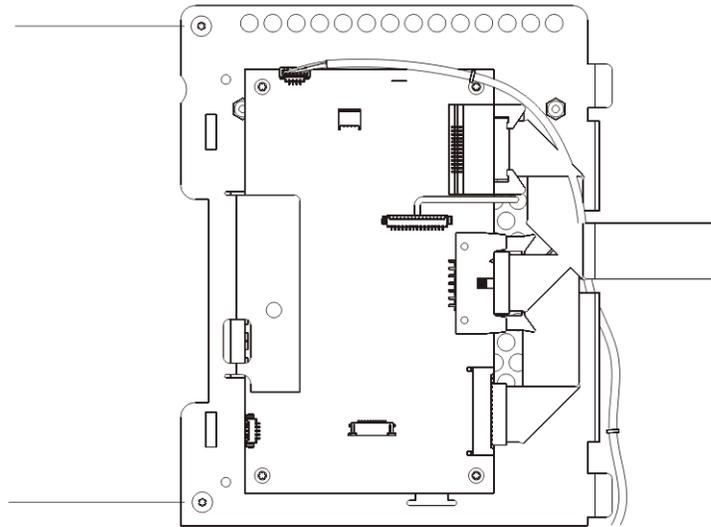
7 Remove the operator panel and replace it with the new one.

8 Using the screwdriver, tighten the screws to secure the new operator panel to the access door.

9 Reconnect the cables.

10 Replace the black cover that you removed earlier, and using your thumb, push the black push-pin to secure the cover to the access door.
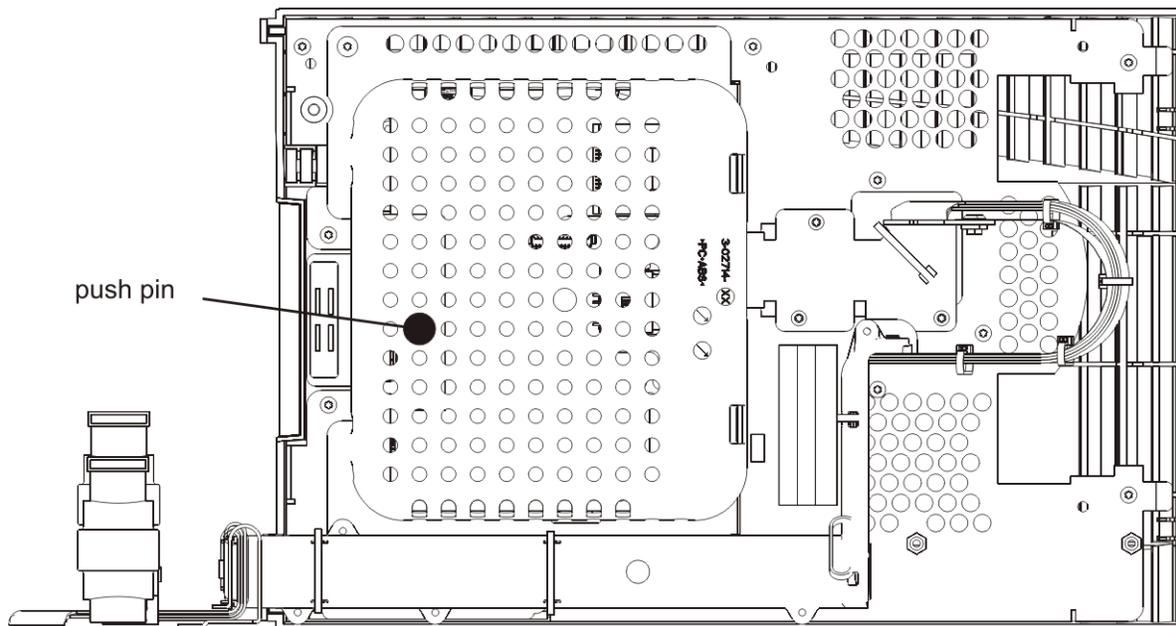
11 Close the access and I/E station doors.

12 Power on the library.

13 If the library does not power on using the front power button, verify that the cables on the LCD are properly seated.

Removing and Replacing the Robot Assembly

As of November 2008, the robot assembly was changed. For pictures illustrating the differences, see the procedures in this section or Robot Assembly on page 442. The two robots are identified as follows:

- Pre-November, 2008 - The robot will be referred to as the "Model 1 robot" and the components as the "Model 1 picker" and the "Model 1 Y-carriage assembly."

- November, 2008 and forward - The robot will be referred to as the "Model 2 robot" and the components as the "Model 2 picker," the "Model 2 Y-carriage assembly," and the "Model 2 robot controller board."

520G is the minimum version of library firmware that supports the Model 2 robot. The Model 2 robot allows access to five additional slots in the library (the second-from-bottom row of slots is now available; the Model 1 robot could not reach them).However, although Model 2 robot assemblies will "fit" onto libraries that were built with the Model 1 robot, Dell does not support switching them out. Robot versions must not be changed in the field. If a customer has a Model 1 robot, you must replace it with a Model 1 robot or components. Similarly, if a customer has a Model 2 robot, you must replace it with a Model 2 robot or components.

The instructions for the Model 2 assemblies differ from those for the Model 1 assemblies. Both sets of instructions are included below.

How to Determine Which Robot Your Library Contains

Physical Indicators

- 5U Library Control Module chassis part number, visible on the label on the lower rear center of the 5U Library Control Module:

    - The part number of the 5U Library Control Module chassis that contains Model 1 robots is 8-00389-xx.

    - The part number of the 5U Library Control Module chassis that contains Model 2 robots is 8-00534-xx.

- Model 2 robot label: Model 2 robots have an "M2" label located on the front of the Y-carriage assembly, visible from outside the library.

- Physical appearance: The Model 2 robot has a large PCB (called the *robot controller board)* on the Y-carriage assembly. It also looks different (for pictures, see <u>Robot Assembly</u> on page 442).

Software Indicators

- Operator panel **Tools > About Library** screen: Libraries containing a Model 2 robot have a line item called "Robot FW." Libraries containing Model 1 robots do not have this line item.

- Web client **Reports > System Information** screen: Libraries containing a Model 2 robot show a listing for "Robot Firmware Version" in the Physical Library section of the page. Libraries containing Model 1 robots do not have this listing.

- Snapshot/log files: The "Robot Firmware" entry noted above is contained in snapshots and logs for libraries containing Model 2 robots. Libraries with Model 1 robots do not have the "robot firmware" entry.

- RAS tickets: For all robot-related tickets, new "Element Type Specific" and "Element Type Description" values denote the robot type, as follows:

Robot Version	Element Type Generic	Element Type Specific	Element Type Description
Model 1	Robotics	10035	Accessor
Model 2	Robotics	10062	Accessor2

FRU Replacement Strategy For Model 1 and Model 2 Robots

Model 1 Robot — You receive either a picker assembly FRU or a Y-carriage assembly FRU, or both. You may replace one or the other, or you may build them into a complete robot assembly and replace it as a single unit.

Model 2 Robot — You receive one FRU (a complete robot assembly), which you must replace as a single unit. Do not take apart the robot assembly and attempt to replace individual components.

Removing the Model 1 and Model 2 Robot Assemblies from the Library

This instruction covers both the Model 1 robot and the Model 2 robots. Differences are noted where they exist. If a process step is the same for both types of robots, a figure may show only the Model 1 robot or component, but the action it illustrates is still correct.

Required tools:

- Phillips #2 screwdriver, for removing and replacing the top cover plate
- T10 TORX screwdriver, for loosening and tightening the thumbscrew that attaches the cable spool clip to the robot assembly

1 Power off the library.

When the library is powered off, the robot assembly slowly falls to rest in the bottom module of the library.

2 Park the robot assembly in the 5U Library Control Module. If the library is a single 5U Library Control Module, skip this step.

    a. Open the I/E station and access doors of each module.

    b. Using your hands, gently lift the robot assembly into the 5U Library Control Module. The robot assembly should glide slowly and with some resistance.

> ⚠️ **CAUTION**   **Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

    c. After raising the robot assembly to the approximate middle of the 5U Library Control Module, hold it in place with one hand, and using your other hand, move the parking tab to the "parked" position (**Model 1 parking tab**: swivel toward you; **Model 2 parking tab**: move in a counter-clockwise direction). The metal parking tab is located at the bottom of column 1.

    d. Gently release the robot assembly to rest on the parking tab.

Model 2 tab

Model 1 tab

3 Unstack the 5U Library Control Module from the library.

Note   You can skip this step if:

- There are no 9U Expansion Modules stacked on the 5U Library Control Module, *and*
- There are 12 inches of clearance above the 5U Library Control Module.

a. Before removing the 5U Library Control Module, you must first remove all 9U Expansion Modules (if any) above the 5U Library Control Module. See Permanently Removing 9U Expansion Modules From an Existing Library on page 75.

Note   If your library is rackmounted, you will need to perform additional steps to remove the module from the rack. For details, see Using the Rack-mount Kit to Install a Library in a Rack on page 108.

b. Remove the 5U Library Control Module. See Replacing a 5U Library Control Module on page 84.

If the 5U Library Control Module's top cover plate is still in place, remove it. Use the Phillips screwdriver to loosen all screws to remove the cover.

Note On newer versions of the top cover, the screws are retained in the cover. Partially loosen all screws before completely loosening any one screw. Loosening one screw completely while the others are tight can cause the retaining clip of the screw being loosened to come off. In older versions of the top cover, remove the screws and set aside.

Screws

Screws
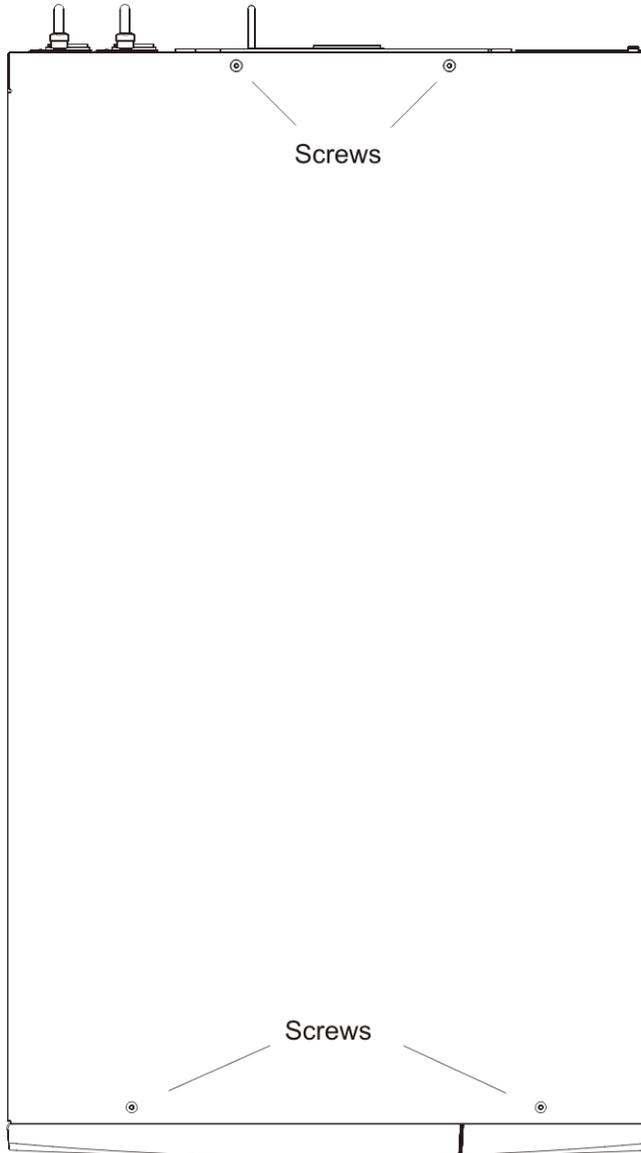
4 If the I/E station and access doors on the 5U Library Control Module are not open, open them now. This makes it easier to access the robot.

5 Carefully grip the picker and pull it toward the front of the library.
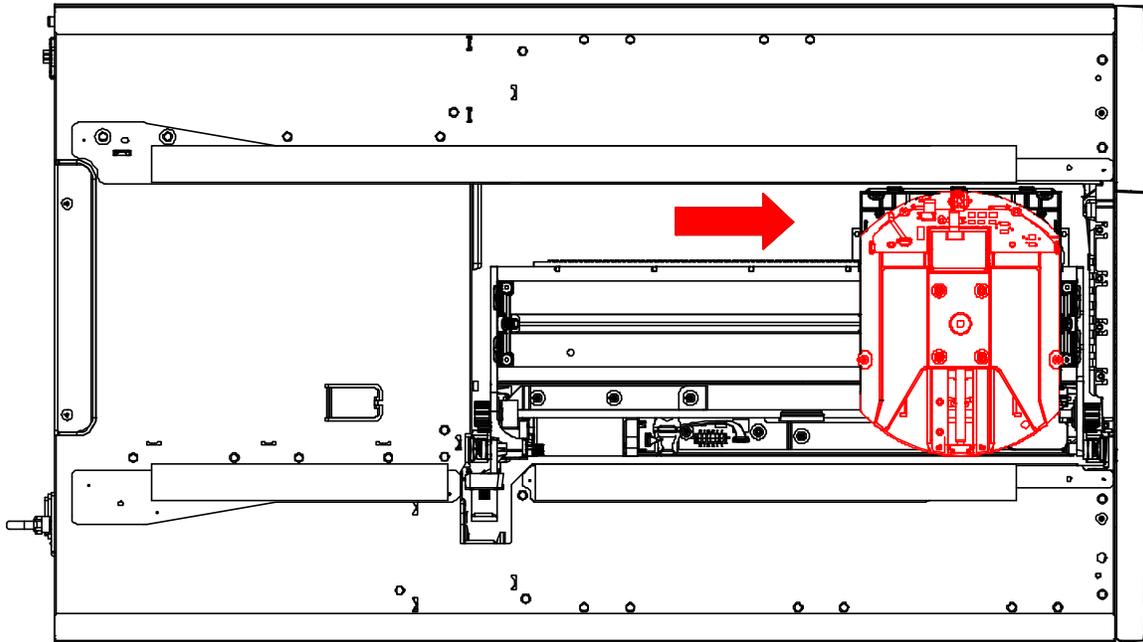
6 Grip the robot in the center of the tray.

7 Carefully lift the robot out of the 5U Library Control Module and place it at an angle on top of the 5U Library Control Module. Be careful not to pinch the cable spool flex circuit.
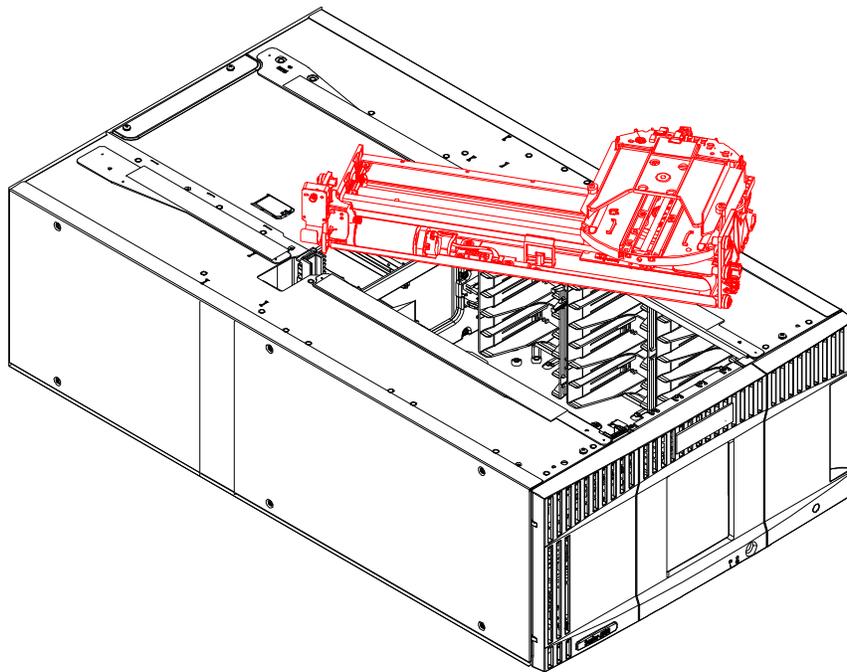
8 Unscrew the captive thumbscrew that attaches the cable spool to the robot assembly, and pull the cable spool flex circuit off the assembly.

Thumbscrew
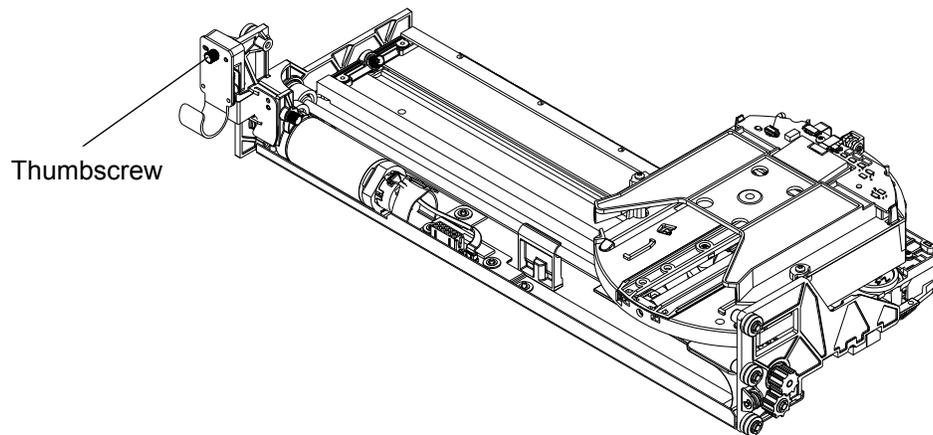
9 Lay the cable spool circuit across the library so that it rests on the edge. (This keeps it from falling inside.)
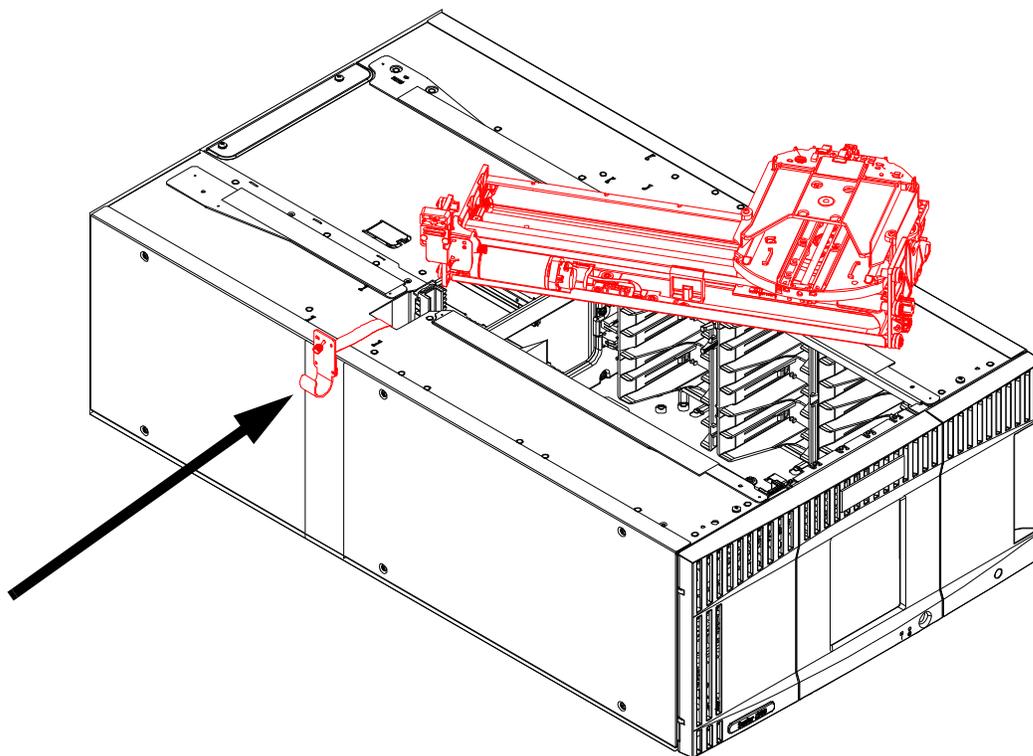
10 Perform any needed replacement or repairs, following the instructions in the appropriate sections of this manual. Then proceed to Installing the Model 1 and Model 2 Robot Assemblies in the Library on page 171.

General Service and Replacing FRUs

Installing the Model 1 and Model 2 Robot Assemblies in the Library

This instruction covers both the Model 1 and the Model 2 robots. Differences are noted where they exist. If a process step is the same for both robots, a figure may contain only the Model 1 robot or component, but the action it illustrates is still correct.

Required tools:

- Phillips #2 screwdriver, for removing and replacing the top cover plate
- T10 TORX screwdriver, for loosening and tightening the thumbscrew that attaches the cable spool clip to the robot assembly

1 Place the robot assembly on top of the 5U Library Control Module at an angle, as shown below. This position keeps the cable from kinking when you attach the cable spool in the next step.
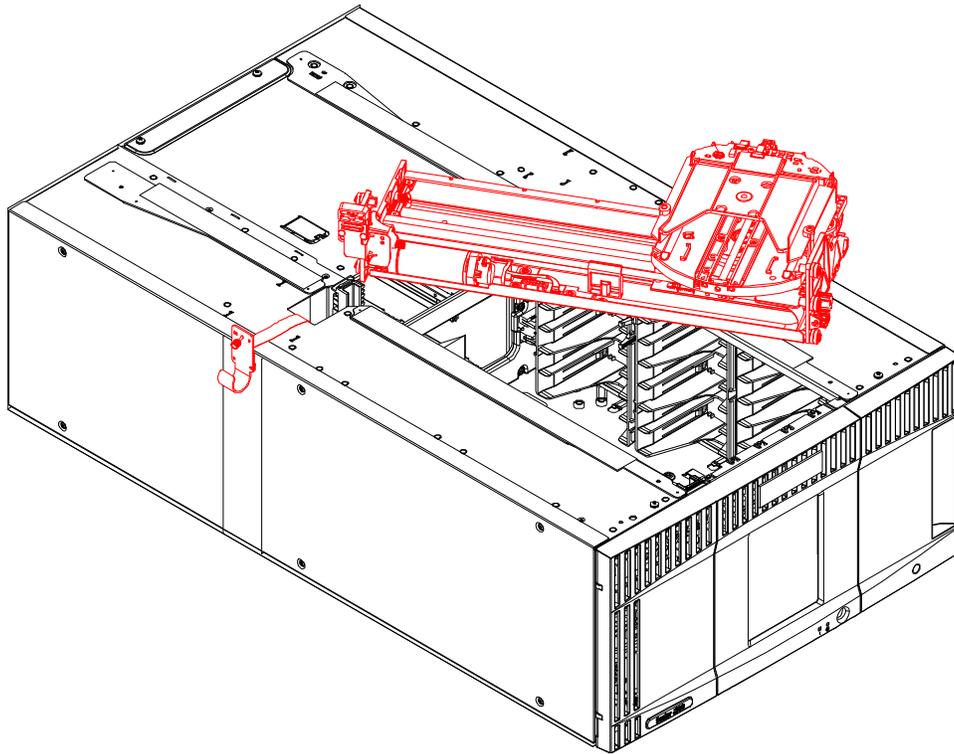
2 Reattach the cable spool to the robot assembly, using the thumbscrew on the cable spool clip. Use the T10 TORX screwdriver to tighten the thumbscrew until the attached lock washers compress. Do not over-tighten, as this could break the thumbscrew.

3 **Model 1 Robot Only - Placing in Library** — Follow this step for the Model 1 robot only:

a. Lift the robot from the center of the tray and hold it at a 30-degree angle to the 5U Library Control Module. Insert the front and rear lower guide rollers into the gear rack on the Y-rail, then lower the robot slightly until both the front and rear gears make contact with the gear rack.

Note   It is very important to hold the robot at a 30-degree angle until both the front and rear gears contact the gear rack on the Y-rail.

30°
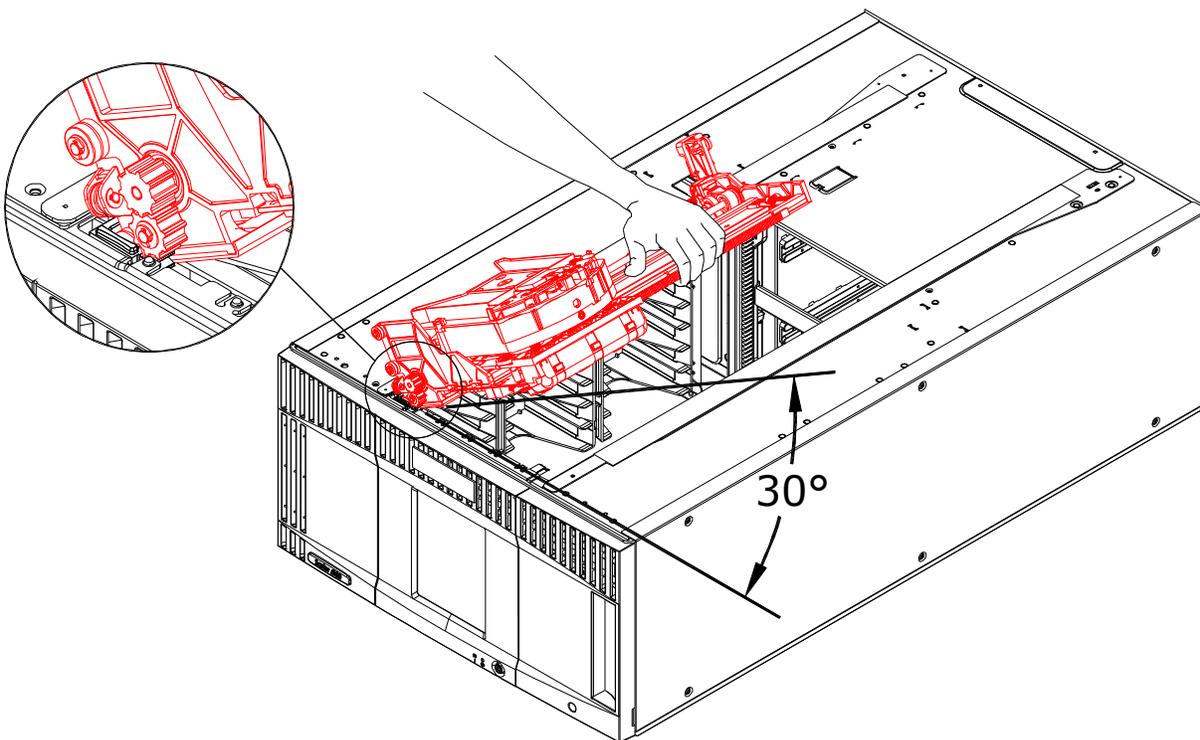
b. Rotate the robot so that it is level with the library. Do not allow either the front or rear lower guide rollers to exit the gear rack on the Y-rail. As you rotate the robot into the level position, the gears will rotate and engage in the gear rack.
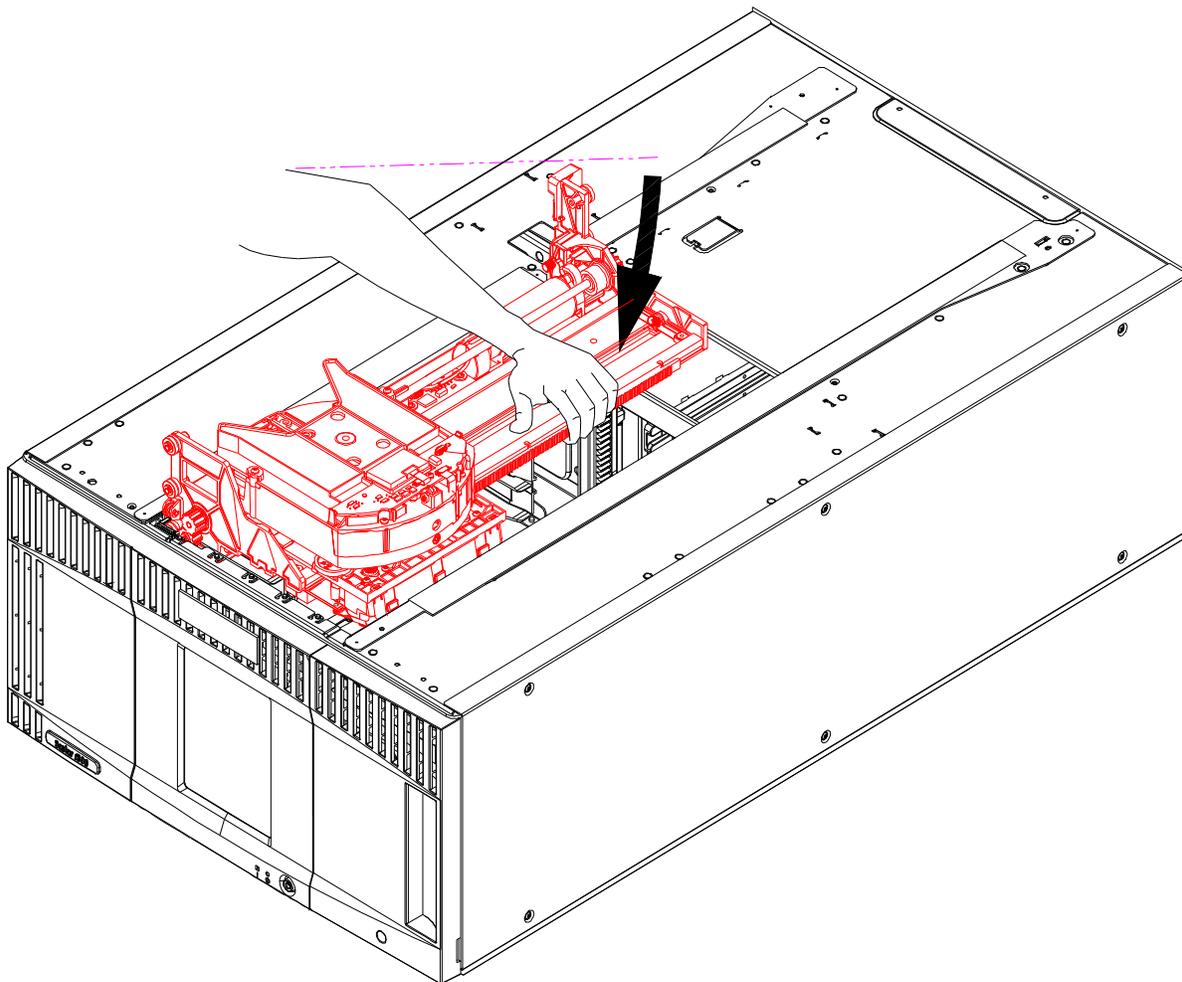
4   Model 2 Robot Only - Placing in Library — Follow this step for the Model 2 robot only:

    a.   Hold the robot with both hands. Keeping the robot level, insert the front and rear lower guide rollers into the gear rack on the Y-rail, then lower the robot slightly until both the front and rear gears make contact with the Y-gear rack. Do not allow the front and rear rollers to exit the gear rack. Exert slight pressure on the robot toward the left side of the library.
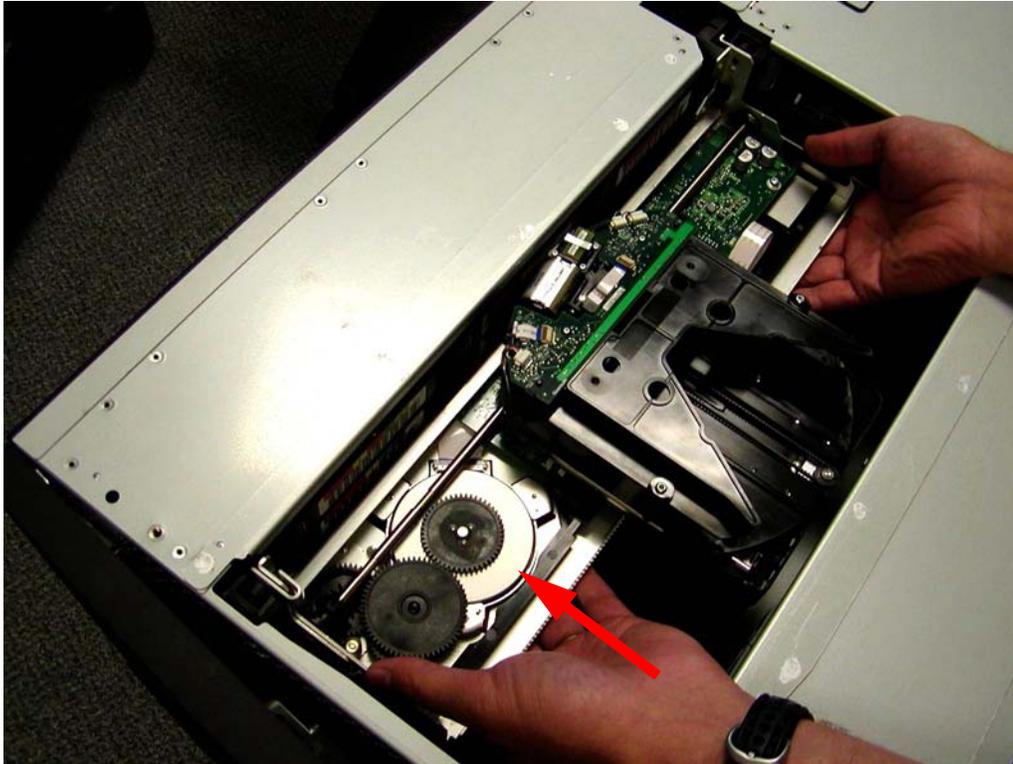
5 While supporting the center of the robot tray, slowly lower the robot until the top of the Y-climber front shelf mount is even with the front gear rack on the Y-rail. You may need to exert slight downward pressure on the robot to engage the gears in the gear rack and begin lowering the robot.

While continuing to hold the robot level, verify that the Y climber rear shelf mount is level with the rear gear rack on the Y-rail. Check both places indicated in the figure below. If it is level, continue to the next step. ***If it is off by more than 2 mm, the robot is NOT LEVEL. Disengage the robot from the gear rack and repeat the previous step.***
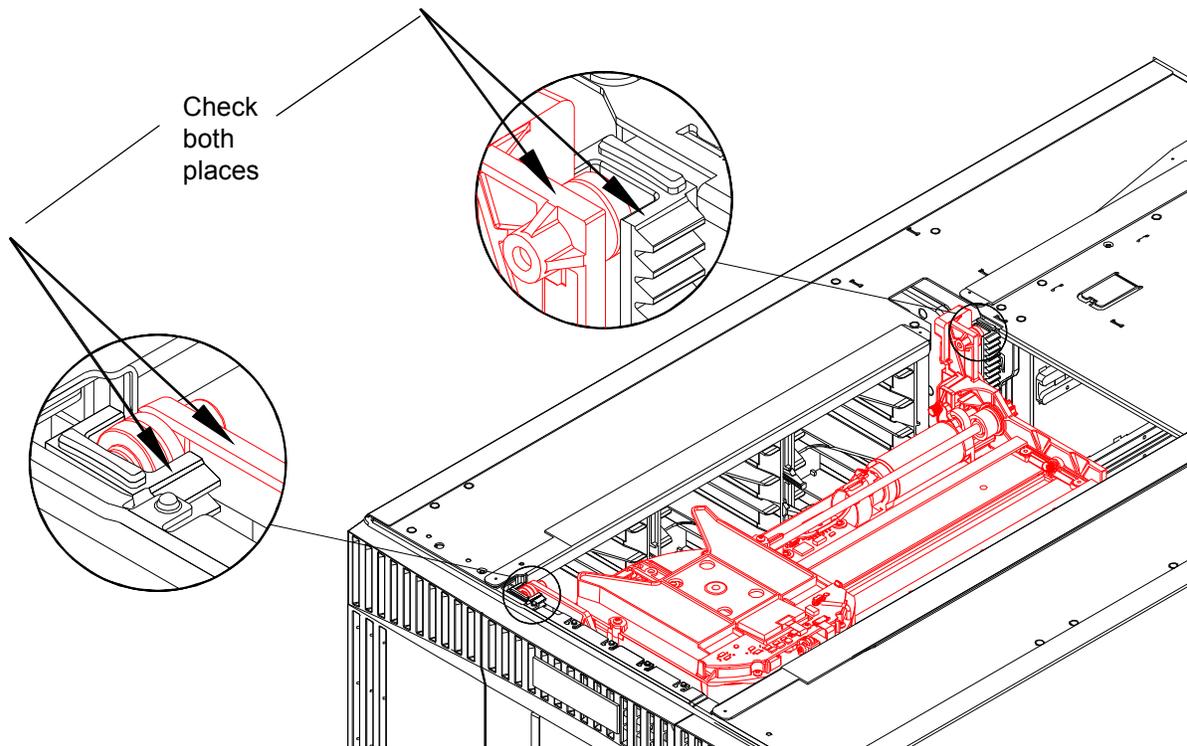
6 After you have verified that the front and rear shelf mounts are level with the Y racks, lower the robot so that it rests on the parking tab. (If your library consists of a single 5U Library Control Module, release the robot so that it rests on the bottom of the unit.)

7 Replace the top cover.

8 Re-stack the library modules as necessary.

> **Note** If your library is rack-mounted, you will need to perform additional steps to add the modules to the rack.

9 Unpark the robot assembly. (If your library consists of a single 5U Library Control Module, skip this step.)

    a. Gently raise the robot assembly so that it no longer rests on the parking tab.

> **CAUTION** **Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

b. With your free hand, move the parking tab to the "unparked" position so that it is removed completely from the interior of the module (**Model 1 parking tab:** swivel the parking tab away from you; **Model 2 parking tab**: move in a clockwise direction). When replaced correctly, the parking tab will not accidentally swivel into the path of the robot.

c. Gently release the robot assembly. It will lower to the bottom module of the library.

Model 2 tab

Model 1 tab

10 Close the library's I/E station and access doors.

11 Power on the library.

Removing and Replacing the Model 1 Picker Assembly from the Y-Carriage Assembly Inside the Library

The picker is the robotic device with mechanical "fingers" that open and close to handle data cartridges inside the library. The picker is housed in the control module, though it can traverse up and down the entire length of the library.

When the library is powered off, the picker rests in the bottom module of the library, regardless of where the control module is located.

These instructions describe how to replace the picker with a new one. You may need to replace the picker if there are problems with the current one.

⚠ CAUTION	**Follow proper ESD protocol any time you are handling the robot assembly or any of its components (picker, Y-carriage assembly).**

⚠ CAUTION	**Handle the picker assembly and flex cable gently. Do not crease or tear the flex cable.**

Required tools: T10 Torx screwdriver, to loosen the picker assembly thumbscrews

1   Power off the library.

   When the library is powered off, the robot assembly slowly falls to rest in the bottom module of the library. You can service the picker assembly from this bottom module.

2   Open the bottom module's I/E station and access doors.

3   Reach inside the access door and rotate the picker so you can access the X-axis flex cable, which is located to the left of the picker.

   To obtain easy access to the X-axis flex cable, rotate the picker so its fingers point to the left rear corner of the control module.

4   Disconnect the X-axis flex cable.

   Using your hand, squeeze the tab of the flex cable, and then pull the cable out and up. The other end of the flex cable remains attached.

tab of flex cable
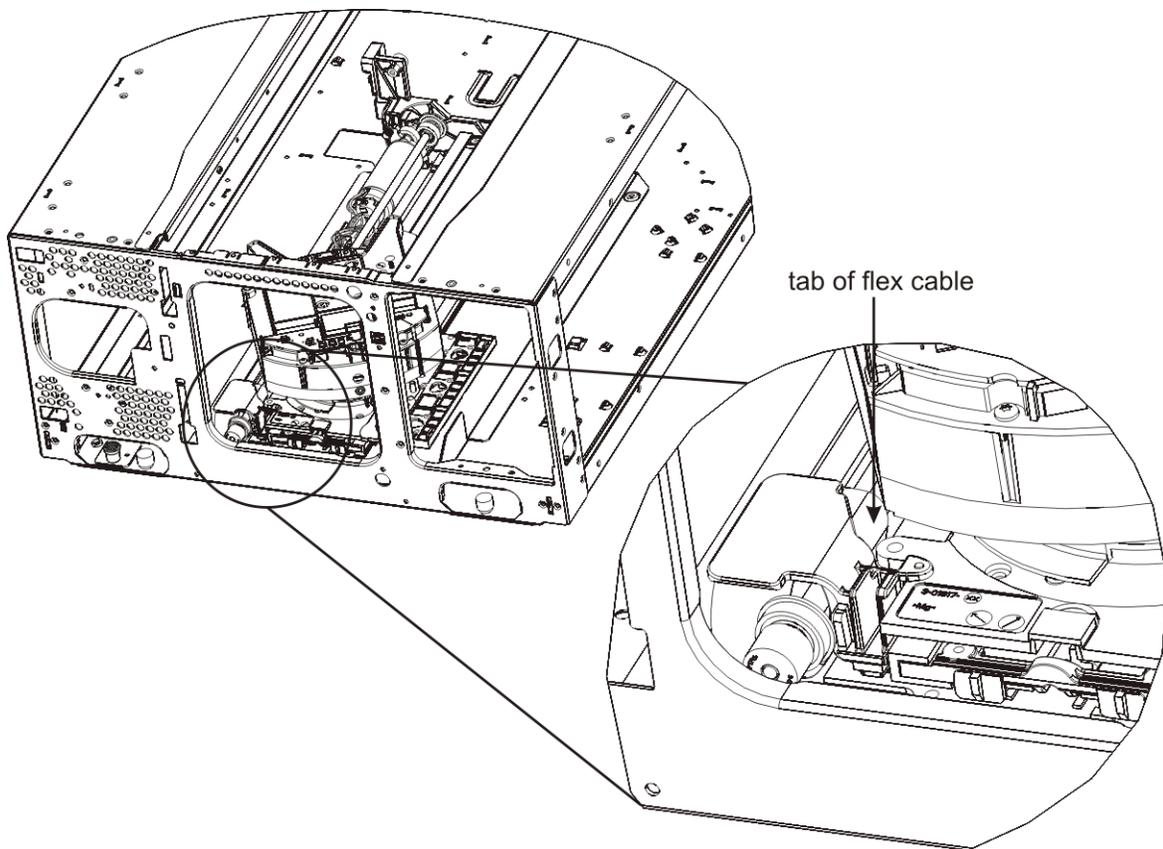
5 Using the T10 Torx screwdriver, loosen the thumbscrews located at the front and back of the picker assembly. You may need to slide the picker to access the thumbscrews.

thumbscrews

front of library
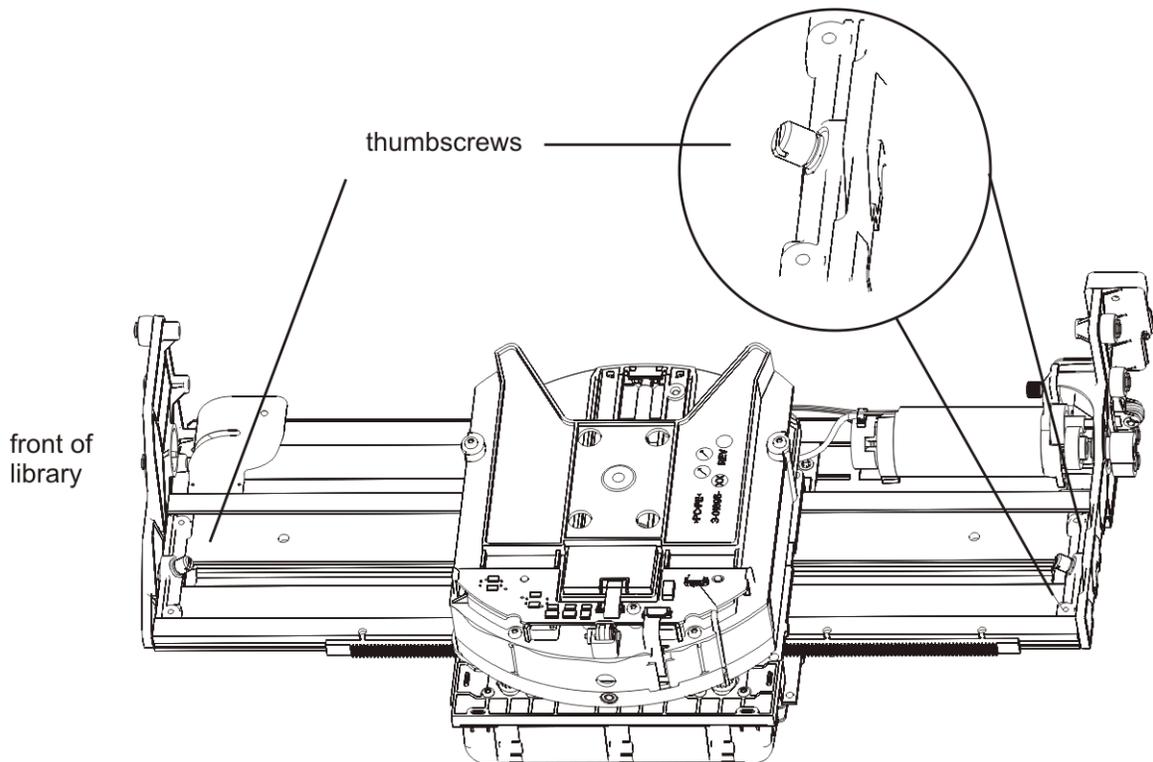
6 Lift the picker assembly up and out of the 5U Library Control Module, through the access door. You will need to turn it on its side to remove it from the access door.

7 Replace the picker assembly with the new one. When inserting the new picker assembly, first align the rear indexing features, and then align the front indexing features and set the assembly into place. The picker assembly must be level.

8 Tighten the thumbscrews located at the front and back of the picker assembly.

9 Reconnect the X-axis flex cable. Remember that the black tab of the X-axis flex cable should be positioned above the bar of the picker assembly.

Align the semi-circular part of the flex cable's tab with the post on the translator base of the picker assembly. Squeeze the tab, and push the cable connector down into its socket. Then push the tab toward the picker until it snaps into place.

⚠ CAUTION	**The X-axis flex cable connection is necessary to provide the power-off braking feature to the robot assembly.**
	After you finish installing the picker and connecting the cable, test the installation. To do this, support the robot assembly under the broad metal X-axis base plate and lift the assembly. (Do NOT lift by the thin metal rod or the black plastic picker body.) You should feel resistance as you lift the robot assembly. Next, place one hand below the robot assembly and allow the assembly to fall to your hand. It should descend slowly. If you feel no resistance, or if the robot assembly falls quickly, re-check the X-axis cable connection.
	Failure to perform these steps may result in damage to the robot assembly.

10 Close the module's doors.

11 Power on the library.

Removing and Replacing the Model 1 Y-Carriage Assembly

The Y-carriage assembly enables the picker to move up and down the length of the library, from one module to another. The Y-carriage assembly, along with the picker assembly, makes up the entire robot assembly.

These instructions explain how to remove the Y-carriage assembly and replace it with a new one. To replace the Y-carriage assembly, you must remove the entire robot assembly (the Y-carriage assembly and the picker assembly) from the library.

Required tools:

- Phillips #2 screwdriver, for removing and replacing the top cover plate
- T10 TORX screwdriver, for loosening and tightening the thumbscrew that attaches the cable spool clip to the robot assembly

1 Remove the robot assembly from the library, following the complete instructions in

2 Separate the robot into the Y-carriage assembly and picker assembly. For details, see <u>Removing and Replacing the Model 1 Picker Assembly from the Y-Carriage Assembly Inside the Library</u> on page 176. (The instructions for removal are the same whether inside or outside of the library.)

Model 1 robot
Y-carriage assembly
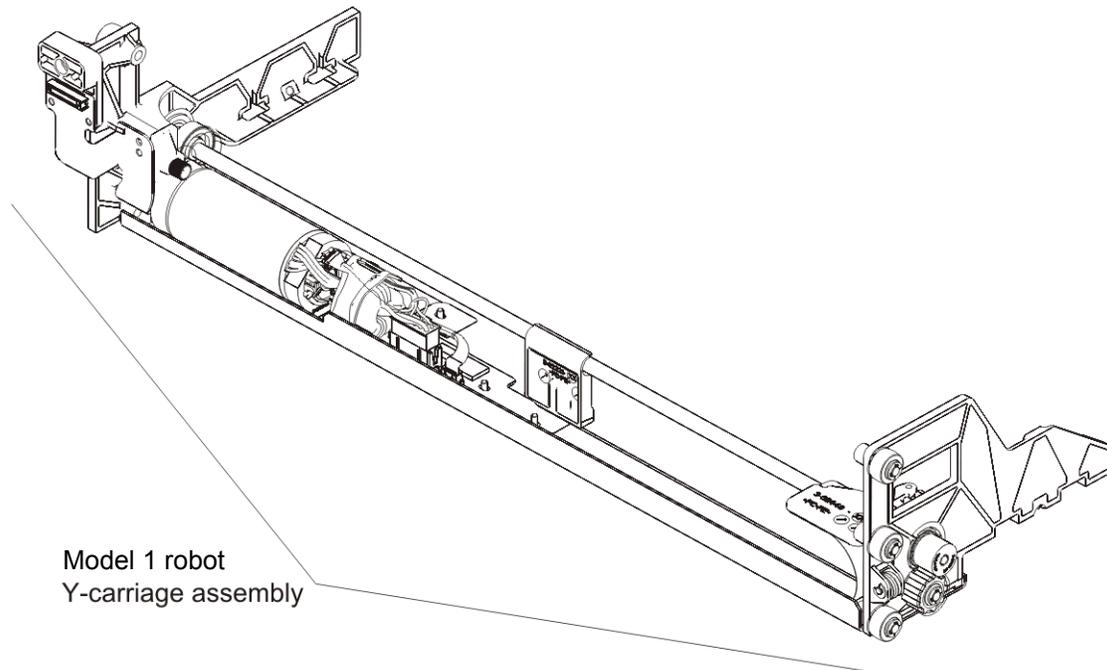
3 Reassemble the new Y-carriage assembly and the picker assembly outside of the module.

4 Replace the robot in the library, following the complete instructions in <u>Installing the Model 1 and Model 2 Robot Assemblies in the Library</u> on page 171.

Removing and Replacing the Cable Spool

The cable spool and Y-carriage assembly enable the picker to move up and down the span of the library, from one module to another. The cable spool is housed in the 5U Library Control Module. To remove the cable spool, you must also remove the Y-carriage assembly.

These instructions explain how to remove the cable spool and replace it with a new one. You may need to replace the cable spool if there are problems with the current one.

> ☒ Note   It is much easier to remove and replace the cable spool if you remove the 5U Library Control Module from the library configuration.

Required tools:

- Phillips #2 screwdriver, for removing and replacing the top cover plate
- T10 TORX screwdriver, for loosening and tightening the screw that secures the cable spool to the chassis

Preparing the Library

1 Power off the library.

When the library is powered off, the robot assembly slowly falls to rest in the lowest module of the library.

2 Park the robot assembly in the 5U Library Control Module. Before you unstack the library, the robot assembly must be placed in the 5U Library Control Module.

    a. Open the I/E station and access doors of each module.

    b. Using your hands, gently lift the robot assembly into the 5U Library Control Module. The robot assembly should glide slowly and with some resistance.

> ⚠ **CAUTION**   **Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

    c. After raising the robot assembly to the approximate middle of the 5U Library Control Module, hold it in place with one hand, and using your other hand, move the parking tab to the "parked" position (**Model 1 parking tab**: swivel toward you; **Model 2 parking tab**: move in a counter-clockwise direction). The metal parking tab is located at the bottom of column 1.

d. Gently release the robot assembly to rest on the parking tab.

Model 2 tab

Model 1 tab

3 **Optional:** Unstack the 5U Library Control Module from the library, following the steps below:

📝 Note
Unstacking the control module is not required, but may be helpful if the library is tall or if there is not enough room above the control module to remove the top cover and the robot.

📝 Note
Before removing the 5U Library Control Module, you must first remove all 9U Expansion Modules (if any) that are located above the 5U Library Control Module.

⚠️ **WARNING**
WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, A 5U LIBRARY CONTROL MODULE WEIGHS APPROXIMATELY 60 LBS (27.2 KG). A 9U EXPANSION MODULE, WITHOUT TAPE DRIVES, TAPE CARTRIDGES, OR POWER SUPPLIES, EXCEEDS 65 LBS (29.5 KG).

TO AVOID SERIOUS INJURY, AT LEAST TWO PEOPLE ARE REQUIRED TO SAFELY LIFT THE MODULES.

a. Remove the power supplies from all modules you are removing. For details, see Removing and Replacing a Power Supply on page 107.

b. Remove the tape drives from all modules you are removing. For details, see Removing and Replacing a Tape Drive on page 129.

c. Remove the cartridges from all modules you are removing.

⚠ CAUTION	**Tape cartridges are assigned to partitions. When removing tape cartridges, make sure to keep track of which partitions the cartridges come from, so you can put them back into the same partitions later.**

d. Remove all 9U Expansion Modules (if any) that are located above the 5U Library Control Module. For details about unstacking and removing modules from a rack, see Removing the 9U Expansion Module on page 93.

e. Remove the 5U Library Control Module. You will also need to remove the modules from the rack. For details about unstacking and removing from a rack, see Removing the 5U Library Control Module on page 84.

4 If the 5U Library Control Module's top cover plate is still in place, remove it now.

Using the Phillips screwdriver, remove the screws from the top cover plate and set the plate and screws aside.

5 **Optional:** Using the T10 TORX screwdriver, remove the side cover panel on the left side of the control module.

> **Note** Removing the side cover panel is not required, but doing so makes it easier to remove the cable spool.

Removing the Cable Spool

1 While holding the picker securely in your hand, reach inside the 5U Library Control Module and remove the cable spool clip from the Y-carriage assembly. Unscrew the thumbscrew that attaches the cable spool to the Y-carriage assembly, let the picker drop down, and pull the cable spool clip off of the assembly.

> ✎ **Note**   The figure below shows the Model 1 robot assembly and cable spool. If you are working on a Model 2 robot assembly and cable spool, they will look slightly different, but the way they attach together is the same.

detach cable spool here
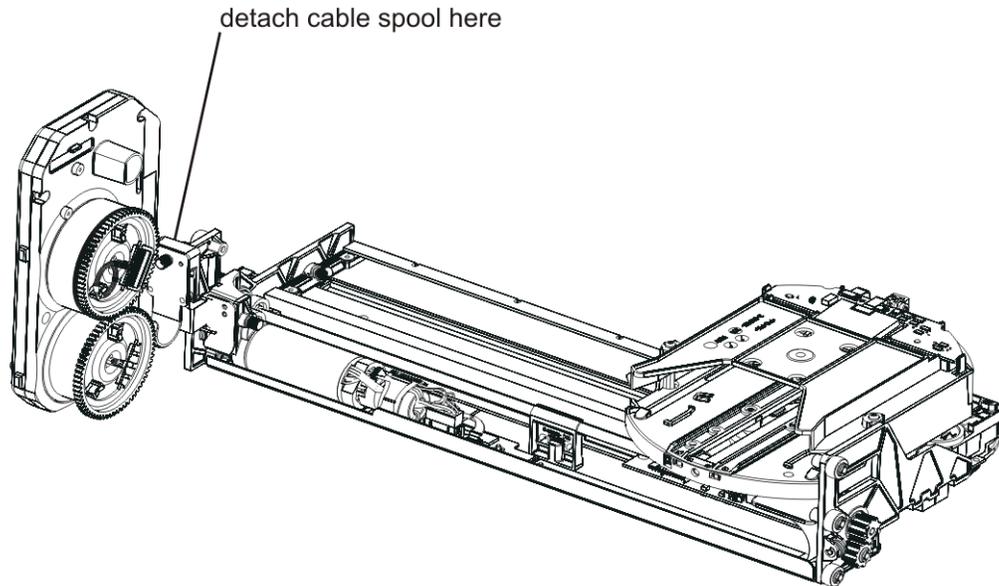
2 Remove the entire robot assembly from the 5U Library Control Module.

> ⚠ **CAUTION**   **Do not support the Y-carriage assembly by the thin metal rod. Lifting the assembly by the thin metal rod will bend the rod.**

To remove the robot assembly, lift the assembly up and out of the top of the 5U Library Control Module.

3 Remove the three tape columns located on the left side of the 5U Library Control Module.

You must remove the tape column located at the front left of the module before removing the other two tape columns. Remove each column by pulling it forward (toward the front of the library) until it unsnaps from the chassis wall, and then pull it gently to the center of the library. For more instructions on removing the columns, see .

> ⚠ **CAUTION**   **Tape columns must be replaced in their original locations, because each column has fiducial indices that help to guide the picker assembly. Consider labeling the tape columns so you can be sure that you replace them in their original locations. Otherwise, the library's self-test will fail.**

4   Using the T10 TORX screwdriver, loosen the screw that secures the cable spool to the chassis.

> **Note**   The external appearance of the cable spool on your library may differ slightly from the one shown in the figure below. However, the fit, function, and location of the screw and cable are the same.
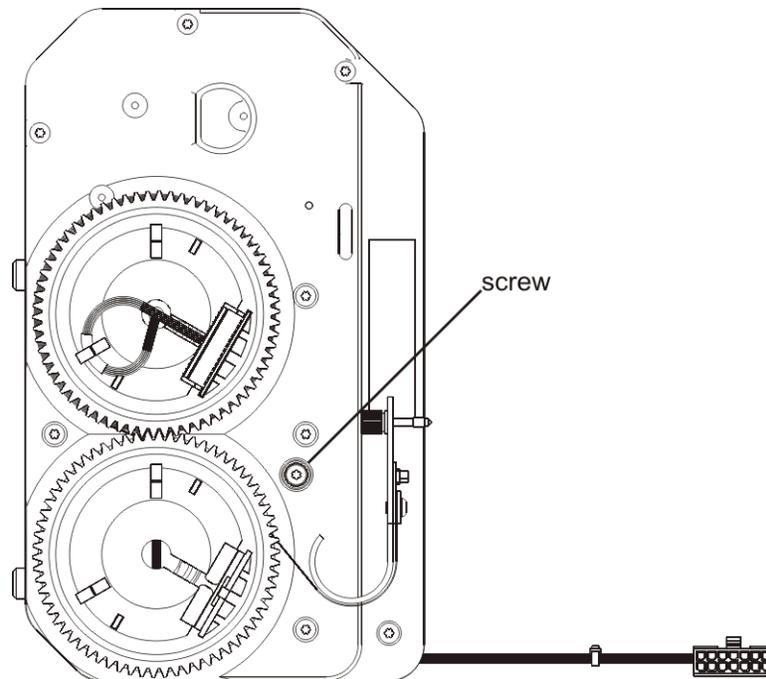
5   Remove the cable spool.

    a. Disengage the cable spool from the side of the module.

    b. Remove the zip tie that secures the cable spool's cables to the chassis.

    c. Reach through the drive bay to disconnect the cable spool cable that is attached to the rear of the module, behind the area where the picker assembly is usually positioned.

    d. Remove the cable spool from the module.

Replacing the Cable Spool

1 Make sure that all cables are out of the way, and thread the cable spool cable through the oval hole in the chassis. Insert the cable spool's studs into the side of the module.

> **Note** The external appearance of the cable spool on your library may differ slightly from the one shown in the figure below. However, the fit, function, and location of the studs, screw, and cable are the same.
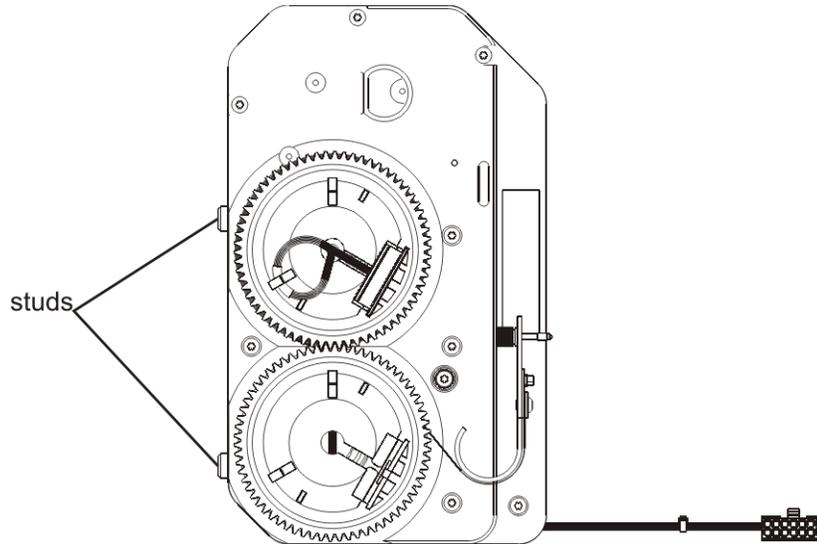
2 Tighten the screw (which you loosened earlier) to secure the cable spool into place.

3 Reconnect the cable spool cable.

4 Attach a new zip tie to secure the cable spool's cables to the chassis. Securing the zip tie ensures that the cables are not accidentally damaged when you remove the tape drives and power supplies.

5 Replace the tape columns in their proper locations.

When replacing the columns, replace the rear column first, then the middle column, and finally the front column. For more instructions on removing the columns, see Removing and Replacing Columns on page 189.

> ⚠ **CAUTION** **Tape columns must be replaced in their original locations, because each column has fiducial indices that help to guide the picker assembly. Consider labeling the tape columns so you can be sure that you replace them in their original locations. Otherwise, the library's self-test will fail.**

6 Reattach the cable spool clip to the Y-carriage assembly, using the thumbscrew on the cable spool clip. Use the T10 TORX screwdriver to tighten the thumbscrew until the attached lock washers compress. Do not over-tighten, as overtightening could break the thumbscrew.

> ⚠ **CAUTION** **Do not support the Y-carriage assembly by the thin metal rod. Lifting the assembly by the thin metal rod will bend the rod.**

7 Replace the robot assembly in the library, ensuring that it is level, following the instructions in Installing the Model 1 and Model 2 Robot Assemblies in the Library on page 171.

Preparing to use the Library

1   Replace the top plate and left-side cover panel on the chassis, if you removed them earlier.

2   Replace the 5U Library Control Module to the desired location in the library, if you removed it earlier. For details about stacking and installing in a rack, see Replacing the 5U Library Control Module on page 87 (ignore instructions about replacing the LCB and unparking the robot).

3   Restack the remaining 9U Expansion Modules of the library as necessary. For details about stacking and installing in a rack, see Replacing the 9U Expansion Module on page 96.

4   Replace the power supplies, tape drives, and cartridges in the module(s).

5   Unpark the robot assembly.

      a. Gently raise the robot assembly so that it no longer rests on the parking tab.

⚠ **CAUTION**	**Support the robot assembly by holding onto the broad metal X-axis base plate. Lifting the robot by the thin metal rod will bend the rod. Lifting the robot by the black plastic picker body can damage the robot.**

      b. With your free hand, move the parking tab to the "unparked" position so that it is removed completely from the interior of the module (**Model 1 parking tab:** swivel the parking tab away from you; **Model 2 parking tab**: move in a clockwise direction). When replaced correctly, the parking tab will not accidentally swivel into the path of the robot.

      c. Gently release the robot assembly. It will lower to the bottom module of the library.

Model 2 tab

Model 1 tab

6   Close the library's I/E station and access doors.

7   Power on the library.

Removing and Replacing Columns

The column is the black plastic tray composed of tape cartridge storage slots. You will generally only need to remove and replace columns in conjunction with removing and replacing the cable spool (see Removing and Replacing the Cable Spool on page 181). In that case, the library top cover will be removed, and you will be removing and replacing the columns on the left side of the 5U Library Control Module.

There may be a case where you need to remove a column because the column or its fiducial is damaged. In that case, you can perform this procedure with the top cover attached, by reaching in through the main access door.

⚠ **CAUTION**   **If you are removing or replacing the left-side front column in a 5U Library Control Module with the library top cover OFF, the control module access door must be OPEN. If it is closed, you will not have enough space.**

1   Power off the library.

2   Open the access door.

3   If the robot is located in the module from which you are removing columns, lift the robot to the control module and park it there.

4   Remove tape cartridges from the column(s) you are removing.

⚠ **CAUTION**   **Keep the tape cartridges in the right order, because you will need to put them back in the same location when finished.**

5   Remove each column **IN ORDER** (you must remove the front column first, then the middle column, and finally the rear column). Pull the column forward (toward the front of the library) until it unsnaps from the chassis wall, and then pull it gently to the center of the library.

⚠ **CAUTION**   **Consider labeling the tape columns so you can be sure that you replace them in their original locations. If you do not put them back in their original locations, the library's self-test will fail.**

6   If you need to install a fiducial on an existing or new column, follow the instructions in Fiducial Placement on a Column on page 190.

7   Replace each column **IN ORDER** (you must install the rear column first, then the middle column, and finally the front column). Press the column toward the chassis wall, inserting the tabs on the back of the column through the holes in the library chassis. Then slide the column firmly toward the rear of the library.

   HINT: It can be difficult to see what you are doing. If you have trouble fitting the column tabs into the chassis holes, you can remove the library side panel so you can better see the holes in the chassis.

⚠ **CAUTION**   **Tape columns must be replaced in their original locations, because each column has fiducial indices that help to guide the picker assembly. Be sure that you replace them in their original locations. Otherwise, the library's self-test will fail.**

8   Re-load the tape cartridges in their proper locations in the columns.

9   If you parked the robot in the control module, unpark it and allow it to move to the floor of the library.

10 Close the access doors.

11 Power on the library and wait for it to initialize.

Fiducial Placement on a Column

The fiducial is a removable white plastic part that snaps on to the column in a specific location. The robot scans the fiducials during initialization and other move operations so that it "knows" where tape cartridges belong. If there is a problem with a fiducial, you may need to replace the fiducial. To do this, you need to first remove the column (see Removing and Replacing Columns on page 189).

These instructions explain how and where to install a fiducial on a column.

⚠ CAUTION	**The location of the fiducial on a column is based entirely upon the location of the column in the library. Mis-application of these instructions will cause the robotic mechanism to be unable to put and get tape cartridges from the columns.**

Required tools: None

1 To place a fiducial on a column, slide it into the appropriate slot, and snap the tail of the fiducial over the post on the column.

2 See Figure 24 for a drawing of a fiducial. See Figure 24 for the locations of the fiducials in a 5U tape column. See Figure 25 for the location of the fiducials in a 9U tape column.

Figure 23   Fiducial
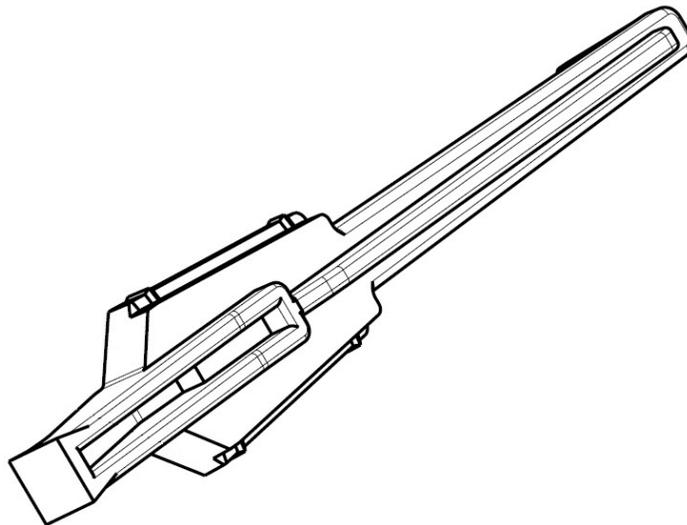
Figure 24 5U Control Module Fiducial Location

"RH" CONFIG   "LH" CONFIG
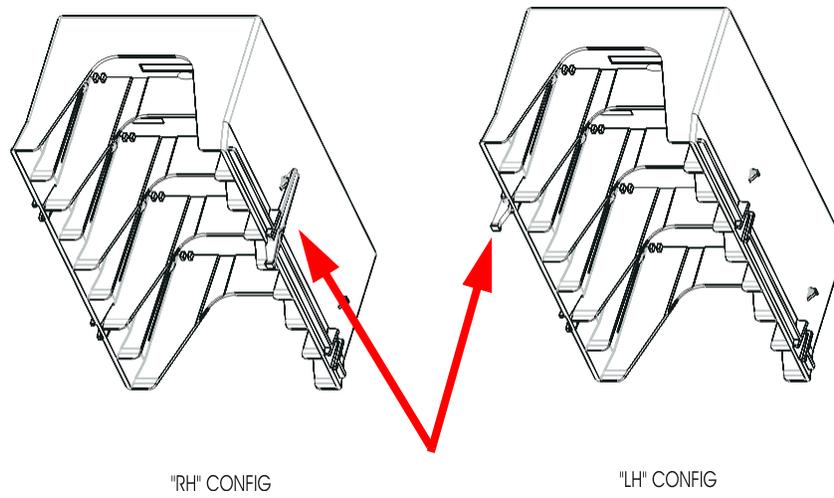
Figure 25 9U Expansion Module Fiducial Location

CONFIG "RH"   CONFIG "LH"
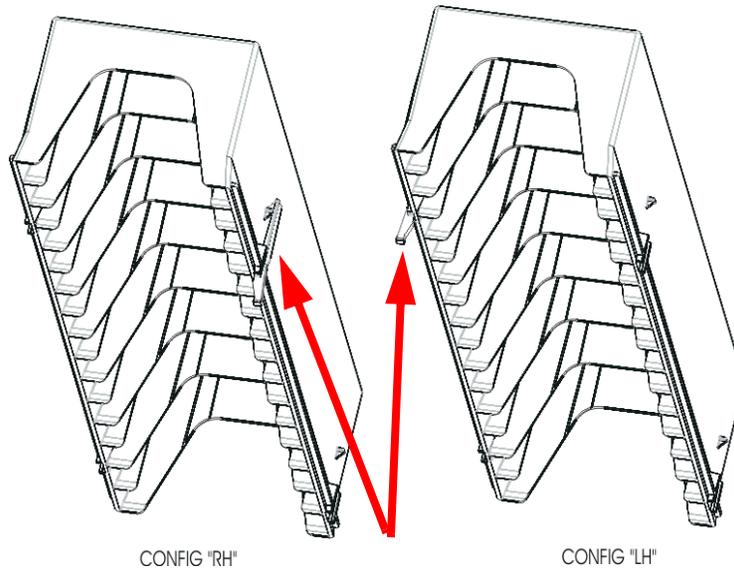
3   See Figure 26 for the locations of the columns in a 5U Library Control Module. See Figure 27 for the locations of the columns in a 9U Library Expansion Module.

Figure 26   5U Control Module Column Location
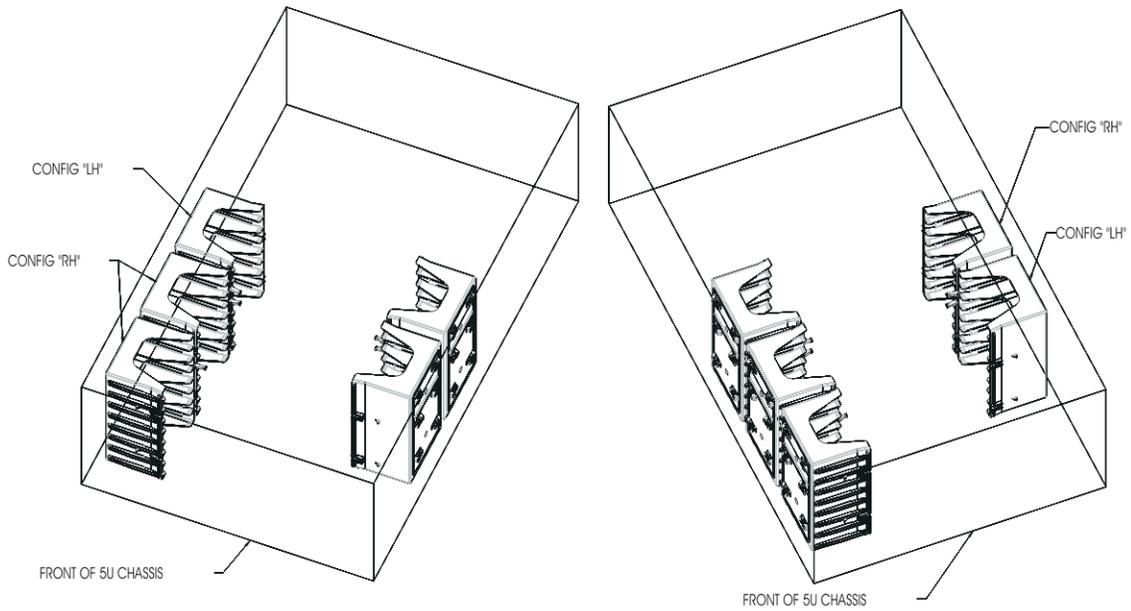
Figure 27   9UExpansion Module Column Location
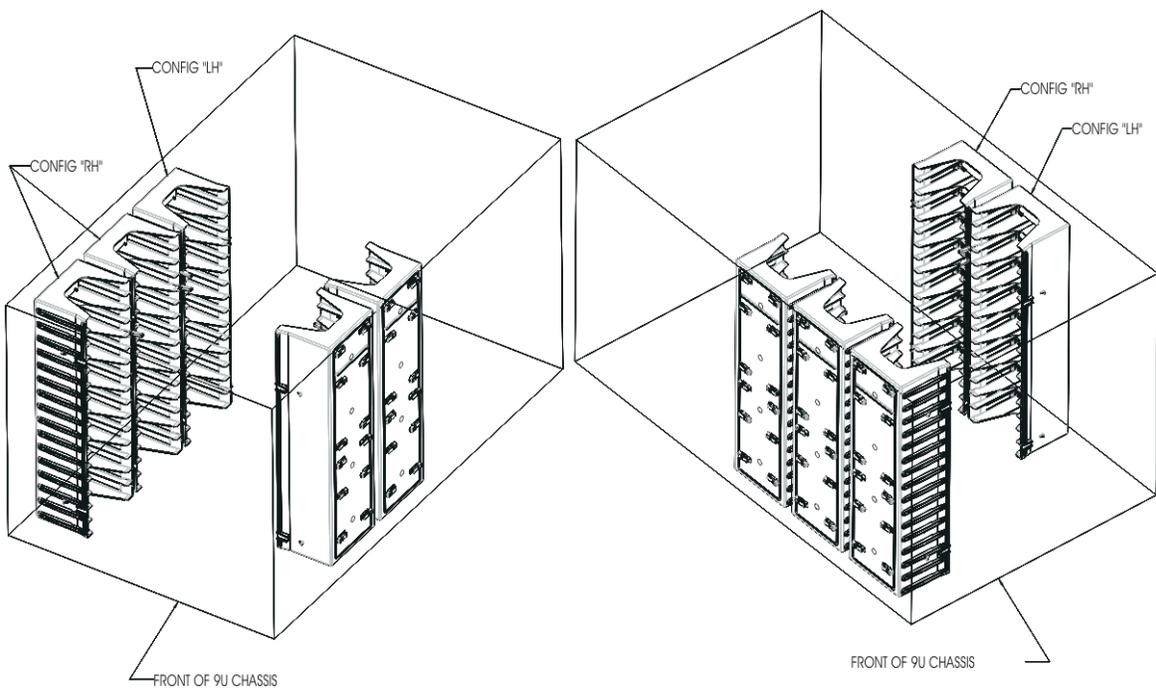
Troubleshooting the Tape Library

This chapter covers the following topics
- How the Library Reports Problems
- Working With RAS Tickets
- RAS Ticket Error Codes
- Diagnostic Resolutions
- Remove and Replace Resolutions
- Interpreting LEDs
- Interpreting "Library Not Ready" Messages

How the Library Reports Problems

The ML6000 uses advanced problem detection, reporting, and notification technology to alert customers of problems as soon as they occur. The library performs numerous self-tests to monitor the library's temperature, voltage and currents, and standard library operations. It performs these self-tests each time the library is powered on, and during normal operation when the library is idle.

If the self-test detects a problem, the library generates a service report, or RAS ticket, that identifies which component is likely causing the problem. The library's LEDs may also indicate an abnormal condition. If the problem is not severe, the library continues to provide full functionality to all unaffected partitions.

When possible, the library provides instructions for resolving problems. These instructions appear on the library's operator panel, and are also available from the remote Web client.

Customers can frequently resolve a simple problem themselves, but if the problem is complex or involves a field replaceable unit (FRU), the customer must contact Dell Technical Support. Only qualified service technicians can service FRUs.

RAS tickets can be e-mailed to the service team for diagnosis, as can the snapshot of the library, which provides detailed information regarding the overall status and health of the library. For details about the snapshot, see Capturing a Snapshot on page 11.

Working With RAS Tickets

RAS tickets are special service reports that describe the current reliability, availability, and serviceability (RAS) of the library. RAS tickets provide detailed information about system problems.

Viewing RAS Tickets

You can view RAS tickets by choosing **All RAS Tickets** from the **Tools** menu. You can also click the **Subsystem Status** buttons at the bottom of the graphical user interface home page to view all RAS tickets for the subsystem you choose (Library, Drives, or Media).

RAS tickets are displayed in the order in which they were created, starting with the most recent. Click a column heading to sort the rows by that heading.

☒ Note	You can see the last time the ticket event occurred by looking at **Last Occurrence**. This information updates any time the ticket event recurs. **Last Occurrence** does NOT update if you open, close, or resolve the RAS ticket.

Resolving RAS Tickets

You can resolve and close RAS tickets from the **Tools - All RAS Tickets** screen. Identify the RAS ticket that you want to resolve, click **Resolve**, and complete the steps listed in the **Ticket Resolve** window. It is also possible to close the RAS ticket without ever resolving the reported issue.

To leave the ticket open for future troubleshooting, click **Cancel** to view the last screen of the ticket, then click **Exit**. The ticket remains on the list.

Closing RAS Tickets Automatically

The library will close all currently open RAS tickets when you reboot the library. If any errors occur during the reboot, the library issues new tickets.

For automatic ticket closure to occur, a user must intentionally initiate a reboot, by either restarting the library, shutting down the library, or upgrading library firmware. Automatic ticket closure will NOT occur if the library shuts down unexpectedly or if the power cord is unplugged.

You can always view closed tickets on the Web client by selecting **Tools > All RAS Tickets** and clicking the **Include Closed Tickets** check box. Tickets that were auto-closed are designated as "Canceled."

Automatic ticket closure is enabled by default. You can enable or disable this feature from the operator panel.

The path to open the appropriate screen is:

   • From the operator panel, select **Tools > System Settings** and then select or clear the **Auto-Ticket Closure** check box.

Closing All RAS Tickets

You can close all RAS tickets without resolving them by clicking the **Close All Tickets** button. Be extremely careful when doing this. It is recommended that each RAS ticket be viewed, analyzed, and closed individually.

RAS Ticket Error Codes

When the library detects a problem, it generates an error code and displays it in the RAS ticket report, along with a full description of the problem and suggestions for resolving it.

The following tables provide details on each RAS ticket error code.

T000

T000 - Tape Cartridge Stuck in Picker, Motion OK	
Description	**GUI Description:** The library detected an initialization problem. **Explanation:** Library firmware detected that the System Interface Component (SIC) is stuck in an initialization sequence and cannot continue. The library may need to be rebooted or power-cycled to recover from the initialization sequence issue that prevents the library from initializing.
Detection Scenarios	A watchdog monitoring of the startup sequence determined the SIC hang condition
Root Causes	An unknown race condition during SIC initialization prevents proper startup sequence.
Service Resolution Steps	Perform DR098 - Resolve Hardware Clock Failure on page 410.
Possible CRUs/FRUs	None

T001

T001 - Tape Cartridge Stuck in Picker, Motion OK	
Description	**GUI Description:** A tape is stranded in the Picker Assembly and must be removed to continue operations. **Explanation:** The robot is not logically expecting to see a tape cartridge in the picker, but the tape cartridge presence sensor indicates otherwise. The tape cartridge cannot legitimately be returned to a home slot, nor can it be placed in a destination slot. The volser may be unknown, the library may be full, or changing the host inventory is disruptive.
Detection Scenarios	1 The robot becomes enabled after a door open or the library system boots up and discovers that the tape cartridge present sensor detects a tape cartridge. 2 The system has tried to recover from a put failure and wants to return the tape cartridge to a home slot; however, the home slot recovery logic completes without recovery (home slot is a tape drive or the I/E station is open or the I/E station is full). 3 The tape cartridge present sensor and sensing circuit is falsely representing the presence of a tape cartridge.
Root Causes	• Operator did not recover tape cartridge. • Operator put a tape cartridge in the picker. • Power loss during move with media, and library logic cannot legitimately return it to the proper cell. • Physical contamination such as dust and debris on the sensor gives a "false full" state. • Various electrical failures.
Service Resolution Steps	1 Perform DR001 - Resolve Picker Cartridge Presence on page 366. 2 Media may be stuck in the picker. Open the door on the unit and inspect the picker to see if any media is present. If media is found, remove it, clear the RAS ticket and retry the original operation.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed)

T002

T002 - Put Operation Failed, Final Cartridge Position Unknown, Motion OK	
Description	**GUI Description:** The robot failed to place a tape cartridge and cartridge recovery is required. **Explanation:** The library cannot successfully put a tape cartridge into a drive, storage slot, or I/E station and the final "resting place" of the tape cartridge is unknown. There are no additional recovery logic paths to be exercised. Fundamental servo control seems OK. If the operation was initiated by a host move media, the move media command has failed with a SK/ASC/ASCQ 4h/15h/01h (hardware mechanical positioning error).
Detection Scenarios	Put is not successful and put recovery is not successful and tape cartridge is not known to be properly seated in picker or storage slot.
Root Causes	• Magazine is damaged. • Magazine is wrong type for tape cartridge. • Cell is blocked by foreign material, cartridge is not clipped in and seated correctly. • Calibration problem results in improper robot position. • Picker offset problem. • Tape cartridge is damaged. • Unlabeled tape cartridge or intermittently readable tape cartridge label in destination. • Tape drive load mechanism not working. • A variety of picker problems such as slipping gears, encoder issues, etc.
Service Resolution Steps	1 Perform DR002 - Resolve Tape Cartridge Recovery on page 367. 2 Use the **Details** option on the RAS ticket to gather more information regarding a specific drive, magazine, or slot causing the problem. Inspect the problem location for any obstruction or media. Remove it, clear the RAS ticket, and retry the original operation.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed) 2 Cable Spool

T003

T003 - Get Operation Failed, Final Cartridge Position Unknown, Motion OK	
Description	**GUI Description:** The robot failed to pick a tape cartridge, and cartridge recovery is required. **Explanation:** The library cannot successfully get a tape cartridge from a drive, storage or I/E location. The final "resting place" of the tape cartridge is unknown. There are no additional related recovery logic paths. Fundamental servo control appears to be OK. If the operation was initiated by a host move media, the move media command has failed with an ASC/ASCQ of 4h/15h/01h (hardware mechanical positioning error).
Detection Scenarios	Get is not successful and put recovery is not successful and tape cartridge is not known to be properly seated in picker or storage slot.
Root Causes	• Magazine is damaged. • Magazine is wrong type for tape cartridge. • Cell is blocked by foreign material, cartridge is not clipped in and seated correctly. • Calibration problem results in improper robot position. • Picker offset problem. • Tape cartridge is damaged. • Unlabeled tape cartridge or intermittently readable tape cartridge label in destination. • Tape drive load mechanism not working. • A variety of picker problems such as slipping gears, encoder issues, etc.
Service Resolution Steps	1 Perform DR002 - Resolve Tape Cartridge Recovery on page 367. 2 Use the **Details** option on the RAS ticket to gather more information regarding a specific drive, magazine, or slot causing the problem. Inspect the problem location for any obstruction or media. Remove it, clear the RAS ticket, and retry the original operation.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed) 2 Cable Spool

Troubleshooting the Tape Library

T004

T004 - Put Operation Failed, Tape Back In Source Location, Motion OK	
Description	**GUI Description:** The robot failed to place a tape cartridge to a destination slot but recovered the cartridge to an alternate location. **Explanation:** The library cannot successfully put a tape cartridge into the intended target tape drive, storage slot, or I/E station location. The library has successfully returned the tape cartridge to the source location. Fundamental servo control appears to be OK.
Detection Scenarios	Put is not successful and put recovery is not successful at the destination element. Recovery logic has allowed the tape cartridge to be returned to the initial source location. If the operation was initiated by a host move media, the move media command has failed with a SK/ASC/ASCQ 4h/15h/01h.
Root Causes	• Magazine is damaged, wrong type, cell is blocked, cartridge is not clipped in and seated correctly. • Calibration problem. • Picker offset problem. • Destination cell full with labeled tape cartridge (invalid inventory). • Destination cell is full with tape cartridge that has damaged label or is unlabeled or has an intermittently readable label. • A variety of picker problems such as slipping gears, encoder issues, etc.
Service Resolution Steps	1 Perform DR004 - Resolve Full Destination Element on page 368. 2 Use the **Details** option on the RAS ticket to gather more information regarding a specific drive, magazine, or slot causing the problem. Inspect the problem location for any obstruction or media. Remove it, clear the RAS ticket, and retry the original operation.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed)

T005

T005 - X, Y, Theta Motion Profile Failure, Tape in Picker, Motion NOT OK	
Description	**GUI Description:** The robot failed to move a tape cartridge due to an axis motion problem. **Explanation:** An X, Y, Theta (θ) motion failure occurred that cannot be considered a complete obstruction. This problem only occurs during a move and NOT a get or put. Because the tape cartridge is in the picker, tape cartridge recovery must be a part of the resolution strategy. This ticket cause specifically excludes any Z axis motion failures that are typically associated with get or put actions. Specifically included are motion failures that occur while pivoting, moving on the X-axis, or moving on the Y-axis.
Detection Scenarios	• A specified move in the X-axis cannot complete. • A specified move in the Y-axis cannot complete. • A specified movement in the Theta (θ) axis cannot complete.
Root Causes	• A large number of electrical hardware failures. Code or hardware detects that motion control is not occurring properly (encoder issues, motor driving circuit issues, motor winding issues, cable connections issues, etc.). • A relatively small number of mechanical hardware errors that do not result in the detection of a complete obstruction, but where motion control does not appear to be normal (contamination or damage to encoder wheel, high friction, etc).
Service Resolution Steps	1 Perform DR005 - Resolve Motion Failure on page 368. 2 Open the main door and inspect the picker path to ensure that no obstructions are visible. Check the Y-climber and picker for any packaging material still left in place. Remove any media in the picker, clear the RAS ticket, and retry the original operation. If using library firmware 400G or later, run an IVT - Robot test through the Library Tests option in the operator panel. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed) 2 Y-carriage Assembly (if Model 1 robot is installed) 3 Cable Spool

T006

T006 - X, Y, Theta Motion Profile Failure, No Tape In Picker, Motion NOT OK	
Description	**GUI Description:** The robot failed to move due to an axis motion problem. **Explanation:** An unrecoverable motion failure occurs at an operational point where a tape cartridge is not in the picker. Because the tape cartridge is not in the picker, tape cartridge recovery is not necessary as part of the resolution to this issue. This cause specifically excludes any Z-axis motion failures. Specifically included are motion failures that occur while pivoting, moving on the X-axis, or moving on the Y-axis. If the RAS ticket details indicate that the Y-axis has problems, both the picker and the Y-carriage assembly should be replaced. Otherwise, only the picker should be replaced.
Detection Scenarios	• A specified move in the X-axis cannot complete. • A specified move in the Y-axis cannot complete. • A specified movement in the Theta (θ) axis cannot complete.
Root Causes	• A large number of electrical hardware failures. Code or hardware detects that motion control is not occurring properly (encoder issues, motor driving circuit issues, motor winding issues, cable connections issues, etc.). • A relatively small number of hardware errors that do not result in complete obstruction but where servo control does not appear to be normal.
Service Resolution Steps	1 See also: DR005 - Resolve Motion Failure on page 368. 2 Open the main door and inspect the picker path to ensure that no obstructions are visible. Check the Y-climber and picker for any packaging material still left in place. Clear the RAS ticket and retry the original operation. If using library firmware 400G or later, run an IVT - Robot test through the Library Tests option in the operator panel. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed) 2 Y-carriage Assembly (if Model 1 robot is installed) 3 Cable Spool

T007

T007 - X, Y, Theta Motion Obstruction, Motion OK	
Description	**GUI Description:** The robot is unable to properly move due to an obstruction in its motion path. **Explanation:** A complete physical obstruction exists in a motion path that precludes repeated attempts to move beyond a certain point in the range of motion. Servo control appears normal, but a move profile cannot be completed. The tape cartridge may have been returned to a home slot.
Detection Scenarios	• A specified move in the X-axis cannot complete, but motion control appears normal. • A specified move in the Y-axis cannot complete, but motion control appears normal. • A specified move in the Theta (θ) axis cannot complete, but motion control appears normal.
Root Causes	• Human intervention that results in foreign material or an obstructing object in a library motion path. • Certain damaged hardware conditions that obstruct motion at a particular point along an axis. • Robot parking tab is out of position and is interfering with robot Y-axis travel.
Service Resolution Steps	1 See also: DR028 - Resolve Motion Obstruction on page 379. 2 Open the main door and inspect the picker path to ensure no obstructions are visible. Check the Y-climber and picker for any packaging material or robot restraint (shipping posts) still left in place. Verify that the robot parking tab is in the unparked position and not interfering with the robot Y-axis travel. Ensure that the robot is level. Clear the RAS ticket and retry the original operation. If using library firmware 400G or later, run an IVT - Robot test through the Library Tests option in the operator panel. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed) 2 Y-carriage Assembly (if Model 1 robot is installed)

T008

T008 - Cannot Home, Motion OK	
Description	**GUI Description:** The robot can move, but cannot establish its home position correctly. **Explanation:** Robot motion and servo control appear normal, but home sensors do not transition when the robot is moved through prescribed search distances and times.
Detection Scenarios	• X home sensor does not transition while homing • Y home sensor does not transition while homing • θ home sensor does not transition while homing • Z home sensor does not transition while homing
Root Causes	• Malfunctioning home sensors. • Missing or damaged mechanical flags that trigger home sensors. • Hardware failures that result in apparent normal motion according to encoders, but no actual motion (for example, slipping gears). • Robot parking tab is interfering with Y-axis travel of the robot. • Robot assembly is not placed properly into Y-climber rails, resulting in an unleveled robot when moving along the Y-rails. • Y-rails are not secured correctly, causing the robot Y-carriage to become unleveled when moving between modules.
Service Resolution Steps	1 Perform DR028 - Resolve Motion Obstruction on page 379. 2 Open the main door and inspect the picker path to ensure that no obstructions are visible. Check the Y-climber and picker for any packaging material still left in place. 3 If it is a 6020 or 6030 configuration, recheck all internal picker rails and make sure they are locked into place between each CM and EM. 4 Look at the bottom of the unit and inspect the bottom cover plate to ensure that the black home position tab is still present. 5 Clear the RAS ticket and retry the original operation. 6 If using library firmware 400G or later, run an IVT - Robot test through the Library Tests option in the operator panel. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

T008 - Cannot Home, Motion OK	
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed) 2 Y-carriage Assembly (if Model 1 robot is installed)

T009

T009 - Drive Load Unsuccessful, Motion OK	
Description	**GUI Description:** An attempted drive load failed, but robotic motion appeared normal. **Explanation:** The robot has successfully completed all motion profiles associated with putting to a tape drive, but the tape drive reports that the tape cartridge did not load.
Detection Scenarios	While checking the status of a tape drive after a put motion profile to the tape drive is completed, the tape drive does not report back a loaded state.
Root Causes	• Defective tape drive. • Defective tape cartridge. • Motion profile was successful as detected at motor encoders, but the tape cartridge did not get placed far enough. • Picker dragged tape cartridge back out of tape drive, but not far enough to trigger picker cartridge present sensor.
Service Resolution Steps	1 Perform DR030 - Resolve Drive Load Failure on page 381. 2 Open the main door and inspect all drive sleds for any media not fully loaded into a tape drive. Remove any media, clear the RAS ticket, and retry the operation with another known good piece of media. If using library firmware 400G or later, run an IVT - Drive test through the Library Tests option in the operator panel. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled 2 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed) 3 Y-carriage Assembly (if Model 1 robot is installed)

T010

T010- Drive Unload Failed	
Description	**GUI Description:** A drive failed to unload/eject a tape cartridge, preventing the robot from picking and moving the cartridge. **Explanation:** The library is expecting the tape drive to achieve an unloaded state, but the tape drive does not succeed and reported an error when unloading/ejecting the tape cartridge for picker access. This RAS ticket is ONLY displayed if the tape drive was actually instructed to perform an unload operation and the drive's command response informed of an issue. In the case where the library controller code is determining that the drive is still busy for a defined wait time period and the unload request is not sent to the tape drive, this ticket shall not be generated, but rather the request to unload shall be denied as an illegal request. In the case where the command is issued but the library times out waiting for an unload response, ticket **T053** shall be reported.
Detection Scenarios	• A SCSI Move Medium was issued, but the drive does not achieve an unload/eject state after being instructed to unload and eject. • A UI command was issued to unload or move from a drive, but the drive does not achieve an unload/eject state after being instructed to unload and eject.
Root Causes	The tape drive reports a failure and fails to unload a tape cartridge after the library issued an unload command.
Service Resolution Steps	1 See also: DR003 - Resolve Drive Eject Failure on page 367. 2 Use the **Details** option in the RAS ticket to identify the suspect tape drive sled. Open the main door and inspect drive for any stuck media. If media is present, attempt an emergency power-on reset by holding the eject button down for 5 seconds, which will reset the drive and attempt to eject the media. 3 Clear all RAS tickets and retry the original operation with another piece of known good media.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T011

T011- Drive Over Eject Condition	
Description	**GUI Description:** A drive over-ejected a tape cartridge into the robot's motion path.
	Explanation: The library is about to perform a get from a tape drive and checks the tape drive status to determine if the tape cartridge is ejected. LTO tape drives have demonstrated a specific failure mode where they eject a tape cartridge in an abnormal manner. Normally upon eject, the tape cartridge is in a particular position where it is clear of the robot motion path and it cannot be reloaded due to mechanical interlock within the tape drive load mechanism. The historical failure mode is that the tape cartridge slips an additional amount out of the tape drive throat, which re-arms the load mechanism of the tape drive.
	Two subsequent problems can occur. The over-ejected tape cartridge can become an obstruction hazard for robot moves. In addition, the robot get operations can then re-trigger the tape drive load mechanism by bumping the tape cartridge during a get. There can be a "tug of war" between the robot and tape drive, *or* the tape drive can win the tug of war, resulting in the loading of a phantom tape cartridge. When the tape drive loads a phantom tape cartridge, there are resulting tape drive errors. The goal of reporting this problem is to identify tape drives that over-eject tape cartridges, to avoid the two types of problems.
Detection Scenarios	Library checks tape drive status prior to moving to perform a get. It is trying to determine if the tape drive is in an unloaded state and if a tape cartridge is present. If a tape cartridge is not reported as present, the library can assume it was "over-ejected."
Root Causes	The tape drive eject process did not result in the proper position of the ejected tape.
Service Resolution Steps	1 Perform RR001 - Remove and Replace Drive Sled on page 420. See also Removing and Replacing a Tape Drive on page 129. 2 Use the **Details** option in the RAS ticket to identify the suspect tape drive sled. Open the main door and inspect drive for any stuck media or media which is not in a fully ejected state. If media is partially out of the drive, attempt to remove it by hand. If media is still in the drive, attempt an emergency power-on reset by holding the eject button down for 5 seconds, which will reset the drive and attempt to eject the media. 3 Clear all RAS tickets and retry the original operation with another piece of known good media.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T012

T012- Drive Unload Control Prevented	
Description	**GUI Description:** A host issued a SCSI Prevent/Allow Media Removal command that is preventing the drive from unloading a tape cartridge. **Explanation:** The library needs to issue a command to the drive (such as unload) but cannot perform the operation, because the host issued a Prevent/Allow Medium Removal SCSI command, preventing media removal.
Detection Scenarios	• Library tries to issue an unload command, but drive status indicates that media removal is prevented. • Library tries to issue a command associated with tape drive download.
Root Causes	A host has issued a Prevent/Allow Medium Removal SCSI command, preventing a user to move the media from the drive.
Service Resolution Steps	1 Perform DR016 - Resolve Prevent/Allow Media Removal on page 374. 2 Perform an unlock operation through the backup software to remove this condition on the tape drive.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. No library CRU or FRU is involved. Rather, this is an indication that a host may have orphaned a reserve on the drive.

T013

T013- Invalid Library SN Label, Library Cannot Initialize	
Description	**GUI Description:** A library module serial number label cannot be read, preventing the library from proper initialization and operation. **Explanation:** The library logic learns the serial number of the system by reading an internal serial number label. This is done at first bootup from a "cleared to ship" condition to establish the serial number. It is also done on subsequent bootups to confirm that the LCB Compact Flash memory card is in the proper library. The library will report a problem when it cannot read a serial number or detects an invalid serial number or another barcode on the module label when in this "cleared to ship" condition. When T013 is posted, the library cannot operate normally. Different RAS tickets will be posted if there are motion-related problems, scanner communication problems, etc.
Detection Scenarios	• At first bootup from clear to ship, the library must establish the serial number for the first time. There may be no serial number in system memory at this point. • During any bootup, the library must be able to read both the serial number and the WWN. If neither of these barcodes is readable, the library cannot be certain that the serial number stored in memory is accurate.
Root Causes	• Label is damaged. • Label is missing. • Label is physically obstructed. • Label is readable but does not meet minimum criteria to be considered a library serial number label. • Scanner cannot read serial number label. • Damaged module terminator or module-to-module cable with bent or broken pins.

T013- Invalid Library SN Label, Library Cannot Initialize	

Service Resolution Steps	1 Perform [DR027 - Resolve Unknown Library SN Label](#) on page 379.
	
	2 Use the **Details** option in the RAS ticket to identify which label is unreadable. Open the main door and inspect the label for any bubbling, fading, or damage. If the label is damaged, there is no need to dispatch a picker, since the module will need to be replaced.
	
	3 If the label is not damaged, inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables.
	
	4 Reseat the picker and Y-climber and ensure they are level.
	
	5 Clear the RAS ticket.
	
	6 If using library firmware 400G or later, run an IVT - Robot test through the Library Tests option in the operator panel. If the Robot test passes, the picker is most likely not the issue and a module exchange may be needed.
	
	Note: IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
	
	  • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
	
	  • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Module (EM or CM) — only dispatch this FRU if the label is missing or damaged

T014

T014 - I/E Station Magazine Missing	
Description	**GUI Description:** A library I/E station has been closed with a magazine missing. **Explanation:** There is a fixed barcode label place on the I/E station structure behind the removable magazines. It decodes as **%XXX**. The purpose of the label is to allow the library to detect that an I/E magazine is not installed. This is important on I/E magazines because they are user removable. While performing inventory of I/E station magazines, the library ends up verifying the presence of the magazine by NOT detecting this special fixed label.
Detection Scenarios	Any time the library attempts to inventory an I/E station magazine, it will read the fixed label if a magazine is missing. I/E magazines are always expected to be present.
Root Causes	• Missing I/E station magazine. • A tape cartridge in an I/E station just happens to have a label that decodes as **%XXX**. **Note:** Inability to communicate between the LCB and the scanner should result in a different ticket cause.
Service Resolution Steps	1 See also: [DR023 - Resolve Missing I/E Station Magazine](#) on page 377. 2 Use the **Details** option in the RAS ticket to identify which I/E magazine is being reported missing. Open the I/E station in the CM or EM referenced by the RAS ticket and verify its presence. If the I/E station is present, clear the RAS ticket and if the unit has library firmware 400G or later, run an IVT - I/E Station test through the Library Tests option in the operator panel. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 I/E Magazine

T015

T015 - Drive Sled Fiducial Read Failure	
Description	**GUI Description:** The robot is unable to identify a tape drive by scanning the drive sled's identification/fiducial label. **Explanation:** When the library is attempting to determine the type of tape drive and verify its physical presence in the library, it cannot do so because it cannot read a label where it expects to find one, or the label indicates a drive type that is not supported by the firmware currently installed on the library.
Detection Scenarios	• Installation of a tape drive into a library drive slot triggers the library to discover it. • Bootup causes the library to physically discover any drive that is electrically connected in the system.
Root Causes	• Firmware currently installed on the library does not support a newer generation drive installed in the library. • Damaged label or marginal label that cannot be read. • Drive with invalid label is present (earlier generation of plug compatible tape drive sled). **Note:** Inability to communicate between the LCB and the scanner should result in a different ticket cause.
Service Resolution Steps	1 If the library firmware has recently been downgraded, or if a new drive type has recently been installed, it is likely that one or more drives are not supported by the firmware currently installed on the library. Upgrade library firmware to the latest revision to ensure drive support. 2 Perform DR007 - Resolve Barcode Scanner Issue on page 369 3 Use the Details option in the RAS ticket to identify which label is unreadable on which tape drive. Open the main door and inspect the label for any bubbling, fading, or damage. If the label is damaged, the tape drive will most likely need to be replaced. If the label is not damaged, clear the RAS ticket, and if using library firmware 400G or later, run an IVT - Robot test through the Library Tests option in the operator panel. If the Robot test passes, the picker is most likely not the issue and the tape drive will need to be replaced first. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

T015 - Drive Sled Fiducial Read Failure	
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T016

T016 - Unexpected Drive Type	
Description	**GUI Description:** A configured drive sled has been replaced with a drive sled of different type. **Explanation:** When the library is attempting to determine the type of a drive and verify its physical presence in the library, it detects a drive type that is not compatible with the logical library assignment of the drive slot (for example, an LTO-1 drive in an LTO-3 drive position or the like).
Detection Scenarios	• Installation of a tape drive into a library drive slot triggers the library to discover it. • Bootup causes the library to physically discover any tape drive that is electrically connected in the system.
Root Causes	• End user or CE mistakenly uses the actual wrong type of CRU (for example, LTO-1 drive sled in a slot defined as LTO-3). • Manufacturing defect has wrong label type for actual physical drive type (for example, LTO-1 label on an LTO-3 drive). **Note:** Inability to communicate between the LCB and the scanner should result in a different RAS ticket cause.
Service Resolution Steps	1 Perform RR001 - Remove and Replace Drive Sled on page 420. 2 Check to make sure you installed the correct drive type for the slot. Check the label on the tape drive to be sure it correctly identifies the tape drive type.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T018

Status: Implemented in firmware version 580.

T018 - Invalid Drive Sled Connection	
Description	**GUI Description:** The library detected that a tape drive is incorrectly connected to an FC I/O blade. **Explanation:** The library detected that a library control path drive is connected to an FC I/O blade. Such configuration is invalid and the tape drives need to be disconnected from the FC I/O blade or reconfigured to not enable a library control path.
Detection Scenarios	• The FC I/O blade reports that an SMC device was detected. • The library detected that an FC I/O blade reports connectivity to a tape drive that is configured as a control path drive.
Root Causes	• User error when connecting the drive to the SAN. • User error regarding enabled drive features.
Resolution	See: DR013 - Resolve Drive Connection Issue on page 373.
Possible CRUs/FRUs	None

T019

T019 - Drive Calibration Failure, Motion OK	
Description	**GUI Description:** The library is unable to calibrate the position of a drive. **Explanation:** System electrically detects a tape drive and is able to scan the barcode label, but cannot successfully calibrate the position of the tape drive. The calibration search pattern completes successfully.
Detection Scenarios	Calibration motion completes, but edge finding of one or more edges does not occur.
Root Causes	• Damaged drive sled calibration fiducial. • Dust on picker assembly calibration sensor. • Calibration sensor not functioning properly. • Tape drive or robot position is so far off nominal that search pattern cannot locate target.
Service Resolution Steps	1 Perform DR082 - Resolve Library Calibration Failure on page 403. 2 Use the **Details** option in the RAS ticket to identify which tape drive is having trouble being calibrated. Reseat the drive sled in another sled bay. 3 Reseat the picker and Y-climber to ensure they are level. 4 Clear the RAS ticket and retry the original operation.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T020

T020 - Storage Calibration Failure, Motion OK	
Description	**GUI Description:** The library is unable to calibrate the position of a tape cartridge magazine. **Explanation:** System cannot successfully calibrate the position of a storage magazine or I/E station, but the calibration search pattern completes successfully.
Detection Scenarios	Calibration motion completes, but edge finding of one or more edges does not occur.
Root Causes	• Dust on picker assembly calibration sensor. • Calibration sensor not functioning properly. • Calibration target not functioning properly. • Fiducial target or robot position is so far off nominal that search pattern cannot locate target (i.e., unlevel picker).
Service Resolution Steps	1 Perform DR082 - Resolve Library Calibration Failure on page 403. **Note:** The picture shown in DR082 shows the location of the calibration sensor. If you are guiding a customer by phone, you may want to copy the picture and e-mail it to them. 2 Open the doors on the all the modules in the library from the bottom to the control module. Lift up the robot and bring it to rest on the parking tab. Check inside the library for any debris on the floor of the library that would interfere with picker movement. 3 Remove the robot from the library and carefully inspect the picker for any damage or obstruction on the face that would prevent a clear line of sight to the barcodes or fiducials. Place the robot back into the library. Ensure that the Y-rails are locked in the down position and that the robot is level. Close this RAS ticket and resume normal operations. If this ticket reoccurs, to go the next step. 4 Close the RAS ticket and retry the original operation.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 I/E Station Slide Assembly

T021

T021 - Drive Sled Communication Failure	
Description	**GUI Description:** The library lost communication with a drive sled. **Explanation:** The library had been communicating with a drive sled that is configured for use in a partition. When the library detects loss of communication with a drive that is online, the library robot attempts to scan the barcode label on the drive. If the label is read and communication is not present, the RAS ticket gets posted based on the fact that the drive is physically present but no communication is occurring. If the label is not read, the drive is assumed to be physically removed and therefore communication should not be expected. This ticket is specifically NOT caused in two common scenarios: • Physical removal of a drive if the drive is not assigned to a partition. • Complete physical removal of a drive if it is turned offline via the library operator interface.
Detection Scenarios	Routine polling of the sled conveyed the drive communication issue.
Root Causes	• Drive sled is physically removed/unplugged (intentional or not properly secured with its thumbscrews) while drive is online. • Various hardware failures occurred on the drive sled controller or communication path from the drive bay to the drive sled controller. • Various hardware failures occurred in the library communication path to the drive sled. • A module terminator or module-to-module cable is damaged with bent or broken pins.
Service Resolution Steps	1 Perform DR029 - Resolve Drive Sled Communication Loss on page 380. 2 Use the **Details** option in the RAS ticket to identify which tape drive is generating the RAS ticket. If possible, check the front of the tape drive for error indications. Check the suspect drive sled and reseat it. 3 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables. 4 Finally, ensure that power is properly being received by the tape drive (green LED on the front of the drive). 5 If using library firmware 400G, run an **IVT - Drive test** from the **Library Tests** menu on the operator panel. Clear the RAS ticket and retry the original operation. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). 　• If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. 　• If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

T021 - Drive Sled Communication Failure	
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Module Terminators and Module-to-Module Cables 2 Drive SledModule (CM or EM)

T022

T022 - Tape Drive Communication Failure	
Description	**GUI Description:** Communication to the tape drive has failed inside the drive sled assembly. **Explanation:** Internal to the tape drive, the sled control board can no longer communicate with the tape drive.
Detection Scenarios	• Routine polling between sled control board and tape drive can no longer occur. • Specific commands such as unload, reset, etc. are not responded to.
Root Causes	• Cable broken, unplugged, damaged, etc. • Tape drive failure
Service Resolution Steps	1 Perform RR001 - Remove and Replace Drive Sled on page 420. See also Removing and Replacing a Tape Drive on page 129. 2 Use the **Details** option in the RAS ticket to identify which tape drive is generating the RAS ticket. If possible, check the front of the tape drive for error indications. 3 Clear the RAS ticket. Upgrade the library firmware to 400G or later revision of code. A timing issue was addressed in the 400G library firmware which was occasionally falsely reporting T022 RAS tickets.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T023

T023 - Drive Sled Fan Failure	
Description	**GUI Description:** The fan within the drive sled assembly is spinning too slowly or does not rotate at all.
Detection Scenarios	Regular polling/monitoring of the fan indicates a problem.
Root Causes	• Hardware failure of fan • Wiring or PCBA failure • Blocked air paths • Physical obstruction
Service Resolution Steps	1 Perform RR001 - Remove and Replace Drive Sled on page 420. See also Removing and Replacing a Tape Drive on page 129. 2 Use the **Details** option in the RAS ticket to identify which tape drive is generating the RAS ticket. If possible, check the front of the tape drive for error indications. Check the suspect drive sled to determine if the fan is still spinning. Check for any obstructions.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T024

T024 - AC Power Loss	
Description	**GUI Description:** AC power to a library power supply has been turned off. **Explanation:** A power supply has detected loss of AC power. AC power loss to a single power supply control module is unlikely to be able to post this RAS ticket due to the speed at which system shutdown occurs after an AC loss. This RAS ticket is most likely to occur when there is AC loss to a redundant power supply in a control module or any supply in any expansion module.
Detection Scenarios	AC power status from the supply creates an interrupt that is managed by software.
Root Causes	• AC supply is gone (cord removed, customer side AC failure, etc.). • Individual on/off switch for the supply has been set to off. • Hardware failure inside supply. • Damaged module terminator or module-to-module cable with bent or broken pins.
Service Resolution Steps	1 Perform DR009 - Resolve AC Failure on page 371. 2 Use the **Details** option in the RAS ticket to identify which power supply is generating the RAS ticket. Inspect the suspect power supply and verify that there is a power supply present and turned on. For normal operation, both LEDs (AC OK and DC OK) should be solid green. The STANDBY LED should be off. Reseat the power supply and swap with others in the unit to isolate failure to either the slot or the power supply. 3 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the required part based on resolution steps. • Module Terminators and Module-to-Module Cables • Power Supply

T025

T025 - Power Supply Hardware Failure	
Description	**GUI Description:** A defective power supply has been detected. **Explanation:** Power supplies report four failure conditions that are considered to be a hardware failure within the supply: Fan Fail, Over Temp, DC Fail, and Over Current. These failures can occur in both single and redundant power supplies within control modules and any expansion module with a power supply.
Detection Scenarios	Regular monitoring of power supply status results in one of four detected failures.
Root Causes	• Detected fan failure in the supply. • Detected over temp condition in the supply. • Detected DC failure in the supply. • Detected over current failure in the supply. • Damaged module terminator or module-to-module cable with bent or broken pins.
Service Resolution Steps	1 Perform RR003 - Remove and Replace Power Supply on page 422. See also Removing and Replacing a Power Supply on page 107. 2 Use the **Details** option in the RAS ticket to identify which power supply is generating the RAS ticket. Inspect the suspect power supply and verify that there is a power supply present and turned on. For normal operation, both LEDs (AC OK and DC OK) should be solid green. The STANDBY LED should be off. 3 Reseat the power supply and swap with others in the unit to isolate failure to either the slot or the power supply. 4 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch parts as appropriate based on analysis: • Power Supply • Module Terminators and Module-to-Module Cables

T026

T026 - Primary Key Server Failover	
Description	**GUI Description:** The library performed a successful communication failover to the secondary key server. **Explanation:** The key management features on the library allow the user to connect two key servers for redundancy. If communication to the primary server is interrupted, the library will automatically switch or failover to the secondary server. This RAS ticket is generated to notify the user that communication to the primary key server failed and that the library performed a successful failover to the secondary key server.
Detection Scenarios	The library detects that it can no longer communicate with the primary key server and automatically switches to the secondary key server, where it established successful communication.
Root Causes	• Primary key server is not connected properly. • Primary key server is not configured properly. • Library Ethernet settings are not configured properly.

Service Resolution Steps	1 Perform DR079 - Resolve Key Server Request Issue on page 401.
	2 Perform EKM Path Diagnostics (**Tools > Diagnostics > EKM > EKM Path Diagnostics** in the Web client). See Running EKM Path Diagnostics on page 8.
	3 If the "Ping" test is unsuccessful, look for physical connection problems and down server(s).
	4 If "Ping" is successful, do the following:
	
	  a. Verify that EKM is running.
	  b. Verify that the media is not from a different EKM environment.
	  c. Verify that the key server is present.

Possible CRUs/FRUs	None

T027

T027 - Key Server Request Failure	
Description	**GUI Description:** The library is unable to receive a proper response to a key server request. **Explanation:** The key management feature of the library allows the user to connect two key servers for redundancy. If a server request to one of these servers fails and a communication failover is not possible or not successful, this RAS ticket will be generated. A separate RAS ticket will be created for each key server that fails.
Detection Scenarios	• Library detects that communication with a key server is not successful and a communication failover is not possible. • Library detects that the key server is not properly configured.
Root Causes	• Primary/secondary key server is not connected properly. • Primary/secondary key server is not configured properly. • Library Ethernet settings are not configured properly. • Key server is not configured/restored correctly.
Service Resolution Steps	1 Perform DR079 - Resolve Key Server Request Issue on page 401/ 2 Perform EKM Path Diagnostics (**Tools > Diagnostics > EKM > EKM Path Diagnostics** in the Web client). See Running EKM Path Diagnostics on page 8. 3 If the "Ping" test is unsuccessful, look for physical connection problems and down server(s). 4 If "Ping" is successful, do the following: a. Verify that EKM is running. b. Verify that the media is not from a different EKM environment. c. Verify that the key server is present.
Possible CRUs/FRUs	None

T028

T028 - Secondary Key Server Failover	
Description	**GUI Description:** The library performed a successful communication failover to the primary key server. **Explanation:** The key management feature of the library allows the user to connect two key servers for redundancy. If communication to the secondary server is interrupted, the library will automatically switch or failover to the primary server. This RAS ticket will be generated to notify the user that communication to the secondary key server failed and that the library performed a successful failover to the primary key server.
Detection Scenarios	When the library detects that it can no longer communicate with the secondary key server and automatically switches to the primary key server, where it established successful communication.
Root Causes	• Secondary key server is not connected properly. • Secondary key server is not configured properly. • Library Ethernet settings are not configured properly.
Resolution	1 Perform DR079 - Resolve Key Server Request Issue on page 401. 2 Perform EKM Path Diagnostics (**Tools > Diagnostics > EKM > EKM Path Diagnostics** in the Web client). See Running EKM Path Diagnostics on page 8.
Possible CRUs/FRUs	None

T029

T029 - Key Server Communication Warning	
Description	The library is unable to successfully monitor the communication path and operation status of the configured key server. The key management feature of the library allows the user to connect two key servers for redundancy. If communication fails during background key server path testing, this RAS ticket will be generated. A separate RAS ticket will be created for each key server that fails.
Detection Scenarios	Library detects that communication with a key server is not successful.
Root Causes	• Primary/secondary key server is not connected properly. • Primary/secondary key server is not configured properly. • Library Ethernet settings are not configured properly.
Service Resolution Steps	1 Perform DR136 - Resolve EKM Server Connectivity Issue on page 418. 2 Perform EKM Path Diagnostics (**Tools > Diagnostics > EKM > EKM Path Diagnostics** in the Web client). See Running EKM Path Diagnostics on page 8.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. This may require a replacement of the key server.

T030

T030 - Excessive I/E Station Events	
Description	**GUI Description:** An I/E station is reporting continuous door open or closure events although no close or open door state change is detected. **Explanation:** The library controller is receiving too many I/E station interrupts. The problem may be caused by a stuck interrupt line for the CM or EM door open and close indication. Door open and close state changes are detected properly, but the excessive I/E station state change interrupt notifications indicate a hardware problem, most likely due to a cabling/connection issue.
Detection Scenarios	Library firmware receives multiple or continuous I/E station open and close interrupts, but does not detect the required door open and close state change.
Root Causes	• Internal module sensor line and cable connections shorted. • Module terminator pins bent or shorted. • Module-to-module cable pins bent or shorted.
Service Resolution Steps	1 Perform DR008 - Resolve Stuck I/E Station Interrupt on page 370. 2 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables. 3 Power on the library and wait for the library to initialize. Open and close each I/E station door. If the problem is not fixed, you may need to replace the module.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Module Terminators and Module-to-Module Cables 2 Module (EM or CM)

T031

T031 - I/E Station Unlock Failure	
Description	**GUI Description:** An I/E station lock failed to unlock. **Explanation:** System logic or external command is requiring I/E station lock to unlock but it will not.
Detection Scenarios	When unlock action is attempted, lock/unlock position sensor does not detect the proper state.
Root Causes	• Lock mechanism not working properly. • Lock position sensor not working properly. • Mechanical binding or obstruction prevents proper motion and detection. • Mechanical failure of sensor flag.

Service Resolution Steps	1 Perform DR011 - Resolve I/E Station Lock/Unlock Failure on page 372.
	2 Use the **Details** option in the RAS ticket to identify which I/E station in the CM or EM is causing the RAS ticket.
	3 Clear the RAS ticket.
	4 From the Web client or operator panel, use the **I/E Station Lock/Unlock** command to attempt to unlock/lock the door. If door still does not open, use a T10 torx screwdriver to manually try to unlock the I/E station.
	5 If using the 400G library firmware or later, run the IVT - I/E Station test from the Library Tests option through the operator panel.
	
	Note: IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
	
	    • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
	
	    • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 I/E Lock Assembly 2 LCD Front Panel Display (Operator Panel)

T032

T032 - I/E Station Lock Failure	
Description	**GUI Description:** An I/E station lock failed to lock when required. **Explanation:** System logic or external command is requiring an I/E station lock to lock, but the locking mechanism fails to engage.
Detection Scenarios	When lock action is attempted, lock/unlock position sensor does not detect the proper state.
Root Causes	• Lock mechanism not working properly. • Lock position sensor not working properly. • Mechanical binding or obstruction prevents proper motion and detection. • Mechanical failure of sensor flag.

Service Resolution Steps	1 Perform DR011 - Resolve I/E Station Lock/Unlock Failure on page 372.
	2 Use the **Details** option in the RAS ticket to identify which I/E station in the CM or EM is causing the RAS ticket.
	3 Clear the RAS ticket.
	4 From the Web client or operator panel use the **I/E Station Lock/Unlock** command to attempt to unlock/lock the door. If door still does not lock, use a T10 torx screwdriver to manually try to lock the I/E station.
	5 If using the 400G library firmware or later, run the IVT - I/E Station test from the Library Tests option through the operator panel.
	
	Note: IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
	
	    • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
	
	    • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 I/E Lock Assembly 2 LCD Front Panel Display (Operator Panel)

T033

T033 - TapeAlert 3 - Hard Read or Write Error	
Description	**GUI Description:** The tape drive issued a TapeAlert, informing the library that it stopped the current read or write operation due to a hard read or write error that the drive cannot correct. **Explanation:** System determines that the drive has issued a TapeAlert 3, indicating an unrecoverable read, write, or positioning error.
Detection Scenarios	Tape drive issues a TapeAlert 3, which is recognized by the library during the continuous 4-second polling cycle of drive status.
Root Causes	Drive has determined that there is a problem per its internal algorithms.
Service Resolution Steps	Perform <u>DR133 - Resolve Drive TapeAlert 3 - Hard Error</u> on page 418.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Tape Cartridge 2 Drive Sled

T034

T034 - Drive TapeAlert 4 – Media Error	
Description	**GUI Description:** A tape cartridge can no longer be written or read, or performance is severely degraded. **Explanation:** System determines that the drive has issued a TapeAlert 4 indicating an unrecoverable read, write, or positioning error that the drive specifically isolates to the media. As of release 410, this RAS ticket is generated only if accompanied by TapeAlert 39, to indicate a pulled leader pin.
Detection Scenarios	Tape drive issues a TapeAlert 4, which is recognized by the library during the continuous 4-second polling cycle of drive status.
Root Causes	Tape drive has determined that there is a problem per its internal algorithms.
Service Resolution Steps	See: DR044 - Resolve Drive TapeAlert 4 - Media Error on page 387
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Tape Cartridge

T035

T035 - Drive TapeAlert 5 – Read Failure	
Description	**GUI Description:** The drive is having difficulty reading from a tape cartridge. **Explanation:** System determines that the tape drive has issued a TapeAlert 5, indicating an unrecoverable read error where isolation is uncertain between tape drive and media.
Detection Scenarios	Tape drive issues a TapeAlert 5, which is recognized by the library during the continuous four-second polling cycle of tape drive status.
Root Causes	Tape drive has determined that there is a problem per its internal algorithms.
Service Resolution Steps	1 Perform DR045 - Resolve Drive TapeAlert 1, 5, 6 - Read/Write Problem on page 388. 2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. If possible, check the front of the tape drive for error indications. Isolate the media which was used in the tape drive and caused the error. Clear the RAS ticket. 3 Upgrade the tape drive to the latest drive firmware posted on http://support.dell.com. If already at the latest firmware, power cycle the drive sled by either reseating it, rebooting the unit, or performing an emergency reset on the drive by holding the eject button down for 5 seconds. Use a piece of known good media and retry the read operation on the tape drive. 4 Additionally, if using 400G library firmware or later, run the IVT - Drive test from the Library Tests option accessed through the operator panel. 5 Finally, clean the tape drive if continuing to get read or write failures with multiple pieces of media. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Tape Cartridge

T036

T036 - Drive TapeAlert 6 – Write Failure	
Description	**GUI Description:** The drive can no longer write data to a tape cartridge. **Explanation:** System determines that the tape drive has issued a TapeAlert 6, indicating an unrecoverable write error where isolation is uncertain between tape drive and media.
Detection Scenarios	Tape drive issues a TapeAlert 6, which is recognized by the library during the continuous four-second polling cycle of tape drive status.
Root Causes	Tape drive has determined that there is a problem per its internal algorithms.
Service Resolution Steps	1 Perform <u>DR045 - Resolve Drive TapeAlert 1, 5, 6 - Read/Write Problem</u> on page 388. 2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. If possible, check the front of the tape drive for error indications. Isolate the media which was used in the tape drive and caused the error. Clear the RAS ticket. 3 Upgrade the tape drive to the latest drive firmware posted on http://support.dell.com. If already at the latest firmware, power cycle the drive sled by either reseating it, rebooting the unit, or performing an emergency reset on the drive by holding the eject button down for 5 seconds. Use a piece of known good media and retry the write operation on the tape drive. 4 Additionally, if using 400G library firmware or later, run the IVT - Drive test from the Library Tests option accessed through the operator panel. Finally, clean the tape drive if continuing to get read or write failures with multiple pieces of media. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Tape Cartridge

T037

T037 - Drive TapeAlert 8 – Not Data Grade	
Description	**GUI Description:** The drive cannot use a tape cartridge because it is not of required data grade. **Explanation:** System determines that the tape drive has issued a TapeAlert 8, indicating that the tape cartridge in the tape drive is not a data grade tape cartridge.
Detection Scenarios	Tape drive issues a TapeAlert 8, which is recognized by the library during the continuous four-second polling cycle of tape drive status.
Root Causes	Tape drive has determined that there is a problem per its internal algorithms.
Service Resolution Steps	1 Perform <u>DR046 - Resolve Drive TapeAlert 8 - Suspect Data Grade Tape</u> on page 389. 2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. If possible, check the front of the tape drive for error indications. Isolate the media which was used in the tape drive and caused the error. Clear the RAS ticket. 3 Upgrade the tape drive to the latest drive firmware posted on http://support.dell.com. If already at the latest firmware, power cycle the drive sled by either reseating it, rebooting the unit, or performing an emergency reset on the drive by holding the eject button down for 5 seconds. Use a piece of known good media and retry the operation on the tape drive. 4 Additionally, if using 400G library firmware or later, run the IVT - Drive test from the Library Tests option accessed through the operator panel. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Tape Cartridge

T038

T038 - Drive TapeAlert 9 – Write Protected	
Description	**GUI Description:** The drive was requested to write to a write-protected tape cartridge. **Explanation:** System determines that a write was attempted on a write protected tape cartridge.
Detection Scenarios	Tape drive issues a TapeAlert 9.
Root Causes	Write protect feature on tape cartridge is protecting the tape cartridge, but the user is trying to write to it.
Service Resolution Steps	1 Perform DR014 - Resolve Write-Protected Tape Cartridge on page 373. 2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. If possible, check the front of the tape drive for error indications. Clear the RAS ticket. 3 Isolate the media which was used in the tape drive and caused the error. Inspect the media and ensure that the write protect tab is not engaged. If tab is not engaged, try the operation with another piece of known good media.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Tape Cartridge

T039

T039 - Drive TapeAlert 12 – Unsupported Format	
Description	**GUI Description:** The tape cartridge format is incompatible with the drive. **Explanation:** System determines that the tape drive has issued a TapeAlert 12, indicating that the media loaded is an unsupported format. In the case of the LTO family of tape drives, full backward read and write compatibility stopped when LTO-3 was introduced. LTO-3 cannot write in LTO-1 format. Therefore an LTO-1 tape cartridge is an unsupported format when trying to write to it with an LTO-3 tape drive. LTO-1 and LTO-2 tape cartridges are an unsupported format when trying to write to them with an LTO-4 tape drive, etc. **Note:** This TapeAlert is also reported if a FUP tape creation operation is initiated for a tape cartridge that is already a FUP tape.
Detection Scenarios	Tape drive issues a TapeAlert 12, which is recognized by the library during the continuous drive4 polling cycle of tape drive status.
Root Causes	Tape drive has determined that there is a problem per its internal algorithms.
Service Resolution Steps	1 Perform <u>DR015 - Resolve Unsupported Tape Format</u> on page 374. 2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. If possible, check the front of the tape drive for error indications. Isolate the media which was used in the tape drive and caused the error. Verify that the media technology is compatible with the tape drive and clear the RAS ticket. The generation of the LTO drive determines which generations of tape cartridge the drive can write/read or read. LTO drives can write/read tape cartridges that are the same generation and one older, and can read (but not write) tape cartridges that are two generations older. For example, LTO-5 drives can write/read LTO-5 and LTO-4 media, but only read LTO-3 media. LTO-1 and LTO-2 media are not supported in LTO-5 tape drives. 3 Upgrade the tape drive to the latest drive firmware posted on http://support.dell.com. If already at the latest firmware, power cycle the drive sled by either reseating it, rebooting the unit, or performing an emergency reset on the drive by holding the eject button down for 5 seconds. Use a piece of known good and compatible media and retry the operation on the tape drive.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Tape Cartridge

T040

T040 - Drive TapeAlert 15 – MIC Chip Failure	
Description	**GUI Description:** The memory in the tape cartridge has failed. **Explanation:** System determines that the tape drive has issued a TapeAlert 15, indicating that the MIC (memory in cassette) of the media loaded is not working properly.
Detection Scenarios	Tape drive issues a TapeAlert 15, which is recognized by the library during the continuous 4-second polling cycle of tape drive status.
Root Causes	Tape drive has determined that there is a problem with the MIC per its internal algorithms. Tape cartridge access and performance may be reduced.
Service Resolution Steps	1 Perform <u>DR047 - Resolve Drive TapeAlert 15 - Cartridge Memory Failure</u> on page 389. 2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. If possible, check the front of the tape drive for error indications. Isolate the media which was used in the tape drive and caused the error. Clear the RAS ticket. 3 Upgrade the tape drive to the latest drive firmware posted on http://support.dell.com. If already at the latest firmware, power cycle the drive sled by either reseating it, rebooting the unit, or performing an emergency reset on the drive by holding the eject button down for 5 seconds. Use a piece of known good media and retry the operation on the tape drive. 4 If using 400G library firmware or later, run the IVT - Drive test from the Library Tests option accessed through the operator panel. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Tape Cartridge

T041

T041 - Drive TapeAlert 16 - Forced Eject	
Description	**GUI Description:** The tape cartridge has been ejected from a drive while it was being read or written.
	Explanation: System determines that the tape drive has issued a TapeAlert 16, indicating that an unload of a tape drive was triggered while the tape drive was actively reading or writing. The source of the unload can be either an operator-initiated manual push button on the tape drive itself or a GUI initiated command.
Detection Scenarios	Tape drive issues a TapeAlert 16, which is recognized by the library during the continuous 4-second polling cycle of tape drive status.
Root Causes	Tape drive has determined that there is a problem per its internal algorithms.
Service Resolution Steps	1 Perform <u>DR048 - Resolve Drive TapeAlert 16 - Forced Eject</u> on page 389
	2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. If possible, check the front of the tape drive for error indications.
	3 Open the main door to determine if media the media is still in the tape drive or has ejected fully. If the media has ejected fully, attempt to perform a move media operation from the tape drive back to a storage or I/E slot. If the media is still in the drive, unload the media and perform a move operation back to the storage slot.
	4 Isolate the media which was used in the tape drive and caused the error.
	5 Clear the RAS ticket.
	6 Upgrade the tape drive to the latest drive firmware posted on http://support.dell.com. If already at the latest firmware, power cycle the drive sled by either reseating it, rebooting the unit, or performing an emergency reset on the drive by holding the eject button down for 5 seconds. Use a piece of known good media and retry the read operation on the tape drive.
	7 If using 400G library firmware or later, run the IVT - Drive test from the Library Tests option accessed through the operator panel.
	Note: IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
	• If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
	• If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	None

T043

T043 - Drive TapeAlert 18 - Cartridge Memory Tape Directory Corrupted	
Description	**GUI Description:** The tape drive issued a TapeAlert, informing that the tape cartridge directory is corrupted and that file search performance may be degraded. **Explanation:** The library received a drive-generated TapeAlert 18, indicating that the directory on the tape cartridge has been corrupted and that file search performance will be degraded.
Detection Scenarios	The tape drive generated and reported TapeAlert 18.
Root Causes	Tape drive has determined that there is a problem per its internal algorithms.
Service Resolution Steps	1 Perform DR017 - Resolve Corrupted Tape Directory on page 374.
Possible CRUs/FRUs	None

T044

T045 - Drive TapeAlert 19 - Nearing Media Life	
Description	**GUI Description:** The tape drive issued a TapeAlert, informing that the tape cartridge media is nearing then end of its calculated useful life. **Explanation:** The library received a drive generated TapeAlert 19, indicating that the tape cartridge is nearing the end of its calculated useful life.
Detection Scenarios	The tape drive generated and reported TapeAlert 19.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	1 Perform <u>RR008 - Remove and Replace Tape Cartridge</u> on page 423.
Possible CRUs/FRUs	None

T045

T045 - Drive TapeAlert 20 – Clean Now	
Description	**GUI Description:** The drive is requesting cleaning before it can be used again. **Explanation:** System determines that the tape drive has issued a TapeAlert 20, indicating that the tape drive requires cleaning before it can be used again.
Detection Scenarios	Tape drive issues a TapeAlert 20, which is recognized by the library during the continuous 4-second polling cycle of tape drive status.
Root Causes	Tape drive has determined that there is a cleaning need per its internal algorithms.
Service Resolution Steps	1 Perform DR018 - Resolve Drive Cleaning Requirement on page 375. 2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. 3 Clear the RAS ticket. 4 Either manually move a known good cleaning tape to the tape drive, or perform a cleaning operation in the tape backup software.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. No library CRU or FRU is involved. Rather, this is an indication that the tape drive requires a cleaning tape to continue. Use a known good cleaning tape to clean the tape drive.

T046

T046 - Drive TapeAlert 21 – Clean Periodic	
Description	**GUI Description:** The drive is requesting cleaning at the next convenient opportunity. **Explanation:** System determines that the tape drive has issued a TapeAlert 21, indicating that the tape drive requires cleaning. This should be coincident with a `C` on the tape drive's seven-segment display.
Detection Scenarios	Tape drive issues a TapeAlert 21, which is recognized by the library during the continuous four-second polling cycle of tape drive status.
Root Causes	Tape drive has determined that there is a problem per its internal algorithms.
Service Resolution Steps	1 Perform <u>DR018 - Resolve Drive Cleaning Requirement</u> on page 375. 2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. 3 Clear the RAS ticket. 4 Either manually move a known good cleaning tape to the tape drive or perform a cleaning operation in the tape backup software.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. No library CRU or FRU is involved. Rather, this is an indication that the tape drive requires a cleaning tape to continue. Use a known good cleaning tape to clean the tape drive.

T047

T047 - Drive TapeAlert 22 - Expired Cleaning Media	
Description	**GUI Description:** The cleaning tape cartridge has been used up and can no longer clean a tape drive. **Explanation:** System determines that a cleaning media is expired.
Detection Scenarios	Tape drive issues a TapeAlert 22.
Root Causes	The cleaning media within the cartridge is used up (expired).
Service Resolution Steps	1 Perform RR008 - Remove and Replace Tape Cartridge on page 423. See the *Dell PowerVault ML6000 Tape Library User's Guide* for information on removing and replacing a cartridge. 2 Use the **Details** option in the RAS ticket to identify which tape drive contains the expired cleaning media which reported the RAS ticket. 3 Clear the RAS ticket. 4 Unload and export the cleaning media from the library. 5 Load a known good cleaning tape and either manually move it to the tape drive or perform a cleaning operation in the tape backup software.
Possible CRUs/FRUs	No library CRU or FRU is involved. Rather, this is an indication that the cleaning tape media is expired and needs to be replaced.

T048

T048 - Drive TapeAlert 23 – Invalid Cleaning Tape	
Description	**GUI Description:** The tape drive requires cleaning, but a non-cleaning tape was loaded. **Explanation:** System determines that the tape drive has issued a TapeAlert 23, indicating that the tape drive was expecting a cleaning tape, but the loaded tape cartridge is not a cleaning tape.
Detection Scenarios	Tape drive issues a TapeAlert 23, which is recognized by the library during the continuous 4-second polling cycle of tape drive status.
Root Causes	• User or library attempts to mount a cleaning tape cartridge, but the tape is not actually a cleaning tape. • User mistakenly loads a data tape cartridge as a cleaning tape. • Inventory or application issue results in data tape cartridge being loaded when tape drive expects cleaning tape.
Service Resolution Steps	1 Perform <u>RR008 - Remove and Replace Tape Cartridge</u> on page 423. See the *Dell PowerVault ML6000 Tape Library User's Guide* for information on removing and replacing a cartridge. 2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. 3 Clear the RAS ticket. 4 Isolate the media from the library and determine if it is a valid cleaning media. 5 Ensure that a cleaning tape was being used and not a data tape. This RAS ticket can appear if a data cartridge is mistakenly used as cleaning media.
Possible CRUs/FRUs	None

T049

T049 - Drive TapeAlert 30 – Hardware A	
Description	**GUI Description:** The tape drive detected an internal hardware problem. **Explanation:** System determines that the tape drive has issued a TapeAlert 30, indicating a hardware error that requires a tape drive power cycle before the tape drive might recover to a usable state.
Detection Scenarios	Tape drive issues a TapeAlert 30, which is recognized by the library during the continuous 4-second polling cycle of tape drive status.
Root Causes	Tape drive has determined that there is a problem per its internal algorithms.
Service Resolution Steps	1 Perform <u>DR049 - Resolve Drive TapeAlert 30, 31 - Drive Hardware Error</u> on page 390. 2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. 3 If possible, check the front of the tape drive for error indications. 4 Isolate the media which was used in the tape drive and caused the error. 5 Clear the RAS ticket. 6 Upgrade the tape drive to the latest drive firmware posted on http://support.dell.com. If already at the latest firmware, power cycle the drive sled by either reseating it, rebooting the unit, or performing an emergency reset on the drive by holding the eject button down for 5 seconds. 7 Use a piece of known good media and retry the operation on the tape drive. 8 If using 400G library firmware or later, run the IVT - Drive test from the Library Tests option accessed through the operator panel. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T050

T050 - Drive TapeAlert 31 – Hardware B	
Description	**GUI Description:** The tape drive detected an internal hardware problem. **Explanation:** System determines that the tape drive has issued a TapeAlert 31, indicating a hardware error that requires a tape drive power cycle before the tape drive might recover to a usable state.
Detection Scenarios	Tape drive issues a TapeAlert 31, which is recognized by the library during the continuous 4-second polling cycle of tape drive status.
Root Causes	Tape drive has determined that there is a problem per its internal algorithms.

Service Resolution Steps	1 Perform DR049 - Resolve Drive TapeAlert 30, 31 - Drive Hardware Error on page 390.
	2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. If possible, check the front of the tape drive for error indications.
	3 Isolate the media which was used in the tape drive and caused the error.
	4 Clear the RAS ticket.
	5 Upgrade the tape drive to the latest drive firmware posted on http://support.dell.com. If already at the latest firmware, power cycle the drive sled by either reseating it, rebooting the unit, or performing an emergency reset on the drive by holding the eject button down for 5 seconds.
	6 Use a piece of known good media and retry the operation on the tape drive.
	7 If using 400G library firmware or later, run the IVT - Drive test from the Library Tests option accessed through the operator panel.
	
	Note: IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
	
	   • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
	
	   • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T051

T051 - TapeAlert 32 – Interface	
Description	**GUI Description:** The tape drive reported an external data interface problem. **Explanation:** System determines that the tape drive has issued a TapeAlert 32, indicating that a tape drive has detected a problem with the application client interface.
Detection Scenarios	Tape drive issues a TapeAlert 32, which is recognized by the library during the continuous 4-second polling cycle of tape drive status.
Root Causes	Tape drive has determined that there is a connection interface problem per its internal algorithms.
Service Resolution Steps	1 Perform [DR012 - Resolve Drive TapeAlert 32 - Host Interface](#) on page 372. 2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. 3 Clear the RAS ticket. 4 Check the cabling from the back of the tape drive to the host, and reseat all the cables. 5 If the RAS ticket persists, swap cables between drives to isolate a bad cable. If this works and you can detect the drive, replace the bad cable. 6 If swapping cables did not fix the problem, upgrade the tape drive to the latest drive firmware.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled (only if all cables are OK and host communication to other drives works)

T052

T052 - Drive TapeAlert 33 – Media Eject Required	
Description	**GUI Description:** The tape drive has an error which requires the tape cartridge to be ejected for error recovery. **Explanation:** System determines that the tape drive has issued a TapeAlert33, indicating that the tape drive requires a tape cartridge to be ejected to resolve a problem.
Detection Scenarios	Tape drive issues a TapeAlert 33, which is recognized by the library during the continuous 4-second polling cycle of tape drive status.
Root Causes	Tape drive has determined that there is a problem per its internal algorithms.

Service Resolution Steps	1 Perform <u>DR037 - Resolve Media Eject</u> on page 384.
	2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. If possible, check the front of the tape drive for error indications.
	3 Attempt to unload the media through the operator panel or Web client. If this is unsuccessful, open the main door and perform an emergency reset by holding down the eject button for 5 seconds.
	4 Clear the RAS ticket.
	5 Upgrade the tape drive to the latest drive firmware posted on http://support.dell.com.
	6 Use a piece of known good media and retry the operation on the tape drive.
	7 If using 400G library firmware or later, run the IVT - Drive test from the Library Tests option accessed through the operator panel.
	
	Note: IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
	
	   • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
	
	   • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T053

Status: Added with firmware version 580.

T053 - Drive Unload Timeout	
Description	**GUI Description:** A tape drive did not successfully unload a tape cartridge within the allotted time frame, preventing the robot from picking and moving the tape cartridge. **Explanation:** The library is expecting the drive to achieve an unloaded state within 3 to 5 minutes of initiating the unload request, but the drive is still rewinding and unthreading the tape. This RAS ticket is ONLY displayed if the tape drive was actually instructed to perform an unload operation and the drive did not respond with a successful or failed unload response within the allotted time frame. In the case where the library controller code is determining that the drive is still busy for a defined wait time period and the unload request is not sent to the tape drive, this RAS ticket shall not be generated, but rather the request to unload shall be denied as an illegal request. **Note:** The library will not wait for the maximum unload time defined by the drive, since drives may take up to 18 minutes before succeeding or failing the unload/eject operation. The library will only wait for 3 minutes before failing the unload request.
Detection Scenarios	• A SCSI Move Medium was issued, but the drive does not achieve an unload/eject state within the allotted time frame after being instructed to unload and eject. • A UI command was issued to unload or move from a drive, but the drive does not achieve an unload/eject state within the allotted time frame after being instructed to unload and eject.
Root Causes	The tape drive was instructed to unload the tape cartridge, but did not complete the request within the allotted time frame.
Service Resolution Steps	1 Perform DR006 - Resolve Unload Timeout on page 369. 2 If possible, check the front of the tape drive for error indications.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T055

Status: Implemented in firmware version 420.

T055 - Drive TapeAlert 37 – Drive Detects Voltage Problem	
Description	**GUI Description:** The drive has exceeded one of its voltage limits. **Explanation:** System determines that the drive has issued a TapeAlert 37, indicating that the tape drive detected a voltage problem.
Detection Scenarios	The library determines there is a TapeAlert 37 through its Event Message exchange with the drive sled. The drive sled detects the TapeAlert 37 by its periodic polling of the tape drive.
Root Causes	• Tape drive has determined that there is a problem per its internal algorithms. • Drive detected a momentary voltage drop when a separate drive was being activated. • System power supply failure or fault.
Service Resolution Steps	1 Perform DR083 - Resolve Drive Voltage Problem on page 404. 2 If possible, check the front of the tape drive for error indications.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled 2 Power Supply

T056

T056 - Drive TapeAlert 39 - Diagnostic Required	
Description	**GUI Description:** A tape may have a hardware fault, and further diagnostics may be required to isolate the issue to a media or drive problem. **Explanation:** System determines that the drive has issued a TapeAlert 39, indicating that the drive may have experienced a hardware fault and that further diagnostic may be required. Typically, this TapeAlert flag is reported in conjunction with TapeAlert flag 4, which indicates a media issue. If TapeAlert flag 4 is accompanied by TapeAlert 39, this may indicate a pulled leader pin. Resolution text will explain the relationship and possibly reference the TapeAlert flag 4 tickets and resolution.
Detection Scenarios	Tape drive issues a TapeAlert 4, which is recognized by the library during the continuous 4 second polling cycle of drive status.
Root Causes	Drive has determined that there is a problem per its internal algorithms.
Service Resolution Steps	1 Perform DR024 - Resolve Drive TapeAlert 39 – Diagnostics Required on page 377.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T057

T057 - Drive TapeAlert 51 - Tape Directory Invalid At Unload	
Description	**GUI Description:** The tape drive issued a TapeAlert, indicating that the tape cartridge directory has been corrupted during the unload operation, and that file search performance will be degraded. **Explanation:** The library received a drive-generated TapeAlert 51, indicating that the directory on the tape cartridge has not been updated completely during an unload operation, and that file search performance will be degraded.
Detection Scenarios	The tape drive generated and reported TapeAlert 51.
Root Causes	The tape drive generated and reported Tap Alert 51.
Service Resolution Steps	1 Perform <u>DR017 - Resolve Corrupted Tape Directory</u> on page 374.
Possible CRUs/FRUs	None

T058

T058 -Drive TapeAlert 52 - Tape System Area Write Failure	
Description	**GUI Description:** The tape drive issued a TapeAlert, indicating that a tape system area write failed during a cartridge unload operation. **Explanation:** The library received a drive-generated TapeAlert 52, indicating that a tape system area write failed during the unload operation.
Detection Scenarios	The tape drive generated and reported TapeAlert 52.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	1 Perform RR008 - Remove and Replace Tape Cartridge on page 423.
Possible CRUs/FRUs	None

T059

T059 - Drive TapeAlert 53 - Tape System Area Read Failure	
Description	**GUI Description:** The tape drive issued a TapeAlert, indicating that a tape system area read failed during a cartridge load operation. **Explanation:** The library received a drive-generated TapeAlert 53, indicating that a tape system area read failed during a load operation.
Detection Scenarios	The tape drive generated and reported TapeAlert 53.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	1 Perform RR008 - Remove and Replace Tape Cartridge on page 423.
Possible CRUs/FRUs	None

T060

T060 - Main Access Door Open	
Description	**GUI Description:** A library access door has been opened. **Explanation:** At boot time or run time, the library detects that at least one main access door is open. The main access door switches are physically wired in series, and the system firmware cannot distinguish which switch/door is open. In addition, the health of the module-to-module connection and termination affects the series wiring of the switches. Firmware logic will not report this RAS ticket if the module-to-module termination is totally missing or not proper.
Detection Scenarios	Constant monitoring of the switch electrical circuit (hardware interrupt) detects a door open. This is true at run time or at bootup.
Root Causes	• Any main access door is actually open. • A number of electrical hardware failures in the door switch circuit (this includes intermittent issues). • Mechanical issues where door switch connection is not being made, even though a door is closed (this includes intermittent issues). • Disconnected module terminator or module-to-module cable. • Damaged module terminator or module-to-module cable with bent or broken pins.
Service Resolution Steps	1 Perform DR019 - Resolve Open Access Door on page 375. 2 Clear the RAS ticket. Inspect all doors on the front of the library to ensure that they are closed. The main door must be closed before closing the I/E station door in a module. 3 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables. 4 Inspect the main door for any obstruction on the door itself, or where it interfaces with the module.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Module Terminators and Module-to-Module Cables 2 LCD Front Panel Display (Operator Panel)

T061

T061 - TapeAlert 55 - Load Failure	
Description	**GUI Description:** The tape drive encountered a problem while loading a tape cartridge. **Explanation:** When loading a tape cartridge into a tape drive, a hardware malfunction can prevent the tape cartridge from being loaded and threaded in the tape drive, or the tape cartridge may actually be stuck in the tape drive.
Detection Scenarios	After loading a drive, the drive generated a TapeAlert 55.
Root Causes	• A drive hardware error that prevents the tape cartridge from being loaded. • A damaged tape cartridge that cannot be loaded into the drive.
Service Resolution Steps	1 Perform DR078 - Resolve Tape Load/Unload Failure on page 401. 2 Use the **Details** option in the RAS ticket to identify which tape drive reported the RAS ticket. Check for lock block condition. If possible, check the front of the tape drive for error indications. Clear the RAS ticket. 3 Open the main door and inspect the tape drive or path for obstruction. 4 Isolate the media used during the load operation and verify it is not damaged. 5 Finally, pull the drive sled from the sled bay, reseat it in another sled bay, and retry the load operation. Additionally, if using 400G library firmware or later, run the IVT - Drive test from the Library Tests option accessed through the operator panel. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T062

T062 - Module Configuration Problem	
Description	**GUI Description:** The library cannot determine its module configuration due to a bad module-to-module cable connection or a module termination failure. **Explanation:** At boot time or run time, the library physical frame configuration is not valid. The configuration is determined via address bits and module count bits that are routed through the module-to-module cabling and termination.
Detection Scenarios	• Code determines that there is more than 1 CM module, based on geographic address bits. • Code detects 5 frames or more above the CM per the geographic address bits. • Code detects 5 frames or more below the CM per the geographic address bits. • Code detects that one or more geographic address bit patterns do not match a valid configuration. • Code determines that the frame configuration, based on frame count and geographic address bit pattern, is not one of the valid configurations.
Root Causes	• The two module terminators are not installed on the system. • The box to box cable is not installed between CM and EM(s). • More than 1 CM module exists in a stack of frames wired together. • 5 frames or more are actually above the CM. • 5 frames or more are actually below the CM. • Hardware failure results in one or more invalid geo bit patterns. • Hardware failure results in one or more valid but incorrect geo bit patterns when compared to frame count (more frames detected than actual, or fewer frames detected than actual). • Damaged module terminator or module-to-module cable with bent or broken pins.

T062 - Module Configuration Problem	

Service Resolution Steps	1 Perform <u>DR010 - Termination and Connectivity Diagnostic</u> on page 371.
	
	2 Using the Web client or operator panel, click the **Resolve** button in the RAS ticket. In the resolution of the RAS ticket, the user should be presented with another button labeled **Self Test**. Select **Self Test**. The unit will perform a module termination self test and list the results of whether it passes or fails. It will only run this on one module at a time, so the user must click **Next** and do a self test on each module.
	
	3 If the module terminator self test fails, identify which module failed and inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables.
	
	4 Clear the RAS ticket and reboot the library.
	
	5 If using 400G library firmware or later, run the IVT - Frame test from the Library Tests option accessed through the operator panel.
	
	Note: IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
	
	    • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
	
	    • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Module Terminators and Module-to-Module Cables

T063

T063 - WWN Label Change	
Description	**GUI Description:** The robot cannot read the WWN or detected a new library WWN. **Explanation:** The library logic learns the library WWN of the system by reading an abbreviated base WWN base barcode label. This is done at first boot up from a "cleared to ship" condition, to establish the WWN. It is also done on subsequent bootups to verify that the persisted information on the library compact flash file system matches the physical library module. The library will report a problem when it cannot read the WWN or it reads a WWN value that does not match the persisted library configuration. A different motion-related problem will be reported if motion is preventing the proper reading of the WWN.
Detection Scenarios	• At first bootup from clear to ship, the library must establish the WWN for the first time. There may be no WWN in system memory at this point. • At any power up, the system memory already has a WWN established for the LCB. • An LCB is improperly swapped into a different physical module, and the system reads the physical module WWN label. • The compact flash from a system already in use is placed into a new replacement module.
Root Causes	• LCBs are swapped between libraries. • Label is damaged. • Barcode scanner is not working properly. • Entire communication path to barcode scanner is not working properly. • Library module is replaced.

Service Resolution Steps	1 Perform DR007 - Resolve Barcode Scanner Issue on page 369.
	2 Use the **Details** option in the RAS ticket to identify which label is causing the RAS ticket.
	3 Open the main door and inspect the label for damage.
	4 If the label is not damaged, and the library is at 400G library firmware code or later, run the I**VT - Picker test** from the **Library Tests** menu accessed on the operator panel. If the picker test passes, the picker is most likely not the issue and the LCB may need to be replaced.
	
	Note: IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
	
	   • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
	
	   • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

T063 - WWN Label Change	
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed) 2 LCB 3 Module (EM or CM) — only dispatch this FRU if the label is missing or damaged

T064

T064 - LCB Hardware Failure	
Description	**GUI Description:** The library controller board experienced a hardware failure. **Explanation:** The library encounters an error which appears to be isolated to hardware on the LCB itself.
Detection Scenarios	• Code detects a board-level voltage problem. • Code detects a board-level temperature problem. • Code detects a problem with the 48 V fuse on the LCB.
Root Causes	• Board-level voltage problems. • Board-level temperature problems. • 48 V fuse (not a FRU) on board is blown. • Loose cable connection on the LCB board. • Rare faulty display, which interrupts LCB communications. • Rare power supply problem, where too much voltage is transferred to the LCB.
Service Resolution Steps	1 Perform <u>RR002 - Remove and Replace LCB</u> on page 421. Use <u>Removing and Replacing the Library Control Blade and LCB Compact Flash Card</u> on page 102 for further instruction. 2 Look at the LEDs on the back of the LCB. During normal operation, the green LED should blink once every second, and the blue LED once every 10 seconds. 3 Clear the RAS ticket. 4 Power down the library. 5 Reseat the LCB in the library and power on the library.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 LCB

T065

T065 - Robot Over-Current Condition	
Description	**GUI Description:** Robot power is interrupted due to an over-current condition. **Explanation:** The library detects that the 42 V picker supply circuit on the LCB is not at an acceptable voltage. Field data indicates that this is most likely an issue with the LCB, rather than a picker assembly issue. See additional note below for further diagnostics that can be performed by service personnel.
Detection Scenarios	Monitoring of voltage divider indicates partial or complete voltage drop.
Root Causes	• The 48 V to 42 V conversion power supply on the LCB has shut down due to excessive current draw. • Board-level hardware failures. • Permanent or temporary short in cables, connectors, or picker. • Various hardware failures in picker that cause too much current to be drawn. • Shorted module terminator or module-to-module cable pins.
Service Resolution Steps	**1** Perform DR035 - Resolve Robot Power Interruption on page 383. **2** Look at the LEDs on the back of the LCB. During normal operation, the green LED should blink once every second and the blue LED once every 10 seconds. If T065 is posted with T076, use the FRUs listed below, and not the FRUs listed in T076. **3** Visually inspect the fuse on the LCB to see if it is blown. If it is blown, replace the LCB. **Additional Note:** Service personnel can further diagnose this problem and narrow it down to either the LCB or the picker by performing these steps: 1 Open the door. 2 Close the RAS ticket via the operator panel. 3 Remove the picker from the library and unplug the cable spool connector so that the picker is disconnected from the library. 4 Place the picker back into the library in this condition. 5 Close the door. 6 If a T076 RAS ticket is generated, the picker needs to be replaced. Otherwise, the LCB must be replaced.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 LCB 2 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed) 3 Cable Spool (if Model 2 robot is installed)

T066

T066 - Drive Power Failure	
Description	**GUI Description:** The library detected a drive power failure within a library module. **Explanation:** The library detects that a tape drive power fuse located on a drive sled interconnect board (DSIB) has failed. Each module has a DSIB card to provide an electrical connection point for the tape drive sleds. Each DSIB has a replaceable fuse for the overall tape drive power bus. This protects the core library hardware components from some type of short or over current problem in one or more tape drives.
Detection Scenarios	Monitoring of voltage divider indicates partial or complete voltage drop.
Root Causes	• Board-level hardware failures. • Permanent or temporary short circuit conditions in tape drives, tape drive sleds, docking connectors, etc.
Service Resolution Steps	1 Perform RR001 - Remove and Replace Drive Sled on page 420. 2 Remove all drive sleds, close the RAS ticket, reboot the library, and see if the RAS ticket reoccurs. 3 **If the RAS ticket reoccurs** with all drive sleds out, check the fuse. If the fuse is blown, replace per DR094 - Resolve Drive Power Fuse Failure on page 409. 4 **If the RAS ticket does not reoccur** with all sleds out, install one drive sled at a time, checking to see if a RAS ticket occurs for each one to see which drive sled is causing the RAS ticket. Replace the defective drive sled.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Replace FRUs as needed based on Service Resolution Steps above. • Fuse, 5U or 9U • Drive Sled

T067

T067 - Display Assembly Hardware Failure	
Description	**GUI Description:** A local display assembly hardware failure has been detected. **Explanation:** The library encounters an error that appears to be isolated to display assembly hardware. This includes the DIEB board.
Detection Scenarios	• DIEB fuse is blown. • DIEB voltage limit exceeded. • DIEB temperature limit exceeded.
Root Causes	• Blown DIEB fuse. • Rare power supply problem where too much voltage is transferred to the display. • DIEB temperature limit exceeding threshold. • LCB failure.
Service Resolution Steps	1 Perform RR013 - Remove and Replace Display Assembly on page 424. See Removing and Replacing the Operator Panel (LCD) on page 162 for further instructions. 2 Power down the library. 3 Open the main door and remove the cover on the back of the LCD panel. 4 Inspect and reseat all 4 cables on the back of the LCD display. 5 Replace the cover, close the main door, and power on the library.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 LCD Front Panel Display (Operator Panel) 2 LCB

T068

T068 - Destination Element Full	
Description	**GUI Description:** The robot determined that a destination location for a tape cartridge move operation is already full. **Explanation:** The robot has attempted to put to a tape drive, I/E station, or storage element and has determined that the element is full. This is distinctly *not* a SCSI illegal request situation. At the beginning of the move media, the library inventory has indicated that the destination element was in an empty state to allow it to be a valid destination. During recovery operations, the library has concluded that the cell is obstructed by a piece of media. Any failure that is not thought to be a piece of media in the destination should not be mapped to this RAS ticket.
Detection Scenarios	• The destination element for a move media is full with a cartridge. Library inventory does not know that the cell is full. • The destination element for a move media is full with an unlabeled cartridge. As part of recovery, the library attempts to perform a get from the cell. If the get succeeds and a tape cartridge is detected in the picker by the tape cartridge present sensor, the slot is designated as full with an unlabeled tape cartridge present.
Root Causes	• Inventory has not occurred since tape cartridge was placed in element by some manual operator intervention. • An unlabeled tape cartridge is placed in a slot by a user (not by the robot).
Service Resolution Steps	1 Perform DR020 - Resolve Library Inventory Mismatch on page 376. 2 Use the **Details** option in the RAS ticket to identify which destination slot is causing the RAS ticket. Clear the RAS ticket. 3 Open the main door and inspect the slot for media or an obstruction. Remove the media and retry the operation.
Possible CRUs/FRUs	None

T069

T069 - Source Element Empty	
Description	**GUI Description:** The robot determined that a source location for a tape cartridge move operation is empty. **Explanation:** The robot has attempted to get from a tape drive, I/E station, or storage element and has determined that the element is empty. This is distinctly NOT a SCSI illegal request situation, nor is it any situation where the picker fails to get a tape cartridge. At the beginning of the move media, the library inventory has indicated that the source element was not in an empty state and it was a valid source for a move media command. During recovery operations, the library has concluded that the cell is genuinely empty. Empty is defined as *not* containing any tape cartridge.
Detection Scenarios	The library fails to successfully get a cartridge during a move media. The tape cartridge present sensor in the cartridge indicates no tape cartridge at the conclusion of a get. After performing scan and touch tests, it is determined that there is no tape cartridge in the source slot.
Root Causes	• Inventory has been manually changed since last robotic inventory. A tape cartridge was removed from or moved within the system. • A drive may be indicating that it is loaded, but the library inventory shows no tape cartridge present in that drive. This can be caused by a tripped loading mechanism in drive. To recover, manually insert a tape cartridge and cycle it through a drive.
Service Resolution Steps	1 Perform <u>DR020 - Resolve Library Inventory Mismatch</u> on page 376. 2 Use the **Details** option in the RAS ticket to identify which source slot is causing the RAS ticket. Clear the RAS ticket. 3 Open the main door and inspect the slot for media.
Possible CRUs/FRUs	None

T070

T070 - Library Control Path Failure	
Description	**GUI Description:** The library control command path through a tape drive has failed. **Explanation:** The library media changer control path through a tape drive has failed. The host that owns and runs the partition can no longer control the library. The control path must be fixed, or a user could choose to switch the control path to a different tape drive within the same partition. This RAS ticket is essentially a special case of RAS tickets T021 and T023 when the drive in question is the control path for the partition. In this case, special instructions are in order for the user to potentially switch over to another drive as the control path. The reason to have a separate RAS ticket is to drive a specific, separate resolution. In general, if this RAS ticket occurs, there should be a corresponding T021 or T023 posted to lead the user through resolving the root cause of why the drive failed.
Detection Scenarios	• The loss of communications between the library and the universal drive sled (UDS). • The loss of communications between the UDS controller board and the tape drive.
Root Causes	• Various hardware problems inside the sled. • Tape drive (brick) firmware bug. • Drive sled firmware bug. • Library communication firmware bug. • DSIB hardware problem. • Loss of power to the tape drive sled (DSIB 48 V fuse).

Service Resolution Steps	1 Perform DR032 - Resolve Drive Control Path Failure on page 382.
	2 Use the **Details** option in the RAS ticket to identify which tape drive is causing the RAS ticket. Check the suspect drive sled to ensure it is receiving power, and reseat it.
	3 If using library firmware 400G, run an IVT - Drive test from the Library Tests option through the operator panel.
	
	Note: IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
	
	  • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
	
	  • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T071

T071 - Missing Power Supply	
Description	**GUI Description:** A previously installed power supply is missing. **Explanation:** The library can no longer detect the presence of a power supply that was previously physically installed and logically added to the system.
Detection Scenarios	Regular polling between LCB and power supply checks for presence of the power supply.
Root Causes	• Power supply has been physically removed after being added to a powered on system. • Hardware failure inside supply. • Hardware failure in library side connector or other electronics. • Disconnected module terminator or module-to-module cable. • Damaged module terminator or module-to-module cable with bent or broken pins.
Service Resolution Steps	1 Perform DR022 - Resolve Missing Power Supply on page 377. 2 Use the **Details** option in the RAS ticket to identify which power supply bay is generating the RAS ticket. Inspect the power supply bay and verify that there is a power supply present and turned on. For normal operation, both LEDs (AC OK and DC OK) should be solid green. The STANDBY LED should be off. Reseat the power supply and swap with others in the unit to isolate failure to either the slot or the power supply. 3 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch parts as indicated by resolution steps performed above. • Module Terminators and Module-to-Module Cables • Power Supply

T072

T072 - Unmanaged System Fault	
Description	**GUI Description:** The library encountered an unmanaged fault. **Explanation:** Library firmware has reported a problem that is not associated with a specific RAS ticket and corresponding diagnostic resolution. This problem cannot be resolved without escalation to tech support and engineering. By design, this RAS ticket should not occur. Only a code bug should result in this RAS ticket.
Detection Scenarios	Not applicable
Root Causes	Code bug results in an event of the wrong type being reported.
Service Resolution Steps	1 Upgrade to the latest version of drive and library firmware.
Possible CRUs/FRUs	None

T073

T073 - I/E Storage Door Open	
Description	**GUI Description:** An I/E station door configured for storage is open. **Explanation:** Certain I/E station doors can be designated as storage slots. When one of these doors is open, the system should not become operational, because these storage slots would not be available to the robot. The RAS ticket is posted as a means of informing the user that the library cannot become operational, and that they should close the door, so the system can lock it and start using it.
Detection Scenarios	• When the main doors are closed and the robot attempts to initialize, the state of "I/E Storage Doors" will be checked. • When the library powers up and the robot attempts to initialize, the state of the "I/E Storage Doors" will be checked.
Root Causes	• I/E station storage door is left open by user. • Hardware failure in the I/E station door open/closed sensing. • Stuck lock assembly sensor switches.
Service Resolution Steps	1 Perform DR034 - Resolve Open Storage I/E Door on page 383. 2 Clear the RAS ticket. Inspect all doors on the front of the library to ensure that they are closed. 3 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables. 4 Inspect the I/E station door and slide assembly for any obstructions and verify that it is seated properly.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 I/E Lock Assembly 2 I/E Magazine Slide Assembly

T074

T074 - Drive Sled Auto-Leveling Failure	
Description	**GUI Description:** The drive sled assembly failed to automatically update its firmware to the correct version. **Explanation:** The normal auto-level process for a tape drive sled did not work. When a drive sled is inserted into a booted-up library, or when a library powers up, the firmware level of the tape drive sleds is checked to ensure that it is consistent with the level required by the main library firmware. If the level is not correct, the tape drive sled will be up-leveled or down-leveled accordingly. A failure to set the correct firmware level in the sled results in this RAS ticket.
Detection Scenarios	Firmware that controls and performs drive sled firmware download cannot successfully load a drive sled, and all recovery efforts fail.
Root Causes	• Physical interruption of the code download process. • Code bugs. • Hardware failures that result in intermittent or failed communication between library and tape drive sled.
Service Resolution Steps	1 Perform DR033 - Resolve Drive Sled Auto-Level Failure on page 382. 2 Clear the RAS ticket. Before replacing any parts, upgrade library and drive firmware to the latest version. This will correct this issue in most cases.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T075

T075 - Unsupported Module Configuration	
Description	**GUI Description:** The installed library firmware does not support the detected module configuration. **Explanation:** The current level of library firmware does not support the module configuration as detected by scanned module serial number labels. The causes for this RAS ticket will likely change over time as new valid configurations are added to the system. At the initial product launch, the firmware only allowed 5U and 14U rack height configurations. It did not run with anything greater than 14U, configuration.
Detection Scenarios	During initialization, the robot reads serial numbers on the modules that are present.
Root Causes	• The system really is an invalid configuration, and all modules are labeled correctly. • A module is not labeled correctly. • The firmware level loaded on the library does not support a valid configuration. • Barcode reader is not scanning the labels correctly.
Service Resolution Steps	1 Perform DR026 - Resolve Unsupported Module Configuration on page 378. 2 Close the RAS ticket. Before replacing any parts, upgrade library and drive firmware to the latest version. This will correct this issue in most cases.
Possible CRUs/FRUs	None

T076

T076 - Robot Initialization Failure	
Description	**GUI Description:** The robot did not initialize properly. **Explanation:** This RAS ticket is designed to notify the user if the robot cannot initialize at all. The three items most likely to cause this RAS ticket are, in order: 1) module terminators and module-to-module cables; 2) cable spool; and 3) robot assembly. Unless, per the resolution strategy, the customer has found another damaged part, do not dispatch any other parts until after these parts have been replaced.
Detection Scenarios	• Any time the main door(s) closes and the robot goes through an initialization sequence. • At power up of the library if the main door(s) is closed.
Root Causes	• Complete loss of connection to robot (such as unplugged cable spool or equivalent). • Broken connection to Y-motor. • Numerous hardware failures on the picker assembly. • Damaged module terminator or module-to-module cable with bent or broken pins.
Service Resolution Steps	1 Perform DR031 - Resolve Robot Initialization Failure on page 381. 2 If T076 is posted with a T065, use the FRU(s) listed for T065. Otherwise, use the FRU list below. 3 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch parts as appropriate based on analysis: • Module terminators and module-to-module cables • Cable Spool • Robot Assembly (For Model 1 robots, order both the Picker Assembly and the Y-carriage Assembly and replace as a single unit. For Model 2 robots, replace the entire robot assembly.) • LCB

T077

T077 - I/E Station Partially Open	
Description	**GUI Description:** The I/E station is in a partially open state, or a cable connection has failed. **Explanation:** This RAS ticket is specifically designed to report the problem that would occur if the cable connecting any of the I/E stations is unplugged. Hardware limitations make it such that an unplugged I/E station and a partially open I/E station cannot be distinguished from one another. The default state of the open and closed door sensors is such that only the partially open state looks like the unplugged state (door not open + door not closed). The detection logic will check for this condition only at bootup, to avoid triggering the RAS ticket during any operational door open/close sequence.
Detection Scenarios	Any time the library boots up, it checks for the state of the I/E open and close sensors to see if there is a not-open and not-closed condition.
Root Causes	• I/E station is unplugged at bootup. • I/E station is left in a not-open and not-closed state at bootup.
Service Resolution Steps	1 Perform DR036 - Resolve Partially Open I/E Station on page 384. 2 Clear the RAS ticket. 3 Inspect all doors on the front of the library to ensure they are closed. 4 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables. 5 Finally, inspect the I/E station door and slide assembly for any obstructions and verify that it is seated properly.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 I/E Lock Assembly

T078

T078 - Invalid Tape Blocker Location	
Description	This ticket should only occur on systems with **Model 1** robots (see How to Determine Which Robot Your Library Contains on page 165). **GUI Description:** A tape blocker is installed in an incorrect location **Explanation:** A tape blocker is not supported with Model 2 robots. This ticket is generated if a tape blocker is detected to be present in a cell where it should not be. A tape blocker is identified by a barcode label with the string "%XL" encoded on it. Library firmware has determined the physical module configuration of the system and determined which cells are considered to be in the bottom two rows of storage. These cells are the only valid cells to contain a tape blocker. If a barcode label with %XL is detected in any storage or I/E station cell other than the bottom two rows, this RAS ticket message appears. The licensing state or partition assignment state of a cell does not influence whether the ticket is posted. Note that the library only detects presence of the tape blocker in an incorrect location. It cannot confirm that tape blockers are properly installed in the correct locations because it cannot read the %XL barcode if the tape blocker is in the bottom two rows. Tape blockers are not expected to be installed or detected in tape drives. The ticket will not be posted in the case where a %XL is read in a valid tape drive location. Also, the library robot makes no attempt to detect the tape blocker via a physical touch test. However, if a tape blocker with an unreadable barcode label is installed in a physically accessible storage or I/E station cell, it may appear to be an unlabeled cartridge as determined by physical touch tests performed by the picker. Additional explanation about the tape blocker: The tape blocker is a device that is used to physically obstruct the placement of an LTO tape cartridge into a tape storage cell. It has physical features, similar to an LTO tape cartridge, that allow it to slide into and be retained by an LTO storage magazine. A single tape blocker blocks two storage cells in a vertical direction. It physically slides into the lower cell similar to a cartridge and has features that protrude upward to block the cell directly above. Due to the design of the LTO magazines used in the library, the tape blocker can only physically seat in certain cells within a magazine. Certain magazine cells have a structural Web in the rear of the magazine that prevents the tape blocker from being installed completely.
Detection Scenarios	During any inventory operation, a %XL barcode label is detected in any physically accessible storage or I/E station cell location.
Root Causes	• The barcode label of a genuine tape blocker is detected in a valid cartridge storage cell or I/E station cell. • A tape cartridge with a barcode label of %XL is installed in a valid storage or I/E station cell. • A tape blocker is detected within a library that has a model 2 robot installed.

T078 - Invalid Tape Blocker Location	
Service Resolution Steps	1 Perform <u>DR038 - Resolve Tape Blocker Location</u> on page 385. 2 Clear the RAS ticket. Open the main door and inspect the tape blockers are present in the bottom unit of magazine columns 1 through 5.
Possible CRUs/FRUs	None

T079

T079 - Get Operation Failed, Motion OK	
Description	**GUI Description:** The robot failed to pick a tape cartridge. **Explanation:** The library cannot successfully get a tape cartridge from a drive, storage, or I/E location. The tape cartridge is still resting in the source location. The robot is not obstructed in any way and can continue operations (unlike the case for T003). If the operation was initiated by a host move media, the move media command has failed with an ASC/ASCQ of 4h/15h/01h (hardware mechanical positioning error)
Detection Scenarios	The picker cannot get a tape cartridge from the source location. It can scan or touch the tape cartridge to verify that it is present.
Root Causes	• Picker has broken fingers. • Picker has bad calibration, so it is not positioned correctly. • Picker has bad Y-gears, so it is not at the height it thinks it is at. • An obstruction that prevents the picker fingers from getting into the tape cartridge grooves. • A bad tape cartridge that is jammed and stuck in the slot. • A damaged slot or drive that will not release the tape cartridge.

Service Resolution Steps	1 Perform [DR076 - Resolve Get Failure](#) on page 400.
	2 Use the **Details** option on the RAS ticket to gather more information regarding a specific drive, magazine, or slot causing the problem. Inspect the problem location for any obstruction or media. Remove it, clear the RAS ticket, and retry another move operation.
	3 If using 400G library firmware or later, run the IVT - Picker test using the Library Tests option accessed through the operator panel.
	
	Note: IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
	
	   • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
	
	   • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed) 2 Y-carriage Assembly (if Model 1 robot is installed)

T080

T080 - Module SN Change	
Description	**GUI Description:** The library detected the removal of an expansion module or a replacement of the control module. **Explanation:** When the library boots up and the robot initializes, the barcode serial number (SN) labels in each module are scanned by the robot, beginning at the bottom of the library (closest to Y-axis home) and then working up. The library uses the 5U Library Control Module SN and any 9U Library Expansion Module SNs to establish key operational properties and characteristics of library storage slots and partitions. A change in the 5U Library Control Module SN or the removal of a 9U Library Expansion Module (even if it is replaced with another 9U Library Expansion Module) will "break" any already established partition in such a way that it must be deleted. This RAS ticket was designed to notify the user that a condition exists that requires the deletion of a partition and allows them to assess whether human error, such as mixing library control blades (LCBs)/compact flash memory between libraries, is involved.
Detection Scenarios	At library bootup time, the robot attempts to scan all module SNs. When SNs are discovered, they are compared to persisted data on the system compact flash.
Root Causes	• An LCB is improperly swapped into a different physical module and the system reads the physical module label. • A 5U Library Control Module chassis FRU is replaced in an already configured system • A previously detected and configured 9U Library Expansion Module is removed completely from a vertical stack of modules. • A previously detected and configured 9U Library Expansion Module is removed completely from a vertical stack of modules and replaced with another 9U Library Expansion Module of similar or different size and location. • Barcode reader is not scanning the labels correctly. • Scratched or damaged label.

Service Resolution Steps	1 Perform DR039 - Resolve Logical Library Deletion on page 385.
	2 Clear the RAS ticket.
	3 Upgrade the library firmware to 400G or later and run the IVT - Picker test using the Library Tests option accessed through the operator panel. If the test passes reboot the unit and see if the RAS ticket persists.
	
	Note: IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
	
	    • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
	
	    • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

T080 - Module SN Change	
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed)

T081

T081 - Incorrect Module Brand	
Description	**GUI Description:** The library detected an incompatible module brand that does not match the library configuration. **Explanation:** The branding of a system is accomplished in two different ways. The firmware uses information saved on the compact flash to determine what brand the firmware and GUIs will present to the user. There is also physical branding of the system in the form of different cosmetic skins, badging, paint, external labels, and so forth, each module. In addition, each module has a machine-readable barcode label that carries a module serial number and branding information that should match the physical branding of the module. The library manufacturing process should install a machine-readable barcode label that matches the external, user- visible branding of the module. Because the library robot can read this barcode label, it can check the branding of the physical modules against the branding of the firmware and GUIs. This RAS ticket is a defensive tool used to notify the user that there is a mismatch in the branding mechanisms. The root cause of a mismatch can be manufacturing defects, logistical errors (shipping the wrong spare part), or user errors such as moving parts between systems. The parts would mechanically fit together, but the system would recognize the mismatch.
Detection Scenarios	At library bootup time, the robot attempts to scan all module barcode labels. When the OID number on each label is read, the embedded branding information is compared to persisted data on the system compact flash.
Root Causes	• Various manufacturing defect errors, mislabeling, or part mix-ups. • Spare part logistics error where wrong module FRU or compact flash FRU is sent to a customer site. • End users or Service personnel mixing and matching hardware from multiple systems of different branding in the field. • Malicious intent, where customers attempt to buy and combine hardware from different sources. • Barcode reader is not scanning the labels correctly.
Service Resolution Steps	1 Perform <u>DR040 - Resolve Incompatible Module Branding</u> on page 385. 2 Clear the RAS ticket. Upgrade the library firmware to 400G or later and run the IVT - Picker test using the Library Tests option accessed through the operator panel. If the test passes reboot the unit and see if the RAS ticket persists. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

T081 - Incorrect Module Brand	
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 9U Library Expansion Module or 5U Control Module.

T082

T082 - Barcode Scanner Failure	
Description	**GUI Description:** The library barcode scanner is not operating properly. **Explanation:** The barcode scanner is detected to be in a state where the library control logic cannot use it. Library robot power is known to be applied (door is closed and robot is detected to be functioning enough to confirm that power is applied), but scanner communication cannot be established at all or appears to be not healthy.
Detection Scenarios	• During any library bootup or door close operation, picker power is applied and barcode scanner communication is established. • During run-time operations such as inventory, where the barcode scanner is used.
Root Causes	• Scanner is physically disconnected. • Various electrical hardware failures that prevent proper communication between LCB and barcode scanner. • Barcode scanner is not functioning properly.
Service Resolution Steps	1 Perform RR004 - Remove and Replace Picker Assembly on page 422. See also Removing and Replacing the Robot Assembly on page 164. 2 Clear the RAS ticket. Power down the library. Open the main door and inspect the flex cable on top of the picker to determine if it is loose or not seated properly.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed) 2 Cable Spool 3 Y-carriage Assembly (if Model 1 robot is installed)

T083

T083 - Unlevel Robot Assembly Not Level	
Description	**GUI Description:** The robot assembly does not seem to be horizontally level and may be installed improperly. **Explanation:** The firmware has detected a condition that indicates the robot assembly (Y-carriage and picker) is not installed level within the system. The robot assembly has drive gears that mate with rack gears inside the library modules. There are field assembly problems and hardware failure problems that can cause the robot assembly to be not level and therefore not function properly.
Detection Scenarios	• The robot cannot move to its Y-axis parking position after homing in Y because the front of the Y-carriage hits the floor. Parking position is below homing position by 0.5 mm. • Front and back magazine fiducial positions on the left side are not at the same Y-level. They differ by more than 1.2 mm. This test algorithm can detect non-level conditions in both directions (front high or back high). **Note:** There are a few known **false detection scenarios**, as follows: • Certain specific-size obstructions sitting on the floor of the library. • Magazines not seated correctly. • Damaged fiducials that can be detected but are mis-positioned due to damage.
Root Causes	• Robot drive gears not installed in Y -racks at the same time. This can result in the two ends of the Y-carriage being one to two teeth out of synchronization. • Y-racks not seated properly/evenly. Both the front and rear Y-racks are intended to be released from their shipping latches and lowered such that the racks in the very bottom module rest on the floor of the unit. • There are hardware failure and assembly failure modes that can result in the front and rear drive gears on the Y-carriage being excessively out of phase with each other. • Robot parking tab is out of position and is interfering with robot Y-axis travel.
Service Resolution Steps	1 Perform <u>DR041 - Resolve Robot Installation</u> on page 386. 2 For the following steps, see <u>Removing the Model 1 and Model 2 Robot Assemblies from the Library</u> on page 165 and <u>Installing the Model 1 and Model 2 Robot Assemblies in the Library</u> on page 171. 3 This RAS ticket appears almost exclusively for a picker and Y-carriage assembly climber not being level. Clear the RAS ticket. Remove these components from the unit and then reseat them to ensure they are level. 4 Inspect the picker rails inside the unit and make sure they are level, flush with the unit, and properly locked into place. 5 Ensure the entire library is level in the rack.
Possible CRUs/FRUs	None

T084

T084 - Missing Cleaning Tape	
Description	**GUI Description:** A cleaning tape cartridge, configured for automatic library-initiated cleaning, is missing. **Explanation:** When using the library to manage drive cleaning, the cleaning tapes that are imported into the library are not visible to any host and are not part of any partition. Rather, they are in the "system" partition. Under all circumstances, the user should use the import and export cleaning tape functions to move cleaning tapes into and out of this system partition. If the library becomes aware during inventory that a system cleaning tape has been removed manually (through an open door and/or with the power off) this RAS ticket will be used to notify the user that this cleaning resource is now missing. Because the tape cartridge is missing, the library cleaning functionality is no longer intact. It is either degraded (fewer cleaning cartridges available) or totally absent (no cleaning cartridges in the library). T084 will be used to handle either case.
Detection Scenarios	• When library inventory occurs during robot initialization from a power up. • When library inventory occurs during robot initialization from a door close.
Root Causes	• User removes tape cartridge manually instead of via export cleaning media functionality on the GUI. • Barcode label on a system cleaning cartridge is not read during inventory. • Any scenario where a properly imported system cleaning cartridge that has not yet been properly exported is detected to be missing, based on library inventory operations.
Service Resolution Steps	1 Perform DR042 - Resolve Missing Cleaning Cartridge on page 386. 2 If auto-cleaning is enabled, ensure that a cleaning tape is loaded in the correctly specified cleaning slot in the library.
Possible CRUs/FRUs	None

T085

T085 - Unknown Cartridge in Cleaning Slot	
Description	**GUI Description:** A configured cleaning slot contains an unknown tape cartridge, which will not be used for automatic library-initiated drive cleaning operations. **Explanation:** When using the library to manage drive cleaning, the cleaning tapes that are imported into the library are not visible to any host and are not part of any partition. Rather, they are in the system partition. Under all circumstances, the user should use the import and export cleaning tape functions to move cleaning tapes into and out of this system partition. If the library becomes aware during inventory that an unexpected (non-imported) tape cartridge has been inserted into a cleaning slot manually (through an open door and/or with the power off) this RAS ticket will be used to notify the user that this slot contains a tape cartridge that cannot be used for cleaning. Because the tape cartridge was not imported as a cleaning tape, the library cleaning functionality is no longer intact. It is either degraded (less valid cleaning tapes available) or totally absent (no valid cleaning tape in the library). T085 will be used to handle either case.
Detection Scenarios	• When library inventory occurs during robot initialization from a power up. • When library inventory occurs during robot initialization from a door close.
Root Causes	• User adds a tape cartridge manually instead of via the import cleaning media GUI functionality. • Any time a cleaning slot is defined via the GUI functionality and there is a rogue, labeled tape cartridge in the slot. This can occur under door open conditions or covers off. • Any scenario where a barcode labeled tape cartridge ends up in a cleaning slot by means other than via the proper import GUI functionality.
Service Resolution Steps	1 Perform DR043 - Resolve Invalid Cleaning Cartridge on page 387. 2 View the **Details** of the RAS ticket to determine which slot is affected. Open the main door and inspect the slot for media. Ensure that the media loaded in the slot is a valid cleaning cartridge.
Possible CRUs/FRUs	None

T086

T086 - Inaccessible Tape Cartridge	
Description	**GUI Description:** A tape cartridge is located in a storage location that is not accessible by the library robot. **Explanation:** In library configurations 23U or taller, the two storage slots in the top row of the right side of the library (columns 4 and 5) become inaccessible by the library's Model 1 robot (not Model 2 robot). When the vertical stack of library modules becomes 23U or taller, the Model 1 robot is no longer adequately supported by the y-racks to get and put tape cartridges from these two specific storage slots. All other storage slots in the library remain accessible. This RAS ticket is produced when a user manually inserts a tape cartridge into one of these slots and the library detects the tape cartridge during inventory. The library itself will not load a tape cartridge into one of these slots via host or operator panel commands. The slots themselves will not be presented as usable in library partitions. Although the library cannot reliably get and put tape cartridges from these storage locations, the library can still discover barcode-labeled tape cartridges in these slots during normal inventory operations. Because these slots are inaccessible, they are not part of the library's inventory, and the RAS ticket WILL NOT list their locations in the details. It will simply list "None"
Detection Scenarios	In libraries 23U or taller, the library discovers a barcode-labeled tape cartridge in one of the two top slots in column 4 or 5 during any inventory.
Root Causes	A user manually places a tape cartridge in the top two slots of column 4 or 5 in a library that is at least 23U in height.
Resolution	1 Perform DR050 - Resolve Invalid Tape Location] on page 391. 2 This RAS ticket should only occur in libraries 23U, 32U, and 41U in height. Open the main door on the CM and ensure that no media is in positions [0, 4, 1] or [0, 5, 1]. Remove the media and clear the RAS ticket.
Possible CRUs/FRUs	None

T087

T087 - Invalid Library SN Label Warning	
Description	**GUI Description:** The library's serial number barcode label cannot be read by the robot, but the library is able to initialize and continue operation. **Explanation:** The library logic learns the serial number of the system by reading an internal serial number label. The service tag is located on the same label as the serial number. This is done at first bootup from a "clear to ship" condition to establish the serial number. It is also done on subsequent bootups to confirm that the compact flash memory card is in the proper library. The library will report this ticket when it cannot read the library serial number but has confirmed the functionality of the barcode reading system by successfully reading some other barcode label in the library, and it has the library serial number stored in memory from a previous successful read. When this ticket is posted, the user can be confident that at least one other barcode label has been read. For example, barcodes that can be used the check functionality are: • WWN or SN (in control modules) • OID (in expansion modules) Different RAS tickets will be posted if there are motion-related problems, scanner communication problems, and so on.
Detection Scenarios	Any power up. System memory already has a valid serial number established for the LCB.
Root Causes	• Label is damaged. • Label is missing. • Label is physically obstructed. • Label is readable but does not meet minimum criteria to be considered a library serial number label. • Scanner cannot read the serial label.
Service Resolution Steps	1 Perform DR051 - Resolve Library SN Label Detection on page 391. 2 Inspect the label inside the unit for damage. 3 Clear the RAS ticket. 4 Ask customer to e-mail a library snapshot. Look at the RAS agents file.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Module (EM or CM) — only dispatch this FRU if the label is missing or damaged.

T088

T088 - Invalid Library Service Tag Warning	
Description	**GUI Description:** The library's service tag barcode label cannot be read by the robot but the library is able to initialize and continue operation. **Explanation:** The library logic learns the service tag number of the system by reading an internal service tag label. The service tag is located on the same label as the serial number. This is done at first bootup from a "clear to ship" condition in order to establish the service tag. It is also done on subsequent bootups to confirm that the compact flash memory card is in the proper library. The library will report this ticket when it cannot read the library service tag but it has confirmed functionality of the barcode reading system by successfully reading some other barcode label in the library. When this ticket is posted, the user can be confident that at least one other barcode label has been read. For example, barcodes that can be used the check functionality are: • WWN or SN (in control modules) • OID (in expansion modules) Different tickets will be posted if there are motion related problems, scanner communication problems, and so on.
Detection Scenarios	Any power up.
Root Causes	• Label is damaged. • Label is missing. • Label is physically obstructed. • Label is readable but does not meet minimum criteria to be considered a library service tab label. • Scanner cannot read the service tag label.

Service Resolution Steps	1 Perform DR052 - Resolve Library Service Tag Detection on page 391.
	2 Inspect the label inside the unit for damage.
	3 Clear the RAS ticket.
	4 Check if any other tickets exist that may indicate a picker scanning issue. If so, resolve those tickets first, to see if that solves the problem.
	5 Upgrade the library firmware to 400G or later and run the IVT - Picker test using the Library Tests option accessed through the OCP. If the test passes the issue is most likely not the picker.
	
	Note: IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above).
	
	   • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available.
	
	   • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.

T088 - Invalid Library Service Tag Warning	
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Module (EM or CM) — only dispatch this FRU if the label is missing or damaged.

T089

T089 - E-mail Notification Error	
Description	**GUI Description:** A library-initiated e-mail notification did not reach its destination. **Explanation:** The user can configure the library to send an e-mail to a specified address whenever a RAS ticket is generated or a configured Advanced Reporting log notification is sent. This e-mail will include a description of the RAS ticket and will optionally include the library snapshot. The library will report this ticket if it receives any error codes when trying to send out this e-mail. This ticket indicates that there is something wrong with the customer's internal network or its settings, but there is no error on the library side. Note that the library cannot detect all errors that could occur on a network, but it can determine if the e-mail was successfully sent to the mail server on the network.
Detection Scenarios	• Any time a RAS ticket is generated and the library has been configured to generate a RAS e-mail. • Any time a Advanced Reporting Notification has been configured and the scheduled sending of such log(s) experiences an error.
Root Causes	• E-mail settings on the library are not correct. • The library is not connected to the network. • Library is plugged into the wrong network port. • Network cable is damaged. • E-mail server is down. • Some other configuration error on the customer's network.
Service Resolution Steps	1 Perform <u>DR053 - Resolve Network Configuration Issue</u> on page 392. 2 Verify the e-mail configuration settings through the Web client or operator panel. These settings can be viewed on the operator panel, but only modified via the Web client. 3 Ensure that the SMTP server is functioning properly and there is network connectivity between the SMTP server and the library.
Possible CRUs/FRUs	None

T090

T090 - Invalid Cleaning Tape	
Description	**GUI Description:** A non-cleaning tape cartridge was used to attempt to clean the tape drive. **Explanation:** System determines that the tape cartridge used to clean a drive is not a cleaning tape. This RAS ticket differs from the TapeAlert 23 RAS ticket (T048) in that this RAS ticket will be generated any time a non-cleaning tape is used to clean a drive, not just in the case where the drive requires cleaning and posts a TapeAlert 23.
Detection Scenarios	After loading a tape cartridge to clean a drive, the system notices that cleaning has not begun within 30 seconds.
Root Causes	• User or library attempts to mount a cleaning tape cartridge, but the tape is not actually a cleaning tape. • User mistakenly loads a data tape cartridge as a cleaning tape. • An inventory or application issue results in a data tape cartridge being loaded when the drive expects a cleaning tape.
Service Resolution Steps	1 Perform DR077 - Resolve Invalid Cleaning Tape on page 400. 2 Verify that the cleaning tape is not expired, or that a data tape is not being used.
Possible CRUs/FRUs	None

T091

T091 - TapeAlert 56 – Unload Failure	
Description	**GUI Description:** The tape drive encountered a problem while unloading a tape cartridge. **Explanation:** When attempting to unload a tape cartridge, a tape drive (brick) hardware malfunction can prevent the tape cartridge from being ejected. The tape cartridge may actually be stuck in the tape drive.
Detection Scenarios	After unsuccessfully attempting to unload a tape cartridge, the drive generates a TapeAlert 56.
Root Causes	• A drive hardware error that prevents the tape cartridge from being unloaded. • A damaged tape cartridge that cannot be unloaded from the tape drive.
Service Resolution Steps	1 Perform DR078 - Resolve Tape Load/Unload Failure on page 401. 2 Use the **Details** option in the RAS ticket to identify the suspect tape drive sled. Open the main door and inspect the drive for any stuck media. If media is present, attempt an emergency power-on reset by holding the eject button down for 5 seconds, which will reset the drive and attempt to eject the media. 3 Clear all RAS tickets and retry the original operation with another piece of known good media.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T093

T093 - Automatic Cleaning Failure	
Description	**GUI Description:** The library detected a problem during an automatic cleaning operation. **Explanation:** When the library is set up for Automatic Cleaning, drive cleaning request tickets are disabled from being displayed, since the automatic cleaning mechanism will resolve the cleaning request. There are, however, situations where a ticket needs to be posted to indicate that the cleaning operation did not succeed.
Detection Scenarios	AutoClean mechanism fails to initiate or perform a drive cleaning operation.
Root Causes	• AutoClean setup error (such as a user manually removing a cleaning tape). • Any tape cartridge, motion, or driver error for which a RAS ticket already exists. • No cleaning tapes available (none present, or only invalid/expired cleaning tapes present).
Service Resolution Steps	Perform DR081 - Resolve AutoClean Failure on page 402.
Possible CRUs/FRUs	None

T094

T094 - Drive Bay Open	
Description	**GUI Description:** A library drive bay in the rear of the library is open. **Explanation:** At boot time or run time. the library detects that at least one of the unoccupied drive bays does not have a cover on it. For safety reasons, if a drive bay is not occupied by a drive and does not have a cover plate installed, the robot is slowed to half speed to minimize the risk of someone putting their hand inside the library and having the robot run into it at full speed. Library operations will take twice as long in this state. Since users normally remove the drive bay covers to insert or move drives, this library will wait between 30 seconds and 10 minutes after detecting this condition to post the RAS ticket. The library cannot display the location of the open drive bay.
Detection Scenarios	• Missing drive cover plate. • Drive cover is loose or ajar somehow and is not electrically connected.
Root Causes	• User removed the drive bay cover plate and forgot to put it back. • Cover plate was not put on securely, and the electrical connection is not solid. • The cover plate is damaged in such a way that the electrical connection cannot be made. • Drive pulled back.
Service Resolution Steps	1 Perform DR054 - Resolve Open Drive Bay on page 392. 2 Clear the RAS ticket. Inspect the rear of the unit to verify that all drive cover plates are present and securely screwed in place.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Cover Plate

T095

T095 - Installation and Verification Test (IVT) Failure	
Description	**GUI Description:** A sub-test failed during the Installation & Verification Test. **Explanation:** The library contains a verification test that can be run to validate that the system has been installed properly and is up and running. Errors can occur during this test. The library will post this RAS ticket whenever an error occurs during this IVT test that is not covered by some other RAS ticket. Because there is no specific resolution strategy to assist the user in diagnosis, the only customer action is to contact Service.
Detection Scenarios	During the IVT test run, any library error occurs that is not already handled by an existing RAS ticket.
Root Causes	Any function that is executed by the Installation and Verification Test (IVT) that does not complete successfully. The actual root cause(s) will be dynamically displayed in the ticket details.
Service Resolution Steps	1 Ensure that the media for the test was imported into the SYSTEM partition and was loaded into the top I/E slot. 2 Do not dispatch parts based solely on this test failure. Continue to use any available additional troubleshooting tools to confirm that the failure listed in the RAS ticket is accurate. **Note:** IVT is optimized for library firmware versions 520G and above and libraries built after July 1, 2008 (serial numbers with last four digits 8602 and above). • If your library was built on or before July 1, 2008, and you are running firmware version 520G or later, you will not be able to run the IVT test, even though the selection is available. • If your library was built on or before July 1, 2008, and you are running firmware version 500G or earlier, you can run the test, but it is not recommended because it may produce erroneous results.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 The items will be dynamically displayed, depending on the failure.

T096

T096 - Module Communication Error	
Description	**GUI Description:** An error occurred while trying to communicate with a module. **Explanation:** The system is having a problem finding and/or communicating with all the modules in the library.
Detection Scenarios	At bootup, the library cannot determine the status of all the modules in the library.
Root Causes	• Damaged module terminator or module-to-module cable with bent or broken pins. • I/E station sensor error. • I2C bus error.
Service Resolution Steps	1 Perform <u>DR056 - Resolve Module Communication</u> on page 393. 2 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables. 3 Inspect the LEDs on the LCB to ensure proper operation. The green LED should blink once every second, and the blue LED should blink once every 10 seconds. 4 Upgrade the library firmware to the latest revision listed on http://support.dell.com.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Module terminators and module-to-module cables

T097

T097 - Noisy Fibre Channel Link	
Description	**GUI Description:** Noisy link detected on Fibre Channel Blade. **Explanation:** The FC I/O blade has detected excessive noise on a specific Fibre Channel port.
Detection Scenarios	Transmission or reception error rates have occurred at an unacceptable rate on a specific channel.
Root Causes	• FC cable is not plugged in correctly. • FC cable is faulty. • The FC I/O blade is not functioning properly.
Service Resolution Steps	Perform DR057 - Resolve Noisy Fibre Channel Link on page 393.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 FC cable attached to FC I/O blade (customer-supplied) 2 FC I/O Blade

T098

T098 - FC I/O Blade Data Path Failure	
Description	**GUI Description:** Data path failure on Fibre Channel Blade. **Explanation:** An FC I/O blade has detected a failure during the specified data path conditioning test. This can occur if there is an error with the hardware or the connection, or if the drive has been rebooted or is undergoing a drive firmware update. These valid cases will be detected and will not generate this ticket.
Detection Scenarios	The data path conditioning test configured for this FC I/O blade has failed.
Root Causes	• Cable is not plugged in. • Cable is faulty. • Drive sled is not inserted correctly.
Service Resolution Steps	Perform DR058 - Resolve Data Path Failure on page 393.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 FC I/O Blade

T099

T099 - Internal FC I/O Blade Memory Error	
Description	**GUI Description:** Memory Error Detected on Fibre Channel Blade. **Explanation:** An error with the FC I/O blade's internal memory has been detected.
Detection Scenarios	During start up, the FC I/O blade detected an error in its internal memory.
Root Causes	FC I/O blade hardware error.
Service Resolution Steps	Perform DR059 - Resolve FC I/O Blade Memory Error on page 394.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 FC I/O Blade

T100

T100 - FC I/O Blade Watchdog Reboot	
Description	**GUI Description:** Watchdog reboot of Fibre Channel Blade has occurred. **Explanation:** A problem with the FC I/O blade firmware has caused it to reboot unexpectedly.
Detection Scenarios	The FC I/O blade contains a watchdog timer that monitors processor activity. If this watchdog timer expires, the FC I/O blade automatically reboots.
Root Causes	FC I/O blade firmware not operating correctly.
Service Resolution Steps	Perform DR060 - Resolve FC I/O Blade Watchdog Reboot on page 394.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 FC I/O Blade

T101

T101 - FC I/O Blade Host Health Check Failure	
Description	**GUI Description:** Host failed health check. **Explanation:** The FC I/O blade relies on a periodic signal from a host, known as a "heartbeat." This ticket is generated when this signal is not detected.
Detection Scenarios	Heartbeat signal is not received when expected.
Root Causes	• Cable not plugged in. • Cable is faulty. • Host is down or not responding. • Port on the FC I/O blade is not functioning. • FC I/O blade is not functioning.
Service Resolution Steps	Perform DR061 - Resolve FC I/O Blade Host Check on page 394.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 FC I/O Blade

T102

T102 - FC I/O Blade Host Port Failover	
Description	**GUI Description:** A host port failed over to the alternate link. **Explanation:** The Host Port Failover (HPF) function has occurred. When HPF is enabled, the Fibre Channel (FC) I/O blade constantly monitors the host port connections for health status. If problems are encountered with the link, with communication, or with high error rates, the FC blade will automatically fail over to the designated secondary port. A warning ticket is generated to notify the user that the failover to the secondary port occurred properly. If a failover has occurred, the original problem on the primary port may or may not be resolved at this point. The failure of the primary port could be a permanent failure, or an intermittent condition. After the connection is corrected and re-established, a user must intervene and manually re-enable the primary port again.
Detection Scenarios	When the FC I/O blade automatically switches to another target port on the host because one has failed.
Root Causes	• Cable not plugged in. • Cable is faulty. • Host is down or not responding. • Port on the FC I/O blade is not functioning.
Service Resolution Steps	Perform DR062 - Resolve Host Port Failover on page 395.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 FC I/O Blade

T103

T103 - FC I/O Blade Connection Failure	
Description	**GUI Description:** Ethernet communication to an I/O blade has failed. **Explanation:** The FC I/O blade has two interfaces to the LCB, internal Ethernet and CAN, and these interfaces are monitored. This RAS ticket is generated when the LCB can no longer communicate to the FC I/O blade via the internal Ethernet connection.
Detection Scenarios	LCB cannot ping the FC I/O blade via the internal Ethernet interface.
Root Causes	• FC I/O blade removed. • Ethernet cable from the EM is not plugged into the LCB. • Ethernet cable from the EM to the LCB is bad. • FC I/O blade is down. • Ethernet chip/port on the FC I/O blade is not working correctly. If the FC I/O blade has completely failed, the RAS ticket will indicate that the CAN interface is not working either. Both an Ethernet failure and a CAN communication failure will isolate the problem to the FC I/O blade itself. • LCB hub is not working correctly.
Service Resolution Steps	Perform DR063 - Resolve FC I/O Blade Connection Failure on page 395.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Ethernet Cable (customer-supplied) 2 FC I/O Blade 3 LCB

T104

T104 - FC I/O Blade CAN Interface Failure	
Description	**GUI Description:** CAN communication to an FC I/O blade has failed. **Explanation:** The FC I/O blade has two interfaces to the LCB, internal Ethernet and CAN, and these interfaces are monitored. This RAS ticket is generated when the LCB can no longer communicate with the FC I/O blade via the CAN connection.
Detection Scenarios	LCB cannot ping the FC I/O blade via the CAN interface.
Root Causes	• CAN cables connecting the expansion module to the control module/ expansion module. • Damaged module terminator or module-to-module cable with bent or broken pins. • FC I/O blade CAN bus interface.
Service Resolution Steps	1 Perform <u>DR064 - Resolve FC I/O Blade CAN Failure</u> on page 396. 2 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Module Terminators and Module-to-Module Cables 2 FC I/O Blade

T105

T105 - FC I/O Blade Temperature Alert	
Description	**GUI Description:** An FC I/O blade issued a temperature warning/alert. **Explanation:** The FC I/O blade detected a temperature problem.
Detection Scenarios	The FC I/O blade has an internal temperature sensor. This RAS ticket is generated when it detects a temperature that is above specification.
Root Causes	• Fan blade is not working properly. The fan blade is also monitored. Check for a fan blade ticket to isolate the problem. • External temperature of the library is not within specification. • Temperature sensor on the FC I/O blade is not working properly.
Service Resolution Steps	Perform DR065 - Resolve FC I/O Blade Temperature Alert on page 396.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 FC I/O Blade 2 Fan Blade

T106

T106 - FC I/O Blade Fan Speed Alert	
Description	**GUI Description:** An FCI/O blade issued a fan speed warning/alert. **Explanation:** The FC I/O blade has detected a fan speed problem.
Detection Scenarios	The FC I/O blade monitors its associated fan blade. This RAS ticket is generated when a fan speed on the fan blade falls below or goes above its speed specification.
Root Causes	• Fan blade is not working properly. A separate temperature ticket may be generated. • Fan speed sensor on the FC I/O blade is not working properly.
Service Resolution Steps	Perform <u>DR066 - Resolve FC I/O Blade Fan Alert</u> on page 397.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Fan Blade 2 FC I/O Blade

T107

T107 - FC I/O Blade Autolevel Failure	
Description	**GUI Description:** The FC I/O blade failed to autolevel to the proper firmware. **Explanation:** Each FC I/O blade has its own firmware image. A copy of the latest revision of that firmware is stored on the compact flash of the LCB. If the version stored on the compact flash is different from the version stored on the FC I/O blade, the library will automatically install the firmware image from the LCB compact flash onto the FC I/O blade. This RAS ticket is generated when this FC I/O blade firmware update process fails.
Detection Scenarios	Autolevel procedure was not successful. Autoleveling is retried twice before this ticket is generated.
Root Causes	• Firmware image on the LCB is corrupted. • Firmware error on the LCB.
Service Resolution Steps	Perform DR067 - Resolve FC I/O Blade Auto-Level Failure on page 397.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 FC I/O Blade

T108

T108 - Incompatible Drive Brand	
Description	**GUI Description:** An incompatible drive sled installation has been detected. **Explanation:** Different library products and configurations support different drives. The drive sleds will contain certain configuration information that the library will use to validate that the drive is indeed configured properly for the respective library brand. If a drive's configuration data does not match what the library expects, the drive will not be usable, and this RAS ticket will be generated.
Detection Scenarios	Upon drive sled detection by library firmware, the drive sled EEPROM reports a drive sled brand that does not match the library brand.
Root Causes	• User installed a drive sled from a different library brand. • User did not purchase the drive sled from an official sales channel. • Drive sled does not have the correct configuration information programmed.
Service Resolution Steps	Perform DR068 - Resolve Incompatible Drive Brand on page 397.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T109

T109 - Drive Firmware Update Failure	
Description	**GUI Description:** A tape drive firmware update failed. **Explanation:** From time to time, new drive firmware is released for Fibre Channel, SCSI, and SAS drives. The library provides the ability to upgrade the firmware installed on a drive either via a firmware upgrade (FUP) tape, via a download through Webthe Web client, via the FC I/O blade, or via a host utility. After the upgrade process is complete, the library checks to verify that the drive reports the new version. If the drive does not, this RAS ticket is generated. This RAS ticket is specific to the case when the user upgrades the tape drive (brick) firmware manually and does not apply when drive firmware is being auto-leveled.
Detection Scenarios	After a drive firmware update, the drive does not report the new firmware version.
Root Causes	• The tape drive firmware image that was used to update the drive was the same as what was already installed on the drive. • A firmware upgrade tape with an incompatible firmware version (wrong generation, drive type, etc.) was used. • A tape cartridge that was not a firmware upgrade tape with a valid firmware version was used. • The firmware image was successfully transferred to the drive, but was corrupt or incomplete. • Error in drive communication, or other drive-specific error.
Service Resolution Steps	Perform DR069 - Resolve Tape Drive Firmware Update Failure on page 397.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T111

T111 - FCB Product Mismatch	
Description	**GUI Description:** An incompatible FC I/O blade installation has been detected. **Explanation:** During bootup, or when an FC I/O blade is inserted, the library checks the product designation of the installed FC I/O blades. If an FC I/O blade has been added to the library whose product designation does not match the product type of the library, this ticket is generated.
Detection Scenarios	When queried, the FC I/O blade returns a product designation that does not match what is expected for the library.
Root Causes	• User installed an FC I/O blade that is not compatible with the library. • Firmware error on the LCB.
Service Resolution Steps	Perform DR071 - Resolve FC I/O Blade Product Mismatch on page 398.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 FC I/O Blade

T112

T112 - Invalid Tape Drive Firmware Image	
Description	**GUI Description:** A stored tape drive firmware image is not usable for auto-leveling of a tape drive.
	Explanation: During initialization, or when a drive is inserted while the library is operating, the library checks the product firmware level of the installed tape drive (brick) and compares that version to the version that it stores internally in its file system. If they are not the same, the library automatically updates the tape drive (brick) with this internally stored firmware image.
Detection Scenarios	The automatic update of the tape drive firmware fails.
Root Causes	The tape drive firmware image stored on the library's file system is corrupt.
Service Resolution Steps	Perform DR072 - Resolve Tape Drive Auto-Level Failure on page 398.
Possible CRUs/FRUs	None

T113

T113 - FC I/O Blade Voltage Alarm	
Description	**GUI Description:** An FC I/O blade issued a voltage alarm. **Explanation:** The FC I/O blade has detected that 1 of its 5 monitored voltage levels has spiked above, or dropped below, a safe threshold.
Detection Scenarios	A sensor that monitors a voltage level on the FCB detects a voltage change beyond tolerable limits.
Root Causes	• FCB hardware is not handling the voltage correctly. • A power supply is malfunctioning.
Service Resolution Steps	Perform <u>DR073 - Resolve FC I/O Blade Voltage Alarm</u> on page 399. **Note:** If there are other active voltage/power-related tickets, the problem may be caused by the power supply to the library, so you can dispatch a power supply; otherwise, the only CRU/FRU you should dispatch is the FC I/O blade.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 FC I/O Blade 2 Power Supply (only dispatch if warranted; see note in Service Resolution Steps above)

T114

T114 - Unassigned Tape Cartridge	
Description	**GUI Description:** A tape cartridge has been detected in a storage location that is not assigned to any partition. **Explanation:** At bootup, or after a door open event, the picker performs an inventory of the entire library. There is a chance that a tape cartridge may be located in a slot that is not part of a partition. If so, this tape cartridge will be inaccessible to the user and must be manually removed. This ticket will be generated upon the first occurrence of such a tape cartridge; a separate ticket will not be generated for each tape cartridge found.
Detection Scenarios	During inventory, at least one tape cartridge is found in a slot that does not belong to a partition.
Root Causes	• Tape cartridge was manually placed into the slot. • A partition was deleted that contained media, and the library was power cycled or the main door was opened.
Service Resolution Steps	See: DR074 - Resolve Unassigned Inaccessible Tape Cartridge on page 399.
Possible CRUs/FRUs	None

T115

T115 - Installation & Verification Test Warning	
Description	**GUI Description:** A marginal, but still operable, assembly condition was found during the Installation & Verification Test. **Explanation:** The library includes a verification test that can be run to validate that the system has been installed properly and is up and running. Errors can occur during this test. The library will post this ticket whenever an error occurs during this Installation & Verification Test that does not affect the overall functionality of the library. It is more of a warning that a problem may be developing.
Detection Scenarios	During the Installation & Verification Test run, when any error occurs that is not serious enough to limit library functionality.
Root Cause	Any function that is executed by the Installation & Verification Test that does not complete successfully.
Service Resolution Steps	Perform DR075 - Resolve Installation & Verification Test Warning on page 399.
Possible CRUs/FRUs	None

T116

T116 - Robotics Firmware Image Error	
Description	This RAS ticket applies to **Model 2 robots only** (see How to Determine Which Robot Your Library Contains on page 165).
	GUI Description: The robotics firmware auto-level process cannot be performed because necessary files are missing or corrupted.
	Explanation: The library is unable to attempt the robotics firmware autoleveling process. In this case, the robotics firmware autolevel is not attempted, and the robotics subsystem is left in the "not ready" state.
Detection Scenarios	• A necessary autolevel file is missing in the library firmware.
	• A necessary autolevel file failed validation.
Root Cause	Firmware corruption.
Service Resolution Steps	Perform DR084 - Resolve Robotics Firmware Image Error on page 404.
Possible CRUs/FRUs	None

T117

T117 - Robotics Auto-Level Failure	
Description	This RAS ticket occurs with **Model 2 robots only** (to determine which your library contains, see How to Determine Which Robot Your Library Contains on page 165). **GUI Description:** The robotics firmware auto-level process failed to update either the robot flash image or the scanner flash image. **Explanation:** The normal firmware auto-level process for robotics was not successful. Each time the robot is initialized, the firmware level of the robot is checked to be consistent with the level required by the main library firmware. If the level is not correct, the robotics firmware will be up-leveled or down-leveled accordingly. Failure in this process to update to the correct robotics firmware level results in the generation of this RAS ticket.
Detection Scenarios	The Robot Controller Board could not perform one of the following operations: • Validate the received flash image. • Program its flash with the robot flash image. • Program its scanner with the scanner firmware image.
Root Cause	• Flash image CRC failure on the received file. • Hardware failures that result in unsuccessful flash programming.
Service Resolution Steps	Perform DR085 - Resolve Robotics Auto-Level Failure on page 404.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Robot Assembly

T118

T118 - Degraded Robotics Flash	
Description	This RAS ticket occurs with **Model 2 robots only** (to determine which your library contains, see How to Determine Which Robot Your Library Contains on page 165). **GUI Description:** The robotics firmware auto-leveling process completed, but failed to update one of the redundant robot controller flash partitions. **Explanation:** The library was not able to update one of the robotics flash parts (but the other was successfully updated). The robotics subsystem can still become ready, but the flash is in a degraded mode, and the backup image is unavailable. This is a warning RAS ticket.
Detection Scenarios	The robotics firmware auto-level process was unable to update one of the robot controller board's flash parts.
Root Cause	One of the robot controller board's flash partitions is bad.
Service Resolution Steps	Perform DR086 - Resolve Robotics Degraded Flash Warning on page 405.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Robot Assembly

T120

T120 - Robotics Y-Axis Motion Failure, Tape In Picker	
Description	**This ticket applies to Model 2 robots only.** **GUI Description:** A Y-axis motion error occurred while the robot was moving a tape cartridge. **Explanation:** A Y-axis motion error that cannot be considered a complete obstruction has been reported by robotics. Because a tape cartridge is in the picker, tape cartridge recovery must be a part of the resolution strategy. This RAS ticket only occurs during a robotics move, not during a robotics get or put.
Detection Scenarios	• A specified move in the y-axis cannot complete. • Robotics firmware reports a y-axis error condition.
Root Causes	• A physical obstruction in the path of the robot's motion. Examples include tape cartridges that are extending from the picker assembly or from a storage location, as well as tape cartridges or debris that may have collected on the floor of the library. • A large number of electrical hardware failures. Firmware or hardware detects that motion control is not occurring properly (encoder issues, motor driving circuits, motor winding issues, etc.). • A relatively small number of mechanical hardware failures that do not result in the detection of a complete obstruction, but where motion control generates robotics firmware error codes (contamination or damage to encoder wheel, high friction, etc.).
Service Resolution Steps	Perform DR088 - Resolve Robotics Y-Axis Motion Failure on page 405.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Robot Assembly 2 Cable Spool

T121

T121 - Robotics Y-Axis Motion Failure, No Tape In Picker	
Description	**This ticket applies to Model 2 robots only.** **GUI Description:** A Y-axis motion error occurred, which does not seem to be the result of robotic obstruction. **Explanation:** A y-axis motion error that cannot be considered a complete obstruction has been reported by robotics. Because a tape cartridge is *not* in the picker, tape cartridge recovery is not necessary as part of the resolution strategy. This RAS ticket only occurs during a robotics move, not during a robotics get or put.
Detection Scenarios	• A specified move in the y-axis cannot complete. • Robotics firmware reports a y-axis error condition.
Root Causes	• A physical obstruction in the path of the robot's motion. Examples include tape cartridges that are extending from the picker assembly or from a storage location, as well as tape cartridges or debris that may have collected on the floor of the library. • A large number of electrical hardware failures. Firmware or hardware detects that motion control is not occurring properly (encoder issues, motor driving circuits, motor winding issues, etc.). • A relatively small number of mechanical hardware failures that do not result in the detection of a complete obstruction, but where motion control generates robotics firmware error codes (contamination or damage to encoder wheel, high friction, etc.).
Service Resolution Steps	Perform DR088 - Resolve Robotics Y-Axis Motion Failure on page 405.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Robot Assembly 2 Cable Spool

T122

T122 - Robotics X, Z, Theta Axis Motion Failure, Tape In Picker	
Description	**This ticket applies to Model 2 robots only.**
	GUI Description: An X, Z, or Theta axis motion error occurred while the robot was moving a tape cartridge.
	Explanation: An x, z, or theta axis motion error that cannot be considered a complete obstruction has been reported by robotics. Because a tape cartridge is in the picker, tape cartridge recovery must be a part of the resolution strategy. This RAS ticket may occur during a robotics move or during a robotics get or put.
Detection Scenarios	• A specified move in the x, z, or theta axis cannot complete.
	• Robotics firmware reports an x, z, or theta axis error condition.
Root Causes	• A physical obstruction in the path of the robot's motion. Examples include tape cartridges that are extending from the picker assembly or from a storage location, as well as tape cartridges or debris that may have collected on the floor of the library.
	• A large number of electrical hardware failures. Firmware or hardware detects that motion control is not occurring properly (encoder issues, motor driving circuits, motor winding issues, etc.).
	• A relatively small number of mechanical hardware failures that do not result in the detection of a complete obstruction, but where motion control generates robotics firmware error codes (contamination or damage to encoder wheel, high friction, etc.).
Service Resolution Steps	Perform DR089 - Resolve X, Z, Theta Axis Motion Failure on page 406.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts.
	Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time.
	1 Robot Assembly
	2 Cable Spool

T123

T123 - Robotics X, Z, Theta Axis Motion Failure, No Tape In Picker	
Description	**This ticket applies to Model 2 robots only.** **GUI Description:** An X, Z, or Theta axis motion error occurred, which does not seem to be the result of a robotic obstruction. **Explanation:** An x, z, or theta axis motion error that cannot be considered a complete obstruction has been reported by robotics. Because a tape cartridge is *not* in the picker, tape cartridge recovery is not necessary as part of the resolution strategy. This RAS ticket may occur during a robotics move or during a robotics get or put.
Detection Scenarios	• A specified move in the x, z, or theta axis cannot complete. • Robotics firmware reports an x, z, or theta axis error condition.
Root Causes	• A physical obstruction in the path of the robot's motion. Examples include tape cartridges that are extending from the picker assembly or from a storage location, as well as tape cartridges or debris that may have collected on the floor of the library. • A large number of electrical hardware failures. Firmware or hardware detects that motion control is not occurring properly (encoder issues, motor driving circuits, motor winding issues, etc.). • A relatively small number of mechanical hardware failures that do not result in the detection of a complete obstruction, but where motion control generates robotics firmware error codes (contamination or damage to encoder wheel, high friction, etc.).
Service Resolution Steps	Perform DR089 - Resolve X, Z, Theta Axis Motion Failure on page 406.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Robot Assembly 2 Cable Spool

T124

T124 - Robotics Hardware Error - RCB	
Description	**This RAS ticket only occurs for systems containing Model 2 robots** (to determine which your library contains, see How to Determine Which Robot Your Library Contains on page 165). **GUI Description:** A servo hardware error has been isolated to the robot controller board.
Detection Scenarios	Robotics firmware reports a specific hardware error, identifying the robot controller board as the source.
Root Causes	Electrical hardware failure.
Service Resolution Steps	Perform DR090 - Resolve Robotics Hardware Error - RCB on page 406.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Robot Assembly 2 Cable Spool

T125

Status: Implemented in firmware 520G. Disabled in firmware 580G.

T125 - Robotics Hardware Error - Picker	
Description	**GUI Description:** A servo hardware error has been detected in the picker mechanism. **Explanation:** A servo hardware error has been isolated to the robotics picker mechanism.
Detection Scenarios	Robotics firmware reports a specific hardware error, identifying the picker electronics as the source.
Root Causes	Electrical hardware failure.
Service Resolution Steps	Perform DR091 - Resolve Robotics Hardware Error - Picker on page 407.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed)

T126

T126 - Robotics Hardware Error - Scanner	
Description	**GUI Description:** A hardware error has been isolated to the barcode scanner. **Explanation:** A hardware error has been isolated to the robot's scanner device.
Detection Scenarios	Robotics firmware reports a specific hardware error, identifying the scanner device of the picker assembly as the source.
Root Causes	• Obstructions in the view path of the robot scanner. • Electrical connection or picker assembly hardware failure. • Improper J1 connector connection.
Service Resolution Steps	Perform DR092 - Resolve Robotics Hardware Error - Scanner on page 407.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed)

T127

T127 - Robotics Communication Error	
Description	This RAS ticket occurs with **Model 2 robots only** (to determine which your library contains, see How to Determine Which Robot Your Library Contains on page 165). **GUI Description:** The library controller firmware lost communication with the robotics subsystem. **Explanation:** The library is not able to communicate with the Model 2 robotics subsystem. This RAS ticket is generated if the library had previously established a communication link with the robotics subsystem, but that link has now been lost and cannot be reestablished.
Detection Scenarios	The library firmware did establish communication with the robotics subsystem, but encountered a communication failure during operation, and communication could not be re-established.
Root Causes	• An intermittent door-open condition disconnecting power from the robot. • A cable spool or connection problem. • A picker assembly hardware failure. • A Y-carriage assembly connection problem. • A robot controller board hardware or software failure. • An LCB serial communication link failure.
Service Resolution Steps	1 Perform DR093 - Resolve Robotics Communication Error on page 408. 2 Check to see if there is a main door open condition, which may be caused by an open door or a defective or loose module terminator or module-to-module cable. 3 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Cable Spool 2 Robot Assembly

T128

T128 - Incompatible Robot Installation	
Description	**GUI Description:** The library control firmware detected that an incompatible robot is installed. **Explanation:** The library has an incompatible robot installed. This may happen when a GA-style (Model 1) robot is replaced with the Model 2 robot, or vice versa.
Detection Scenarios	Library firmware detects a change in robot model, which is incompatible with the current library configuration.
Root Causes	The robot was replaced with an incompatible robot type.
Service Resolution Steps	Perform RR016 - Remove and Replace Incompatible Robot on page 425. See Removing and Replacing the Robot Assembly on page 164 for instructions.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Robot Assembly (If a Model 2 robot is in the library, replace it with a Model 1 robot—order both the Picker Assembly and the Y-carriage Assembly and replace as a single unit. If a Model 1 robot is in the library, replace it with a Model 2 robot.)

T129

T129 - Drive Sled Firmware Image Error	
Description	**GUI Description:** Drive sled firmware cannot be auto-leveled, due to a missing or corrupt drive sled firmware image. **Explanation:** During an attempt to autolevel the drive sleds, the library detected a missing or corrupt UDS.lif (drive sled firmware) file.
Detection Scenarios	Main library firmware that controls and performs drive sled firmware updates detects that the drive sled firmware update file is missing or corrupted.
Root Causes	The drive sled firmware update file is missing or corrupted.
Service Resolution Steps	Perform DR095 - Resolve Drive Sled Auto-Level Failure on page 409.
Possible CRUs/FRUs	None

T130

T130 - Tape Drive Cleaning Failure	
Description	**GUI Description:** A tape drive was cleaned, but continues to request cleaning. **Explanation:** After a tape drive was cleaned and the cleaning tape was removed from the tape drive, the tape drive continues to request cleaning.
Detection Scenarios	A tape drive continues to request cleaning after successful cleaning cycles have been applied.
Root Causes	Tape drive malfunction.
Service Resolution Steps	Perform [DR096 - Resolve Drive Cleaning Failure](#) on page 409.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T131

T131 - Invalid EKM Configuration	
Description	**GUI Description:** The number of tape drives enabled for encryption exceeds the number of tape drives supported under the current encryption license. The 120-day grace period to correct the violation expires on the termination date. **Explanation:** The number of encryption-capable tape drives configured in LME partitions exceeds the number of tape drives that may be encryption enabled, under the current EKM license. If the license is not corrected within 120 days from the creation date of this ticket, the library firmware shall reconfigure all LME partitions/tape drives to use AME encryption. To prevent or correct disabling of LME capabilities, the customer may reconfigure partitions to allow LME configurations that are in line with the installed EKM license. Alternatively, the customer may purchase and install an encryption license that meets their current usage.
Detection Scenarios	Following a library firmware upgrade, the number of tape drives configured for encryption exceeds the number allowed under the current EKM license. Library firmware continues to monitor every 24 hours to determine if the ticket should be re-generated or updated, until such time as the license infraction is resolved.
Root Cause	The customer has configured more tape drives for encryption than the current EKM license supports.
Service Resolution Steps	See: DR097 - Resolve Invalid EKM Configuration on page 410
Possible CRUs/FRUs	No library FRU is identified. Rather, this is an indication that the EKM license has been exceeded.

T132

T132 - Hardware Clock Failure	
Description	**GUI Description:** The hardware real-time clock (RTC) has failed. The library system time may appear to be set correctly, but accurate time will be lost following a power cycle or reboot. **Explanation:** While setting the library time, the library detected an error in the hardware real-time clock (RTC). This type of error will allow the library system time to be changed, but the time will not be set correctly following a power cycle or reboot.
Detection Scenarios	The main library firmware determined that setting the hardware clock failed, though the system time may appear to have been set correctly.
Root Causes	The hardware clock on the LCB failed.
Customer Resolution Steps	Perform RR007 - Remove and Replace LCB Hardware Clock on page 423.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 LCB

T133

T133 - Barcode Label Mapping Failure	
Description	**GUI Description:** The library control firmware cannot map barcode labels to respective slots during an inventory operation. **Explanation:** The library is attempting to map barcode labels during inventory and is being prevented from doing so because one or more barcode labels are improperly attached, or a magazine is improperly seated/installed.
Detection Scenarios	The library cannot complete an inventory, and there are no indications of hardware failure.
Root Causes	• Obstructions in the view path of the robot scanner device. • Improper installation of magazine(s). • Improper barcode label on tape cartridges. • User interface operations were being performed while the robot was scanning barcode labels.
Service Resolution Steps	Perform DR099 - Resolve Barcode Label Mapping on page 411.
Possible CRUs/FRUs	None

T134

T134 - Barcode Scanner Malfunction	
Description	**GUI Description:** The library barcode scanner cannot read any barcode labels. **Explanation:** The barcode scanner is unable to detect target information. The barcode scanner cannot detect any barcodes within the library.
Detection Scenarios	The library was unable to detect any barcodes when scanning target columns at startup.
Root Causes	• Barcode scanner illumination is insufficient. • Barcode scanner view is obscured (blocked). • Barcode scanner failed.
Service Resolution Steps	Perform DR100 - Resolve Barcode Scanner Malfunction on page 411.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed)

T135

T135 - Tape Drive Type Change	
Description	**GUI Description:** An assigned tape drive has been replaced with a tape drive of a different type. **Explanation:** A tape drive that is assigned to a partition has been replaced with a tape drive of a different type, where *type* is defined by the tape drive's vendor, generation, and interface. This RAS ticket is generated to notify the user of the tape drive type change.
Detection Scenarios	• Installation of a tape drive into a library drive slot triggers the library to discover it. • Bootup causes the library to physically discover any tape drive that is electrically connected in the system.
Root Causes	End user replaced an assigned tape drive with a tape drive of a different generation, interface, or vendor.
Service Resolution Steps	Perform DR101 - Resolve Tape Drive Type Change on page 411.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T136

T136 - Robotics Z Axis Motion Failure	
Description	**This ticket applies to <u>Model 1 robots only</u>.** **GUI Description:** An unrecoverable robot motion failure has occurred in the Z-axis. **Explanation:** An unrecoverable robot motion failure occurred in the z-axis. Because a tape cartridge may or may not be present in the picker, tape cartridge recovery must be part of the resolution strategy.
Detection Scenarios	A specified motion in the Z-axis cannot complete.
Root Causes	• Any of a large number of electrical hardware failures. Code or hardware detects that motion control is not occurring properly (encoder issues, motor driving circuit issues, motor winding issues, cable connections issues, etc.). • A relatively small number of hardware errors that do not result in complete obstruction, but where servo control does not appear to be normal.
Service Resolution Steps	Perform DR102 - Resolve Robotics Z Axis Motion Failure on page 412.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly

T137

T137 - Display Assembly Communication Failure	
Description	**GUI Description:** A local display assembly communication failure has been detected. **Explanation:** The library encountered an error that appears to be caused by a communication link failure to the display assembly (DIEB) board.
Detection Scenarios	• Failed I2C communication with the DIEB board. • Failed GPIO communication with the DIEB board.
Root Causes	• Board-level hardware failures. • Display not plugged in correctly. • Cable failure or not plugged in.
Service Resolution Steps	Perform DR103 - Resolve Display Assembly Communication Failure on page 412.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 LCD Front Panel Display (Operator Panel) 2 LCB

T138

T138 - EKM License Violation	
Description	**GUI Description:** The grace period has expired for operating in excess of the current encryption license. LME capabilities have been disabled in all partitions. **Explanation:** The grace period for operating in excess of the current encryption license has expired. The number of encryption-capable tape drives configured in LME partitions exceeds the number allowed under the current encryption license. LME capabilities in all LME partitions have been disabled. To correct the disabling of LME capabilities, the customer may reconfigure partitions to allow LME configurations that are in line with the installed encryption license. Alternatively, the customer may purchase and install an encryption license that meets their current usage.
Detection Scenarios	For 120 days following a library firmware upgrade, the library has detected that the number of tape drives configured for LME encryption exceeds the number allowed under the current encryption license.
Root Causes	The customer has configured more tape drives for LME encryption than the current encryption license supports.
Service Resolution Steps	Perform <u>DR104 - Resolve EKM License Violation</u> on page 413.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. No library FRU is identified. Rather, this is a notification that the grace period for exceeding the current encryption license has expired.

T139

T139 - Robotics Communication Loss	
Description	This RAS ticket is generated by the **Model 1 (GA) robot** (to determine which your library contains, see How to Determine Which Robot Your Library Contains on page 165). **GUI Description:** The library controller firmware lost communication with the robotics subsystem. **Explanation:** The library has lost communication with the Model 1 robotics subsystem. This RAS ticket is generated if the library had previously established a communication link with the robotics subsystem, but that link has now been lost and cannot be reestablished.
Detection Scenarios	The library firmware did establish communication with the robotics subsystem, but encountered a communication failure during operation, and communication could not be re-established.
Root Causes	• An intermittent door-open condition disconnecting power from the robot. • Damaged module terminator or module-to-module cable with bent or broken pins. • A cable spool or connection problem. • A picker assembly hardware failure. • A Y-carriage assembly connection problem. • An LCB serial communication link failure.
Service Resolution Steps	1 Perform DR093 - Resolve Robotics Communication Error on page 408. 2 Check to see if there is a main door open condition, which may be caused by an open door or a defective or loose module terminator or module-to-module cable. 3 Inspect the module terminators and module-to-module cables for loose connectors or damage (bent or broken pins). If damaged, replace the part. Reseat the terminators and cables.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Module Terminators and Module-to-Module Cables 2 Cable Spool 3 Robot Assembly (Replace entire robot. Order both the Picker Assembly and the Y-carriage Assembly and replace as a single unit.)

T140

T140 - Failover Port Connection Failure	
Description	**GUI Description:** A connection failure has been detected for the host-connected failover port. **Explanation:** The Host Port Failover (HPF) port is not connected or has failed. This situation occurs when the Fibre Channel (FC) I/O blade's FC switch connection fails, which is required for a working HPF configuration. With HPF enabled, the FC I/O blade is constantly monitoring the primary and secondary failover port connection status. If a problem is detected with the secondary port connection, a warning ticket is generated to notify the user that the secondary port is not operating properly and that HPF cannot occur should the primary port fail.
Detection Scenarios	Connection failure of secondary HPF port is detected.
Root Causes	• Cable not plugged in. • Cable is faulty. • Port on FC I/O blade is not functioning. • Port on switch is not functioning. • FC I/O blade is not functioning.
Service Resolution Steps	1 Perform <u>DR105 - Resolve HPF Connection Failure</u> on page 413. 2 Check the Ethernet cable connecting the FC I/O blade to the host to make sure there are not bent pins and that the cable is in good working order. Ensure the cable is plugged in correctly.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 FC I/O Blade

T141

T141 - Unknown Picker Calibration Offsets	
Description	**GUI Description:** Library firmware is unable to read the robotics picker's calibration offsets. **Explanation:** The picker's EEPROM/FLASH that contains calibration offset values required for proper picker calibration and fiducial size evaluation does not contain valid calibration offsets. If such offsets are missing and cannot be read, the robot will fail calibration and cannot operate.
Detection Scenarios	Attempts to read the stored calibration offsets from EEPROM/FLASH of the robotics controller board failed.
Root Causes	• Defective EEPROM/FLASH area to read offsets. • Calibration offsets not stored during manufacturing process.
Service Resolution Steps	Perform RR017 - Remove and Replace Un-calibrated Picker on page 425.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Picker Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed)

T142

Status: Implemented in version 520, then canceled.

T142 - Robotics Y-Axis Hardware Failure	
Description	**GUI Description:** The robotic Y-axis gear failed to perform proper motion. **Explanation:** Movement of the robot assembly along the Y-axis is accomplished using the Y-carriage assembly, which contains the Y-motor. The Y-motor has a gear that is attached directly to the motor shaft. Failure or degradation of this Y-motor gear is the failure mode for this RAS ticket.
Detection Scenarios	Robotics firmware reports a specific hardware error, identifying the Y-carriage assembly or Y-motor hardware as the source.
Root Causes	Failure or degradation of the Y-motor gear that drives the robot assembly along the y-axis.
Service Resolution Steps	Perform RR018 - Remove and Replace Robotics Y-Carriage Assembly on page 425.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Y-carriage Assembly (if Model 1 robot is installed) **or** Robot Assembly (if Model 2 robot is installed)

T143

T143 - Unlabeled Cartridge Detected	
Description	**GUI Description:** An unlabeled tape cartridge or unreadable cartridge barcode label has been detected. **Explanation:** During library initialization, or after a main door closure event, the library performs an inventory of the entire library. An inventory of respective magazines is also performed each time an I/E station closes. These inventory operations use scanner-reported barcode label information to determine element full and empty status. If the library is configured to perform an "EMPTY SLOT" detection, actually using the teach sensor to determine if any empty element may hold a tape cartridge that may not have a scanner readable barcode label attached, and such an unlabeled tape cartridge is found, this RAS ticket is generated to alert of such condition and allow the user to correct the issue. The system will be able to report full status and will also allow the tape cartridge to be moved, but any tape cartridge label reference with the listing "NO_LABEL" on the user interface screens and a SCSI READ ELEMENT STATUS response will not list label/volser information at all. A RAS ticket will be generated upon the first occurrence of such unlabeled tape cartridge detection; a separate RAS ticket will not be generated for each tape cartridge found.
Detection Scenarios	During "touch" inventory, the teach sensor indicates tape cartridge presence, but the scanner was unable to read the tape cartridge barcode label.
Root Causes	A tape cartridge does not have a barcode label attached, or the barcode label is damaged and unreadable.
Service Resolution Steps	Perform RR019 - Remove and Replace Unlabeled Tape Cartridge on page 425.
Possible CRUs/FRUs	None

T144

T144 - I/E Station Door Sensor Stuck	
Description	**GUI Description:** An I/E (or I/O) station sensor switch is reporting incorrect sensor status and may be stuck. **Explanation:** The library controller detected that an I/E station sensor is not reporting a valid status. The problem may be caused by a stuck sensor in the I/E station lock assembly with a control module or expansion module. Door open and close state changes are not detected reliably, and premature I/E station teach operations may occur, or no teach and inventory operation may be triggered at all.
Detection Scenarios	When processing a state change on either of the two sensor switches, if the sensor switch causing the interrupt is activated, the opposite sensor switch is checked to see if it is activated too. If they are both active, one sensor switch is stuck.
Root Causes	• A sensor switch is obstructed by foreign material. • A sensor switch is binding or sticking. • A sensor switch is broken.
Service Resolution Steps	See: DR025 - Resolve Stuck I/E Station Sensor on page 378
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 I/E Station Lock Assembly

T145

T145 - Media Removal Notification	
Description	**GUI Description:** The library detected an expected tape cartridge removal from a configured I/E (or I/O) area element. **Explanation:** The library is configured for Media Security Notification and detected an expected removal of media. Media removal is expected whenever an exported tape cartridge has been physically removed by an operator from an I/E area element.
Detection Scenarios	After I/E elements have been inventoried, the library determined that a previously exported cartridge is no longer present.
Root Causes	An exported cartridge has been removed from the library.
Service Resolution Steps	Perform DR106 - Resolve Media Security Notification on page 413.
Possible CRUs/FRUs	None

T146

T146 - Media Removal Warning	
Description	**GUI Description:** The library detected an unexpected tape cartridge removal from the library. **Explanation:** The library is configured for Media Security Notification and detected an unexpected removal of media. Media removal is not expected if the tape cartridge is no longer found in previously configured storage and drive elements, as well as the medium changer (picker) element itself. Media removal is also not expected from configured I/E area elements, unless the tape cartridge had been moved to such element by robotic motion.
Detection Scenarios	After an inventory operation, the library determined that a previously configured, but not exported, tape cartridge is no longer present.
Root Causes	A tape cartridge has been removed from the library without having been properly exported by the robot.
Service Resolution Steps	Perform DR106 - Resolve Media Security Notification on page 413.
Possible CRUs/FRUs	None

T147

T147 - Tape Cartridge Load Count Warning	
Description	**GUI Description:** The library detected that a tape cartridge is exceeding a configured load count threshold. **Explanation:** The library is configured for Advanced Reporting and enabled tape cartridge thread count (load count) threshold notification. This ticket alerts of a tape cartridge having exceeded the configured load count threshold.
Detection Scenarios	After unmounting a tape cartridge, the library determined that the tape cartridge meets or exceeds the configured load / thread count threshold.
Root Causes	The tape cartridge has been loaded/threaded more often than the configured threshold allows.
Service Resolution Steps	Perform DR137 - Resolve Media Threshold Notification on page 419.
Possible CRUs/FRUs	None

T148

T148 - Tape Cartridge Capacity Warning	
Description	**GUI Description:** The library detected that a tape cartridge is exceeding a configured capacity threshold **Explanation:** The library is configured for Advanced Reporting and enabled the tape cartridge capacity threshold notification. This ticket alerts of a tape cartridge having exceeded the configured capacity threshold.
Detection Scenarios	After unmounting a tape cartridge, the library determined that the tape cartridge meets or exceeds the configured capacity threshold.
Root Causes	The tape cartridge has been written to with more data than the configured threshold allows.
Service Resolution Steps	Perform DR137 - Resolve Media Threshold Notification on page 419.
Possible CRUs/FRUs	None

T149

T149 - EKM Path Test Delay	
Description	**GUI Description:** The library is unable to initiate a background EKM Path Test to an EKM server.
	Explanation: The library attempted to perform an EKM Path Diagnostics Test to an EKM server, but a tape drive has not been available with the proper prerequisites, such as being ready and unloaded. This ticket conveys the fact that the test could not be performed within the selected test time period, which is determined by the configured test time interval multiplied by the configured test warning threshold.
Detection Scenarios	The library attempted to perform an EKM Path Diagnostics but did not succeed in initiating the test within the configured test warning threshold, due to a tape drive not being available to allow the test to run.
Root Causes	• LTO tape drive(s) are still loaded, preventing the library from initiating an EKM Path Diagnostic Test via a tape drive. • IBM LTO tape drive(s) are not ready, preventing the library from initiating an EKM Path Diagnostics Test via a tape drive.
Service Resolution Steps	Perform DR118 - Resolve EKM Path Test Delay on page 416.
Possible CRUs/FRUs	None

T153

T153 - Drive Control Failure	
Description	**GUI Description:** A tape drive failed to configure a requested drive functionality. **Explanation:** The drive sled controller firmware commanded the drive to configure a specific function, such as enabling or disabling library managed encryption for the drive, but the drive failed to perform the requested operation.
Detection Scenarios	• Library control firmware received a drive sled event, E_DDC_LME_ENABLED, indicating that the tape drive did enable library managed encryption, but the library requested that the drive configure for application managed encryption (AME). • Library control firmware received a drive sled event, E_DDC_LME_DISABLED, indicating that the tape drive did not enable for library managed encryption, but the library requested that the drive configure for LME. • Library Control firmware received a drive sled response that indicates a drive configuration request failed
Root Causes	Drive sled or tape drive issue.
Service Resolution Steps	Perform DR110 - Resolve Drive Control Failure on page 414.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T154

T154 - Drive Encryption Monitoring Warning	
Description	**GUI Description:** A tape drive request to initiate a library managed encryption key exchange did not provide the required request details to service the encryption key exchange request. **Explanation:** The drive sled controller firmware suspended Encryption Service Request (ESR) monitoring of the tape drive, due to the tape drive having indicated an ESR, but when the drive sled controller firmware requested details from the tape drive, no data was provided. If this issue is encountered twice in a row, ESR monitoring will be suspended for the duration of the drive mount session and will be re-enabled when a new tape cartridge is mounted.
Detection Scenarios	Library control firmware received a drive sled event indicating that the tape drive reported an ESR, but details are not reported by the tape drive.
Root Causes	Tape drive firmware may incorrectly report an ESR when none is outstanding, or have a valid ESR, but not have the proper encryption key request details available upon drive sled controller request.
Service Resolution Steps	Perform DR111 - Resolve Drive Encryption Service Request Monitoring on page 415.
Possible CRUs/FRUs	**Note:** Read and perform all resolution steps before dispatching any parts. Dispatch the first part listed below for replacement. If this does not solve the problem, dispatch the second part, and so on, in order. Dispatch only one part (or set of parts) at a time. 1 Drive Sled

T178

T178 - Tape Drive Connection Failure	
Description	**GUI Description:** The library detected that Ethernet communication to a tape drive has failed. **Explanation:** A tape drive that is mounted in a drive sled is controlled via serial communication by the drive sled controller. If the tape drive is also supporting an Ethernet connection, tape drive control may also be performed via this interface, without drive sled controller involvement. If a tape drive Ethernet connection is used by the library and communication is lost, this ticket is generated to report the issue.
Detection Scenarios	LCB cannot communicate with the tape drive via tape drive Ethernet interface.
Root Causes	• Tape drive powered off. • Drive not connected to EEB. • Drive not connected to LCB (if EEB is not installed). • EEB not connected/operational (separate ticket T177 also shown). • Internal drive sled Ethernet routing/connection failure. • LCB Ethernet hub is not working correctly.
Service Resolution Steps	Perform DR131 - Resolve Tape Drive Connection Failure on page 417.
Possible CRUs/FRUs	None

T180

T180 - Drive TapeAlert 1 - Read Warning	
Description	**GUI Description:** The tape drive issued a TapeAlert, reporting that it encountered read performance issues with the mounted tape cartridge. **Explanation:** The library received a drive-generated TapeAlert 1, indicating severe read problems that affect performance, but no data loss.
Detection Scenarios	The tape drive generated and reported TapeAlert 1.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	Perform DR045 - Resolve Drive TapeAlert 1, 5, 6 - Read/Write Problem on page 388.
Possible CRUs/FRUs	None

T181

T181 - Drive TapeAlert 7 - Media Life	
Description	**GUI Description:** The tape drive issued a TapeAlert, reporting that the tape cartridge media has exceeded the end of its calculated useful life. **Explanation:** The library received a drive-generated TapeAlert 7, indicating that the tape cartridge has reached the end of its calculated useful life.
Detection Scenarios	The tape drive generated and reported TapeAlert 7.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	Perform RR008 - Remove and Replace Tape Cartridge on page 423.
Possible CRUs/FRUs	None

T182

T182 - Drive TapeAlert 13 - Recoverable Mechanical Cartridge Failure	
Description	**GUI Description:** The tape drive issued a TapeAlert, reporting that the tape cartridge in the tape drive experienced a mechanical failure. **Explanation:** The library received a drive-generated TapeAlert 13, indicating that an operation has failed because the tape cartridge in the tape drive experienced a mechanical failure.
Detection Scenarios	The tape drive generated and reported TapeAlert 13.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	Perform RR008 - Remove and Replace Tape Cartridge on page 423.
Possible CRUs/FRUs	None

T183

T183 - Drive TapeAlert 14 - Unrecoverable Mechanical Cartridge Failure	
Description	**GUI Description:** The tape drive issued a TapeAlert, reporting that the loaded tape cartridge experienced a mechanical failure that prevents it from being unloaded. **Explanation:** A tape drive detected and reported that the tape cartridge experienced a mechanical cartridge failure. The tape may be snapped, split, or cut, and the tape cartridge's mechanical failure may prevent the tape cartridge from being properly unloaded and ejected.
Detection Scenarios	The tape drive generated and reported TapeAlert 14.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	Perform RR009 - Remove and Replace Defective Tape Cartridge on page 423.
Possible CRUs/FRUs	None

T184

T184 - Drive TapeAlert 58 - Microcode Error	
Description	**GUI Description:** The tape drive issued a TapeAlert, reporting that a drive firmware error occurred. **Explanation:** The library received a drive-generated TapeAlert 58, indicating the detection of a drive firmware failure.
Detection Scenarios	The tape drive generated and reported TapeAlert 58.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	Perform DR128 - Resolve Drive TapeAlert 58 - Microcode Failure on page 416.
Possible CRUs/FRUs	None

T185

T185 - Drive TapeAlert 59 - WORM Medium Integrity Check Failed	
Description	**GUI Description:** The tape drive issued a TapeAlert, reporting that the loaded WORM media failed a media integrity check. **Explanation:** The library received a drive-generated TapeAlert 59, reporting that the mounted WORM media failed a media integrity check.
Detection Scenarios	The tape drive generated and reported TapeAlert 59.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	Perform DR129 - Resolve Drive TapeAlert 59 - WORM Integrity Check on page 416.
Possible CRUs/FRUs	None

T186

T186 - Drive TapeAlert 60 - WORM Medium Overwrite Detected	
Description	**GUI Description:** The tape drive issued a TapeAlert, reporting that the loaded media may not be recognized by the host application as WORM media, as the drive was requested to overwrite data. **Explanation:** The library received a drive-generated TapeAlert 60, indicating that a host application attempted to overwrite data on the mounted WORM media. Usually this request is an indication that the host application did not recognize the media to be of type WORM.
Detection Scenarios	The tape drive generated and reported TapeAlert 60.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	Perform DR130 - Resolve Drive TapeAlert 60 - WORM Overwrite Attempt on page 417.
Possible CRUs/FRUs	None

T187

T187 - Drive Tape Alert 2 - Write Warning	
Description	**GUI Description:** The tape drive issued a Tape Alert, reporting that it encountered write performance issues with the mounted tape cartridge. **Explanation:** The library received a drive-generated Tape Alert 2, indicating severe write problems that affect performance, but no data loss.
Detection Scenarios	The tape drive generated and reported Tape Alert 2.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	Perform [DR045 - Resolve Drive TapeAlert 1, 5, 6 - Read/Write Problem](#) on page 388.
Possible CRUs/FRUs	None

T188

T188 - Drive Tape Alert 54 - No Start of Data	
Description	**GUI Description:** The tape drive issued a Tape Alert, reporting that it did not detect the start of data on the tape. **Explanation:** The library received a drive-generated Tape Alert 54, indicating a damaged, bulk erased, or incorrect format tape.
Detection Scenarios	The tape drive generated and reported Tape Alert 54.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	Perform <u>DR146 - Resolve Drive Tape Alert 54 - No Start of Data</u> on page 419.
Possible CRUs/FRUs	None

T190

T190 - Library Configuration Corruption	
Description	**GUI Description:** The library detected a configuration file corruption, and reset some configuration parameters to factory defaults. **Explanation:** The library detected a missing or corrupted configuration file, which required the library control firmware to recreate a configuration file with factory default settings. This issue could cause various side effects, such as drives not having the proper SCSI ID or having conflicting SCSI ID settings, or more problematically, having a drive that previously encrypted its data no longer encrypt data on tape. This ticket provides an alert of such problems, as the library is not always able to properly reconstruct configuration settings or prevent drives from initializing incorrectly.
Detection Scenarios	• The library did not locate a required configuration file. • The library detected a corrupted configuration file.
Root Causes	The library encountered an exception condition that resulted in a "core" and restart of the system.
Service Resolution Steps	Perform DR146 - Resolve Drive Tape Alert 54 - No Start of Data on page 419.
Possible CRUs/FRUs	None

T191

T191 - FC I/O Blade Data Path Error	
Description	**GUI Description:** The library detected a FC I/O Blade data path error. **Explanation:** The FC I/O Blade detected a parity or ECC error during a data transfer. The blade will stop all data transfer operations and will require a replacement.
Detection Scenarios	• FC I/O Blade reported a parity issue. • FC I/O Blade reported an ECC error.
Root Causes	• Defective FC I/O blade hardware. • Noisy data communication among FC I/O Blade components.
Service Resolution Steps	Perform [RR015 - Remove and Replace FC I/O Blade](#) on page 424.
Possible CRUs/FRUs	None

T192

T192 - Compact Flash Reorganization Failure	
Description	**GUI Description:** The library detected a defective Compact Flash. **Explanation:** As of GA of the product, the library shipped with a 256 MB Compact Flash (CF) that was formatted for 256 MB use. Since product GA, 256 MB CFs have been obsolete and larger CFs, such 1 GB, 2 GB, and 4 GB CFs qualified and installed, yet all of them are still formatted for 256 MB and utilize only up to 256 MB of CF space. As of library firmware i8.2, firmware will detect the CF size and increase its formatted size to the maximum possible. In the event this process to reformat the CF fails and retries do not succeed, this ticket will be generated to request a CF replacement.
Detection Scenarios	The CF formatting process fails and cannot recover from formatting the installed CF.
Root Causes	• Defective CF • CF error condition causing formatting process to fail
Service Resolution Steps	Perform [RR005 - Remove and Replace Compact Flash](#) on page 422.
Possible CRUs/FRUs	None

T193

T193 - Suspect Drive Command	
Description	**GUI Description:** The tape drive reported a multi-initiator command conflict.
	Explanation: The library detected that a tape drive is experiencing conflicting drive commands from multiple hosts/initiators. This issue is most likely due to multiple initiators requesting drive operations without properly reserving the drive for Input/Output (I/O) operations.
Detection Scenarios	The tape drive generated and reported a multi-initiator command conflict.
Root Causes	The tape drive has determined and reported a problem per its internal error analysis algorithms.
Service Resolution Steps	Perform DR147 – Resolve Suspect Drive Command on page 420.
Possible CRUs/FRUs	None

T194

T194 - Duplicate Barcode Label Detected	
Description	**GUI Description:** A tape cartridge with a duplicate barcode label has been detected. **Explanation:** During library initialization, or after a main door closure event, the library performs an inventory of the entire library. An inventory of respective magazines is also performed each time an I/E (I/O) station closes. These inventory operations use scanner-reported barcode label information to determine element full and empty status. If the library detects a duplicate barcode within the library, it warns of the issue, as it may cause confusion as to which partition owns the tape cartridge. A RAS ticket will be generated for each unique duplicate barcode occurrence; a separate ticket will not be generated for any additional barcode duplications.
Detection Scenarios	During "scan" inventory, the scanner reported a tape cartridge that is already recorded for another element.
Root Causes	A tape cartridge has a duplicate barcode label attached.
Service Resolution Steps	Perform RR020 – Remove and Replace Duplicate Tape Cartridge on page 426.
Possible CRUs/FRUs	None

Diagnostic Resolutions

The diagnostic resolution strategies described in this section are similar to those found in the RAS ticket on the operator panel interface. The diagnostic resolution strategy instructions are available to the library's administrative users.

DR001 - Resolve Picker Cartridge Presence

This DR provides customer resolution steps for **T001** on page 196.

Problem: The library has a tape in the Picker Assembly, but cannot recover without user intervention to remove the tape cartridge.

1 Take all library partitions offline.

2 Open the library main access doors.

3 Rotate the picker assembly by hand, so that the opening faces the drives.

4 Use the gear thumbwheel in the rear of the picker assembly base to manually slide the tape cartridge out of the picker assembly toward the tape drives.

thumbwheel
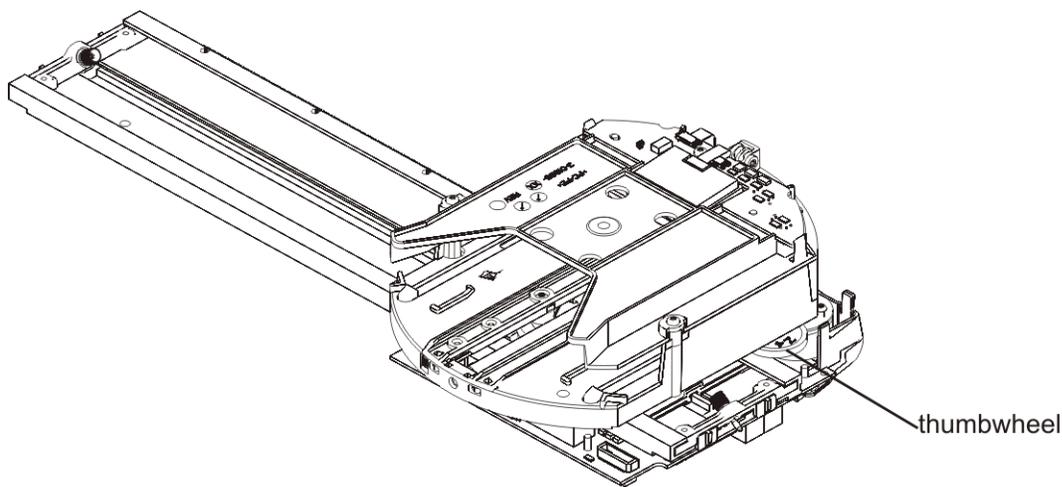
5 Close the library main access doors. Wait for the library to initialize.

6 Import the tape into the appropriate partition.

7 If a tape cartridge was removed, continue operations.

8 If there was no tape cartridge in the picker assembly, it is most likely that the tape presence sensor in the picker assembly is malfunctioning. Contact Service for assistance.

9 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR002 - Resolve Tape Cartridge Recovery

This DR provides customer resolution steps for:

- **T002** on page 197
- **T003** on page 198

Problem: The library robot failed to move a tape cartridge. The tape cartridge must be manually recovered before operations can continue.

1   Open the main access door(s) and find the tape cartridge. The tape may be stranded between the picker assembly and the source or destination of the move.

2   Recover the tape cartridge and inspect it for damage. Damaged tape cartridges can cause failed move media operations.

3   Inspect the source and destination slots for any damage or foreign material that could cause an obstruction. Remove any foreign material from the slot.

4   Close the main access doors and wait for the system to complete initialization.

5   Make sure the partitions are online and continue your normal library operations.

6   Close the ticket and monitor for recurrence of the problem.

7   Admin users can use the **Tools > Diagnostics > Robotics > Get/Put Test** to determine that the robotics are functioning properly or whether the issue repeats. Service users can use the **Service > System > Robotics** test to further verify that the Robotics is functioning properly.

8   If the problem occurs again when initiating the next move operation, or the problem becomes chronic, contact Service for a likely hardware replacement.

9   You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR003 - Resolve Drive Eject Failure

This DR provides customer resolution steps for: **T010** on page 206.

Problem: The library received a request to unload and eject a tape cartridge from a tape drive, but the drive reported an unload failure.

1   View the ticket details to determine which drive failed the unload operation.

2   Consult the user documentation to issue a drive *unload* or *move* command to attempt another drive unload operation.

3   If the requested command succeeds, observe for recurrence of this issue, and contact Service if the issue repeats.

4   If the requested command fails, open the library main access door(s) and press the tape cartridge eject button on the front of the drive to initiate a tape cartridge eject operation. Press and hold the button continuously for 10 seconds. If the tape cartridge is ejected, leave the tape cartridge in the tape drive, close the library access door(s) and continue operation. Observe for recurrence of this issue, and contact Service if the issue repeats.

5   If the drive fails to unload and eject the tape cartridge, contact Service for assistance.

6   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR004 - Resolve Full Destination Element

This DR provides customer resolution steps for **T004** on page 199.

Problem: The library attempted to place a tape cartridge into a tape drive, storage slot, or I/E station slot. The destination location appears to be blocked, or partially blocked. The library successfully returned the tape cartridge to the source or an alternate location.

1   Identify the coordinate provided in the RAS ticket details.

2   Open the library access door(s) and locate the problem location. Inspect it for the presence of an unlabeled cartridge, any foreign object, or other damage that prevented the library robot from placing the tape cartridge into the destination location.

3   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR005 - Resolve Motion Failure

This DR provides customer resolution steps for:

- **T005** on page 200.
- **T006** on page 201.

Problem: The library robot has failed to perform a motion. The detected failure is likely to be a genuine hardware failure.

1   Open the main access door(s) and look for any obvious problems, such as unplugged cables or damage to the picker assembly.

2   Remove any tape cartridges from the picker assembly or the path of robot motion.

3   Inspect any recovered tape cartridges for damage. Damaged tape cartridges can cause failed move media operations.

4   Close the doors and wait for the system to complete initialization.

5   Make sure the partitions are online, and attempt to continue your normal library operations.

6   Close the ticket and monitor for recurrence of the problem.

7   Admin users can use the **Tools > Diagnostics > Robotics > Get/Put Test** to determine that the robotics are functioning properly, or whether the issue repeats. Service Users can use the **Service > System > Robotics** test to further verify that the robotics is functioning properly or continues to fail.

8   If the problem occurs again immediately on the next move, or becomes chronic, contact Service for likely hardware replacement.

9 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR006 - Resolve Unload Timeout

This DR provides customer resolution steps for **.**

Problem: The library received a request to unload and eject a tape cartridge from a tape drive, but the library timed out waiting for a drive response. Although the drive may take up to 20 minutes to complete an unthread and unload/eject operation, in the event of encountering various error recovery scenarios to unthread the tape, the library waits for only up to 5 minutes until the unload operation is timed out and a failure gets reported.

1 Note the RAS ticket details to determine which drive did not complete the unload/eject operation.

2 Wait 5 minutes, then issue a drive *unload* or *move* command to repeat the drive unload operation.

3 If the operation times out again, wait another 10 minutes, then issue a drive *unload* or *move* command to attempt another drive unload operation.

4 If the requested command succeeds, observe for future occurrences, and contact Service if the issue repeats.

5 If the retried commands fail, open the library main access door(s) and use the drive push button on the front of the drive to initiate a tape cartridge eject operation. Press and hold the button continuously for 10 seconds. If the tape cartridge is ejected, leave the cartridge in the tape drive, close the library access door(s), and continue operation. Observe for future occurrences of such issues, and contact Service if the issue repeats.

6 If the drive fails to unload, contact Service for assistance.

7 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR007 - Resolve Barcode Scanner Issue

This DR provides customer resolution steps for:

Problem: The library has failed to scan one of the system barcode labels.

- System Serial Number
- World Wide Name (WWN)
- Drive Identification Label
- Module Serial Number

This problem IS NOT associated with failure to read a tape cartridge barcode label.

1 It is unlikely that users can resolve this problem without technical assistance. Please contact Service.

2 Service personnel should use the **Service > System > Barcode** test to isolate the problem and determine whether the issue is intermittent. Run the test several times, and note the results.

3 If the test passes, the failure is most likely with a particular barcode label.

4 If the test fails, the failure is most likely with the picker assembly FRU that contains the barcode scanner.

5 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR008 - Resolve Stuck I/E Station Interrupt

This DR provides customer resolution steps for **T030** on page 228.

Problem: The library control firmware receives continuous I/E station door state change events. Actual door open and closure state changes can still be detected, and tape cartridge inventory operations will still perform properly, but library performance is affected.

1 Close the RAS ticket and power off the library.

2 Inspect the top and bottom library module terminators for bent or shorted connector pins. Re-attach if no problem is found.

3 If the library consists of multiple modules, inspect all module-to-module cables for bent or shorted connector pins. Re-attach if no problem is found.

4 If a defective connector is found, call Service for part replacement.

5 If no issue is found, power on the library and wait for the library to initialize. Open and close each I/E station door. If the RAS ticket is displayed again, contact Service for replacement CAN bus terminators, module-to-module cables, and an I/E lock assembly.

6 Close the RAS ticket and power off the library. Replace the CAN bus terminators and module-to-module cables.

7 Power on the library and wait for the library to initialize. Open and close each I/E station door. If the RAS ticket is displayed again, close the RAS ticket and power off the library.

8 Replace the I/E lock in the upper-most module with the service replacement.

9 Power on the library and wait for the library to initialize. Open and close each I/E station door. If the RAS ticket is displayed again, close the RAS ticket and power off the library.

10 Re-install the original I/E lock. If another module exists, move the replacement I/E lock to the next module.

11 Repeat steps 9 and 10 for each module.

12 If the problem persists after all parts are swapped, contact Service for module replacement. Replace the CM prior to any EM, no matter which module the T030 is reported against.

13 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR009 - Resolve AC Failure

This DR provides customer resolution steps for **T024** on page 222.

Problem: The facility AC power appears to have failed on a power supply. This can be the result of the facility power actually being off, the power switch on the power supply being turned off, or an actual failure in the power supply. A disconnected module terminator or module-to-module cable with bent or broken pins can also cause this issue.

1 Check the facility AC power, and make sure the power supply is properly seated, and the power switch is on.

2 Inspect all module terminators for any broken or bent pins.

3 If the library consists of multiple modules, inspect all module-to-module cables for any broken or bent pins.

4 Contact Service for assistance.

5 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR010 - Termination and Connectivity Diagnostic

This DR provides customer resolution steps for **T062** on page 258.

Problem: The library requires two terminators to be plugged into two specific ports on the rear of the library in order to automatically detect its configuration. In a multi-module system, these terminators are placed in the expansion modules at the very top and bottom of the vertical stack. In addition, cables must connect all modules together.

1 Are the terminators and all module-to-module cables plugged in properly?

If NO: Power down the library, connect the cables in, and power the library back on. When the library powers up, it should detect the presence of the cables and terminators and properly configure itself.

Select **Continue** before you turn off library power.

2 When you can answer YES in step 1: Place both terminators into the CM to begin isolating the problem. You may back up or proceed with the self test.

- **Self test failed** – Inspect the module connectors and terminators for bent or broken pins. Contact Service to order replacement terminators.

- **Self test passed** – The current library configuration is working properly. Continue to isolate the failure by plugging the terminator into the next upper expansion module and connecting the modules with the module-to-module cable. After the terminators and cables are installed, perform the self test again. If there is no additional upper expansion module, select the **Next** button.

  - **Self test failed** – Inspect the module connectors and module-to-module cables for bent or broken pins. Contact Service to order a replacement cable or expansion module.

  - **Self test passed** – The current library configuration is working properly. Continue to isolate the failure by plugging the terminator into the next lower expansion module and connecting the modules with the module-to-module cable. After the terminator and cables are installed, perform the self test again. If there is no additional lower expansion module, select the **Next** button.

- **Self test failed** – Inspect the module connectors and module-to-module cables for bent or broken pins. Contact service to order replacement cable or expansion module.

- **Self test passed** – Power cycle the library to allow for a final termination and connectivity check.

Select **Continue** before you turn off the library power.

3 The library determined that the problem is corrected. The RAS ticket will be closed.

DR011 - Resolve I/E Station Lock/Unlock Failure

This DR provides customer resolution steps for:

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Problem: An I/E station lock failed to operate properly. It is possible for a user to interfere with lock and unlock operations by trying to open/close an I/E station door while the lock is attempting to engage or disengage.

1 If the user opened or closed the I/E station at the time the problem was reported, close this RAS ticket and retry operations.

2 If there was no user interaction with the I/E station at the time the problem was reported, defective hardware is likely.

3 If the issue re-occurs, contact Service to resolve the problem.

4 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR012 - Resolve Drive TapeAlert 32 - Host Interface

This DR provides customer resolution steps for .

Problem: A tape drive has detected and reported a problem with its host interface connection. This can be caused by a loose or disconnected cable, bad termination, or other FC, SAS, or SCSI communication issues.

1 If the drive is a SCSI drive:

- Check for proper termination.
- Check whether the cable length meets SCSI limits.
- Check host and drive connectors for bent or broken pins.
- Secure host and drive connectors,

2 If the drive is a SAS or Fibre Channel drive:

- Check that cable connections are secure.
- Check for broken or pinched cables.
- Check for cable bend radius being too tight.
- Check that cable connections are clean.

3 Check that all hardware components between the host and drive are communicating correctly.

4   Check that host HBA and components are communicating correctly.

5   If the problem remains unresolved, contact Service.

6   You have three options:

        a. Select **Close** to close the ticket now.

        b. Select **Exit** to leave the ticket open for future troubleshooting.

        c. Select **Back** to return to the Diagnostic Resolution.

DR013 - Resolve Drive Connection Issue

This DR provides resolution steps for **T018** on page 215.

Problem: The library detected that a library control path-enabled tape drive is connected to an FC I/O blade. A library control path enabled tape drive must not be connected to an FC I/O blade.

1   View the ticket details to determine which drive is incorrectly connected.

2   .Determine whether the drive should be enabled as a library control path drive, or whether access to the partition should be configured through the FC I/O blade.

3   If the drive is correctly configured, disconnect the drive from the attached FC I/O blade and connect the drive directly to the FC SAN.

4   If the drive is not configured correctly and is supposed to be connected to the FC I/O blade, consult the user documentation to disable the control paththrough the drive.

5   You have three options:

        a. Select **Close** to close the ticket now.

        b. Select **Exit** to leave the ticket open for future troubleshooting.

        c. Select **Back** to return to the Diagnostic Resolution.

DR014 - Resolve Write-Protected Tape Cartridge

This DR provides resolution steps for **T038** on page 236.

Problem: The host application attempted to write data to a write-protected tape cartridge.

1   Determine whether the tape cartridge should be write-protected or not.

2   If the tape should not be write-protected, export the tape cartridge from the library via the host application and correct the problem by manually changing the write protect switch on the tape cartridge.

3   If the tape cartridge is correctly set as read-only, investigate the host application to determine why a write was attempted.

4   You have three options:

        a. Select **Close** to close the ticket now.

        b. Select **Exit** to leave the ticket open for future troubleshooting.

        c. Select **Back** to return to the Diagnostic Resolution.

DR015 - Resolve Unsupported Tape Format

This DR provides customer resolution steps for **T039** on page 237.

Problem: A tape cartridge with an incorrect format has been loaded into a drive. There are several common scenarios:

- Tape cartridge type not compatible with tape drive generation.

- Firmware update (FUP) tape loaded as data tape.

- FUP tape creation initiated, but tape cartridge is already a FUP tape.

1   If the tape cartridge was loaded to the drive via the library operator interface, export the tape cartridge via the library operator interface.

2   If the tape cartridge was loaded to the drive via a host application, export the tape cartridge using the host application.

3   If the tape cartridge type is not compatible with the tape drive generation, import the proper tape cartridge type and continue with the desired operation.

4   If a FUP tape creation operation was performed, either erase the current FUP tape first before creating a new FUP tape, or insert a different scratch tape for the FUP tape creation process.

5   You have three options:

a.   Select **Close** to close the ticket now.

b.   Select **Exit** to leave the ticket open for future troubleshooting.

c.   Select **Back** to return to the Diagnostic Resolution.

DR016 - Resolve Prevent/Allow Media Removal

This DR provides resolution steps for **T012** on page 208.

Problem: The library has been commanded to perform a tape cartridge move from a drive, but the drive is currently preventing any media removal, due to having received a SCSI Prevent Media Removal command to prevent a tape cartridge removal. The library cannot unload and eject the tape cartridge from the drive until the host application issues a SCSI Allow Media Removal command to allow the drive to unload the tape cartridge.

1   Determine which host application issued the SCSI Prevent/Allow Media Removal command.

2   Use the host application or OS functionality to allow media removal from the drive.

3   You have three options:

a.   Select **Close** to close the ticket now.

b.   Select **Exit** to leave the ticket open for future troubleshooting.

c.   Select **Back** to return to the Diagnostic Resolution.

DR017 - Resolve Corrupted Tape Directory

This DR provides resolution steps for:

- **T043** on page 240

- **T057** on page 253

Problem: The directory on the tape cartridge has been corrupted. No data is lost, but file search performance will be degraded until all data has been read from media. Reading all data from tape will cause the tape directory to get rebuilt.

1   Determine the tape drive location and tape cartridge barcode label information from the ticket details.

2   Use the host application and read all data from the respective tape cartridge to rebuild the corrupted tape directory.

3   You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR018 - Resolve Drive Cleaning Requirement

This DR provides customer resolution steps for:

- **T045** on page 242

- **T046** on page 243

Problem: A tape drive has reported that it requires cleaning. The drive cannot be used for normal operations again until it is successfully cleaned.

There are two cases to consider:

- Library-controlled or host-controlled cleaning is enabled.

- Library-controlled automatic cleaning is disabled.

Case A: Library-controlled or host-controlled cleaning is enabled.

1   Prior to the tape drive requesting cleaning, the cleaning process should have been triggered already when the tape drive recommended cleaning. However, since the tape drive is now requesting to be cleaned, a valid, non-expired cleaning tape may not have been available for library-initiated or host-controlled cleaning. Verify that cleaning tapes are properly configured and not expired.

2   Perform a manually initiated cleaning operation for the tape drive, as documented in the library user guide.

Case B: Library-controlled automatic cleaning is disabled.

1   Since automatic library-initiated tape drive cleaning operations are not enabled, perform a manually initiated drive cleaning operation for the tape drive, as documented in the library user guide. Note that in the case of ticket **T045,** the drive may require multiple drive cleaning operations.

You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR019 - Resolve Open Access Door

This DR provides customer resolution steps for **T060** on page 256.

Problem: A library main access door appears to be open. Either an access door is opened, or module termination is interrupted.

1   Determine whether a main access door was actually opened.

2   Note all resolution steps and close this ticket.

3   If no access door appears to have been opened, check that all module terminators and module-to-module cables are properly connected.

4 If any module terminator or module-to-module cable is not fully connected or secured, power off the library and inspect terminator and cable connectors for broken or shorted pins.

5 If any connector is damaged, contact Service for part replacement; otherwise, connect and secure all module terminators and module-to-module cables.

6 Close all library access doors and/or apply power to the library, allowing the library to initialize and establish its tape cartridge inventory.

7 Verify that the problem is no longer reported.

8 If the ticket is displayed again, contact Service for assistance; otherwise, restart any host application that may have been interrupted.

9 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR020 - Resolve Library Inventory Mismatch

This DR provides customer resolution steps for:

- **T068** on page 266
- **T069** on page 267

Problem: The library has encountered a problem that indicates a mismatch between the library's physical and logical inventory.

1 View the ticket details to determine any source and destination element locations.

2 Open a main access door, and inspect the destination element for tape cartridge presence.

3 If a labeled tape cartridge is present, the robot is not reading that label reliably. Inspect the label, replace if needed, and close the main access door to trigger an inventory of the library.

4 If the source element is empty, close the main access door to trigger an inventory of the library.

5 Wait for the library to initialize, and then restart the host applications to continue operation.

6 If the robot does not inventory the library after the door is closed, contact Service for further assistance.

7 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR021 - Contact Dell Service

The following tickets direct users to this DR:

- **T019** on page 216
- **T072** on page 270
- **T095** on page 296

This ticket requires technical assistance from Dell. Contact Dell Technical Support online at http://support.dell.com.

Please see the Website for a complete list of phone numbers by country.

You may select the **No** button to leave this problem open for future review.

DR022 - Resolve Missing Power Supply

This DR provides customer resolution steps for **T071** on page 269.

Problem: A power supply is detected to be missing in the system. This is most likely caused by an actual removal of a power supply.

1   If you have temporarily removed a power supply from the library, replace it and close this ticket.

2   If you want to permanently remove a power supply, close the ticket and power cycle the library with the power supply removed.

3   If all power supplies are actually present, the ticket details may indicate a failed power supply. Contact Service for possible replacement.

4   You have three options:

      a. Select **Close** to close the ticket now.

      b. Select **Exit** to leave the ticket open for future troubleshooting.

      c. Select **Back** to return to the Diagnostic Resolution.

DR023 - Resolve Missing I/E Station Magazine

This DR provides resolution steps for **T014** on page 211.

Problem: An I/E station has been closed with a cartridge magazine missing. The library can still perform most operations; however any attempt to export a tape cartridge to this I/E location will fail.

1   If the magazine was intentionally removed, the only action required is to close this RAS ticket.

2   If the magazine was removed by mistake, open the I/E station and reinstall the magazine. Close the RAS ticket.

3   If the magazine is actually installed, close the ticket and open and close the I/E station. If the ticket is displayed again, contact Service for assistance.

4   You have three options:

      a. Select **Close** to close the ticket now.

      b. Select **Exit** to leave the ticket open for future troubleshooting.

      c. Select **Back** to return to the Diagnostic Resolution.

DR024 - Resolve Drive TapeAlert 39 – Diagnostics Required

This DR provides resolution steps for **T056** on page 252.

Problem: The tape drive determined that a hardware fault may have occurred that requires further diagnostics.

1   View the ticket details to determine the specific tape cartridge and drive involved in the problem.

2   Check whether ticket **T034 - Drive TapeAlert 4 – Media Error**, is also reported by this drive.

3   If the same drive reports **T034** for the currently loaded tape cartridge, media can no longer be read and/ or written, or performance is severely degraded. Attempt to copy any required data from this tape, and retire the tape from service.

4   If **T034** is not reported, close this ticket and follow the resolution steps for any other tickets that may have been reported by this drive.

5   You have three options:

      a.   Select **Close** to close the ticket now.

      b.   Select **Exit** to leave the ticket open for future troubleshooting.

      c.   Select **Back** to return to the Diagnostic Resolution.

DR025 - Resolve Stuck I/E Station Sensor

This DR provides customer resolution steps for **T144** on page 343.

Problem: The library control firmware detected an invalid I/E station door sensor state. Actual I/E station door closure events may be detected prematurely, resulting in premature I/E station calibration attempts and calibration failures, or may not be detected at all, skipping any calibration and inventory operations.

1   Identify the library module listed in the ticket and open its I/E station door.

2   Close the ticket.

3   Open the main access door to view the I/E Station Lock Assembly of the opened I/E station.

4   Inspect both I/E Station Lock Assembly sensor switches, located in the front and rear of the I/E Station Lock Assembly.

5   Look for obstructions or misalignment causing the rear sensor switch actuator lever to be held down.

6   Open and close the I/E Station Safety Door multiple times to view operation of the front sensor switch.

7   If no issue is found, or if interference was identified and corrected, close the I/E station and main access door and wait for the library to complete initialization.

8   Open and close the I/E station door and verify that the I/E station is being calibrated and scanned.

9   If the I/E station is not being calibrated and inventoried, or the ticket is displayed again, contact Service for further assistance.

10   You have three options:

      a.   Select **Close** to close the ticket now.

      b.   Select **Exit** to leave the ticket open for future troubleshooting.

      c.   Select **Back** to return to the Diagnostic Resolution.

DR026 - Resolve Unsupported Module Configuration

This DR provides customer resolution steps for **T075** on page 273.

Problem: When barcode-scanning the module serial numbers inside the library, the library firmware detected a module configuration that is not supported by the library firmware. The module identification labels are either invalid or not being read correctly.

1   Contact Service to determine if your module configuration is supported.

2   If the module configuration is supported, ensure that the barcode reader is scanning the labels correctly. If the reader is functioning properly, new library firmware may be available that supports your configuration.

3 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR027 - Resolve Unknown Library SN Label

This DR provides resolution steps for **T013** on page 209.

Problem: The robot cannot read one of the module serial number labels, but has already validated that the barcode scanning system is working properly.

There are four likely scenarios:

- Line of sight from the scanner to the module serial number barcode label is blocked by foreign material, such as a media barcode label.

- The module serial number barcode label is damaged, and the barcode scanner cannot read it reliably.

- One or more module terminators or module-to-module cables has bent or broken pins.

- The module terminators or module-to-module cables are not installed in the correct locations, and exclude a module.

1 Power off the library and inspect all module terminators and module-to-module cables for any bent or broken pins. Contact Service to replace any damaged parts.

2 Ensure that the module terminators are connected to the extreme top and bottom connectors of the library, and that the module-to-module cables are connected correctly per the library documentation.

3 Open the main library access doors and look for any damage to the module serial number. Check for obstructions in front of the module serial number barcode labels.

4 If no obvious foreign material is found, the module serial number is damaged, and the EM or CM will need to be replaced. The library is not operational until it can successfully read the barcode label. Close the ticket and close all main access doors to allow the library to initialize again.

5 If the issue re-occurs, contact service for possible CM or EM replacement.

6 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR028 - Resolve Motion Obstruction

This DR provides customer resolution steps for:

- **T007** on page 202
- **T008** on page 203

Problem: The library robot has failed to perform a motion. It appears that the motion has been obstructed by the parking tab, a foreign object, a misplaced tape cartridge, or a misaligned robot.

1 Open the main access door(s) and look for interference by the parking tab, any obvious foreign objects, or tape cartridges obstructing motion.

2 If this is a new installation, check for packing material and robot shipping posts, which are large plastic screws that protrude from the top of the robot. Make sure the Y-rails are secured properly and the robot is moving horizontally level along the Y-rails.

3 Look under the robot to make sure that there is no tape cartridge or other hidden obstruction on the floor of the library.

4 Verify that the robot parking tab is in the un-parked position and not interfering with the robot Y-axis travel.

5 If there appears to be nothing blocking the path of the robot and the ticket details indicate the y-axis, the robot may not be level, such as the rear being higher than the front.

6 If the issue was resolved or no issue was found, close the doors and wait for the system to complete initialization. Make sure the partitions are online; then continue normal library operations.

7 Close the ticket and monitor for recurrence of the problem.

8 Service users can use the **Service > System > Robotics** test to further verify that the robotics is functioning properly.

9 If the problem occurs again, contact Service for a likely hardware replacement or robot re-installation.

10 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR029 - Resolve Drive Sled Communication Loss

This DR provides customer resolution steps for **T021** on page 218.

Problem: The system can no longer communicate with a tape drive sled. There are a few scenarios that can create this problem:

- A user removed a tape drive sled.

- A hardware failure that results in the tape drive appearing to be disconnected.

1 Note the ticket details to identify the drive location.

2 If the drive sled was intentionally removed, close this ticket and continue operation, otherwise follow the steps below

3 Check for **T021 - Drive Sled Communication Failure** tickets posted against other drive sleds in the same module. If other tickets exist, skip to step 7.

4 Close this ticket and remove and reseat the suspect drive sled. Check the thumb screws on the drive sled to make sure they are tight and the drive sled is mounted flush with the library chassis.

5 If this ticket reappears, close it again and move the drive to an empty slot in the same module. If no ticket appears after this, contact Service to replace the module. Otherwise close the ticket and move the drive sled to an empty slot in an adjacent module, if applicable. Then check for ticket recurrence

6 If the ticket is posted yet again, and follows the drive sled, contact Service for a drive replacement and skip all remaining steps. Otherwise replace the drive in the original location.

7 Ensure power is properly being received by the tape drive (green LED on the front of the drive). Check the power supply in the back of the module to verify that it is turned on and plugged in properly. If not, powered up, correct the problem, close all the **T021 - Drive Sled Communication Failure** tickets for the module, and verify that they do not get posted again. If the **T021 - Drive Sled Communication Failure** tickets are not posted, skip all remaining steps.

8 If the tickets do reappear, contact Service for CAN bus terminator and module-to-module cable replacement. Close all **T021 - Drive Sled Communication Failure** tickets and power down the library. Replace the terminators and cables and restart the library.

9 If the tickets continue to reappear contact Service and request a library controller blade (LCB) replacement if no drives are communicating, or a module replacement if drives in the control module are operational, but communication in extension modules is failing. (Replace the CM prior to any EM, no matter of T021 drive location.)

10 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR030 - Resolve Drive Load Failure

This DR provides customer resolution steps for **T009** on page 205.

Problem: The robot was unable to load a tape cartridge into a drive. The robot motion completed normally, but the tape drive did not report that it successfully loaded the tape cartridge. The problem may be caused by defective drive hardware, or a defective picker mechanism.

1 The problem is most likely isolated to the specific tape drive referenced in the ticket details. However, check for the same problem being reported for other tape drives in the system.

2 If this same problem is reported for multiple tape drives, contact Service for a picker assembly replacement.

3 If this problem is isolated to an individual tape drive, contact Service for drive sled replacement.

4 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR031 - Resolve Robot Initialization Failure

This DR provides resolution steps for **T076** on page 274.

Problem: During power-up, or after closing the library main access doors, the robot did not initialize properly. A common cause for this problem is an unplugged cable that leads to the robot assembly or the 5U Library Control Module. Other permanent hardware failures that result in loss of connection to the robot can also be a root cause.

1 Open the library main access doors. This will allow access to the robot and remove power from the robot.

2 Check for any obvious disconnected cables leading to the robot.

3 Remove the drives from the 5U Library Control Module.

4 Check for any loose cable connections on the circuit board behind the lower drive.

5 If any disconnected cables are discovered, plug them in and close all main access doors. The robot automatically attempts to initialize.

6 Power off the library and inspect all terminators and module-to-module cables for bent or broken pins. Contact service to replace any damaged parts.

7 If no problem is found, or the robot continues to fail, contact Service for assistance.

8 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR032 - Resolve Drive Control Path Failure

This DR provides customer resolution steps for **T070** on page 268.

Problem: A library control path through a drive sled has failed. It is likely that a tape drive sled failure is being reported as a separate problem.

It may be possible to reestablish the control path by resetting the drive sled. In libraries with more than one tape drive, you have the option to use an alternate tape drive as the control path if your host connection architecture permits it.

Changing the control path can be a temporary workaround until the original tape drive problem is corrected or the change is applied permanently.

1 Close this ticket and attempt to reestablish the control path by pulling the drive sled out of the library, waiting for the robot to scan the tape drive location, then reinserting the drive sled and securing the thumbscrews.

2 Wait for the tape drive to initialize and become ready.

3 If this ticket reoccurs, continue to Step 4 to switch the control path; otherwise, the problem is resolved and no further action is required.

4 Use the functions on the **Setup > Control Path** menu to switch the control path to an alternate tape drive. See your User's Guide for detailed instructions.Whether you change the control path or not, you may close this RAS ticket.

5 Resolve any other associated tape drive problem tickets.

6 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR033 - Resolve Drive Sled Auto-Level Failure

This DR provides customer resolution steps for **T074** on page 272.

Problem: The library attempted to change the firmware level in a drive sled, but the process failed.

1 Using the tape drive coordinate from the problem **Details** screen, identify the tape drive sled that failed.

2 After you have located the tape drive on the rear of the library, unscrew the thumbscrews and pull the drive sled out of the library completely for at least 30 seconds.

3 Close the ticket, re-insert the drive sled, and tighten the thumbscrews.

4 The library should now attempt to discover and initialize the tape drive again.

5 If this second attempt to auto-level the drive sled firmware level fails, contact Service for assistance.

6 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR034 - Resolve Open Storage I/E Door

This DR provides customer resolution steps for **T073** on page 271.

Problem: This library has an I/E station door that is configured for tape cartridge storage. This door was detected to be open at a time when the library needed it to be closed. The library cannot access these tape cartridge storage locations until this I/E station door is closed and locked by the library.

1 Close all I/E station doors.

2 Observe that the library automatically locks any I/E station door that is configured for storage. Any I/E station that is not configured for storage will normally remain unlocked.

3 If the I/E station does not lock, open the module's I/E station and main access door to view the I/E station's lock assembly.

4 Inspect both I/E station lock assembly sensor switches, located in the front and rear of the I/E station lock assembly.

5 Look for obstructions or misalignment causing the rear sensor switch actuator lever to be held down.

6 Open and close the IE station safety door multiple times to view operation of the front sensor switch.

7 If no issue is found, or if interference was identified and corrected, close the ticket, then close the I/E station and main access door.

8 Observe the library initialization and verify that the I/E station is being locked.

9 If the I/E station is not being locked, or the ticket is displayed again, contact Service for further assistance.

10 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR035 - Resolve Robot Power Interruption

This DR provides customer resolution steps for **T065** on page 263.

Problem: The robot has momentarily pulled too much current. Circuit protection has occurred, and a fuse may have blown, or an internal power supply may have temporarily shut off.

1 Close this ticket.

2 Open a library main access door, wait 10 seconds, and then close the main access door.

3 Observe library initialization.

4 If the robot does not initialize and/or a ticket is displayed again, contact Service for further assistance.

5 You have three options:

     a. Select **Close** to close the ticket now.

     b. Select **Exit** to leave the ticket open for future troubleshooting.

     c. Select **Back** to return to the Diagnostic Resolution.

DR036 - Resolve Partially Open I/E Station

This DR provides resolution steps for **T077** on page 275.

Problem: An I/E station cannot be accessed. Possible causes include:

- An I/E station door may be partially open.

- A control cable to the I/E station is unplugged.

1 If any of the I/E station doors are partially open, close them. Otherwise, open the main access door and look for an unplugged cable on the back of the I/E station lock assembly.

2 Contact Service if problem persists.

3 You have three options:

     a. Select **Close** to close the ticket now.

     b. Select **Exit** to leave the ticket open for future troubleshooting.

     c. Select **Back** to return to the Diagnostic Resolution.

DR037 - Resolve Media Eject

This DR provides customer resolution steps for **T052** on page 249.

Problem: A tape drive has reported a problem that requires the currently loaded tape cartridge to be ejected from the tape drive in order for the tape drive to recover.

1 Note the ticket details to determine the drive location and reason details.

2 If the reason details do not indicate an undetermined root cause of the issue, but actually isolated the problem to the drive or tape cartridge due to saved historical information, consider media or drive replacements to prevent the issue in the future.

3 To recover from the issue, eject the tape cartridge from the drive and export it out of the library.

4 Inspect the tape cartridge and retire the tape cartridge if problems are found:

- Damaged cartridge shell

- Misplaced barcode label or interference by foreign material

- Snapped tape or disconnected leader pin

5 If the tape cartridge appears good, import the media back to the respective partition and retry operations with the tape cartridge.

6 You have three options:

     a. Select **Close** to close the ticket now.

     b. Select **Exit** to leave the ticket open for future troubleshooting.

     c. Select **Back** to return to the Diagnostic Resolution.

DR038 - Resolve Tape Blocker Location

This DR provides customer resolution steps for **T078** on page 276.

Problem: The library detected one or more tape blockers installed in improper magazine slot locations. Tape blockers are not supported in libraries with Model 2 robots and libraries with Model 1 robots support tape blockers only in the very bottom row of storage magazines within the bottom library module.

1   Make note of the slot coordinates provided in the Ticket Details.

2   Take all library partitions offline and open the library main access door(s).

3   Locate all tape blockers per noted coordinates from the Ticket Details.

4   Remove and retain the tape blockers for possible installation in appropriate storage locations.

5   If a Model 1 robot is installed, tape blockers should only be installed in the bottom rows of storage magazines within the bottom library module. If any of these storage magazine slots does not have a tape blocker installed, a tape blocker may be added and inserted.

6   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR039 - Resolve Logical Library Deletion

This DR provides customer resolution steps for **T080** on page 279.

Problem: The system has detected a change in module configuration, such as a new control module serial number or a removed expansion module that will invalidate any existing partitions.

Although a partition may be visible on the user interface, slot and drive associations are incorrect, due to the new module configuration.

1   If the library module configuration was not changed, contact Service for assistance.

2   If the module configuration was changed, consult the user documentation regarding deletion and creation of partitions.

3   Delete all existing partitions, and then recreate new partitions.

4   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR040 - Resolve Incompatible Module Branding

This DR provides customer resolution steps for **T081** on page 281.

Problem: The library has detected a branding mismatch. This is most likely caused by a manufacturing labeling error or a user mixing incompatible parts from multiple library systems. It is also possible that the barcode reader is not scanning the labels correctly.

1   If this problem was reported following a field upgrade, or the replacement of a defective part, it is likely that the new part is not correct or is mislabeled. Contact Service for possible replacement.

2 If this problem occurred following the swapping of a module, control boards, or compact flash cards between libraries, the two libraries have incompatible parts, and the parts should be returned to their original libraries.

3 If neither of these scenarios apply, or the problem remains unresolved, contact Service for assistance.

4 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR041 - Resolve Robot Installation

This DR provides customer resolution steps for **T083** on page 284.

Problem: The library detected a condition that indicatesthe robot assembly has been installed incorrectly. The robot travels on Y-rack gears, located at the front and rear of the library. If the robot is installed into these Y-rails with one end higher or lower than the other, the robot assembly will not be level, and may not function properly.

1 Close the ticket and power off the library.

2 Open the library main access door(s) and verify that the vertical Y-rails in all modules are secured properly, and that the vertical Y-rail columns on the left side are fully settled to the lowest positions.

3 After all Y-rails have been secured, close all main library access doors, power on the library, and observe if the ticket reappears.

4 If the ticket reappears, contact Service for assistance.

5 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR042 - Resolve Missing Cleaning Cartridge

This DR provides customer resolution steps for **T084** on page 285.

Problem: While performing inventory, the library determined that a cleaning cartridge is missing. This cleaning tape was originally imported using the library operator interface specifically for the library to use for cleaning tape drives. This tape cartridge is not managed by any host applications. It is likely that this tape was manually removed while the library was powered off, or when the main access door was opened.

1 View the ticket details to determine the barcode label of the missing cleaning tape and the coordinate where it used to be stored.

2 A valid cleaning cartridge should be imported into the library to allow cleaning operations to function properly.

3 If inspection of the slot shows the tape cartridge to be present, the barcode label is not being read reliably by the library. Replace the barcode label or the tape cartridge.

4 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR043 - Resolve Invalid Cleaning Cartridge

This DR provides customer resolution steps for **T085** on page 286.

Problem: While performing inventory, the library determined that an unknown tape is occupying a cleaning slot. In order for a tape cartridge to be a valid cleaning tape, it must be imported as a cleaning tape via the library operator interface. It is likely that this invalid tape cartridge was manually imported while the library was powered off, or when the main access door was opened.

1   View the ticket details to determine the barcode label of the invalid cleaning tape and the coordinate where it is stored.

2   Open the library main access door(s) and remove this tape cartridge.

3   Import a valid cleaning tape into the library to allow cleaning operations to function properly.

4   You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR044 - Resolve Drive TapeAlert 4 - Media Error

This DR provides customer resolution steps for **T034** on page 232.

Problem: The tape cartridge is suspect due to failing tape operations. Data may be at risk, based on the condition of the tape cartridge. This problem may be caused by:

   •   The specific tape

   •   The specific drive

   •   The interaction of the tape and drive

1   Note the ticket details to determine the drive location and reason details.

2   If the reason details do not indicate an undetermined root cause of the issue, but actually isolated the problem to the drive or tape cartridge due to saved historical information, consider media or drive replacements to prevent the issue in the future.

3   If the noted ticket details list drive error code 7075 or 7076 for a drive, this means that the media does not have an End of Data (EOD) written to tape and data can no longer be written or appended to tape. Either rewrite all existing data on tape and then reformat and reuse the tape cartridge for new write operations.

4   If the drive error code lists error 7122 for a drive, the Format Identification Dataset (FID) is not properly recorded, and data cannot be written to tape. The tape cartridge does not contain data and needs to be discarded/replaced.

5   If the steps above do not apply, check whether ticket T056 - Drive TapeAlert 39 - Diagnostic Required, is also reported by this tape drive. If the same drive reports ticket T056 - Drive TapeAlert 39 - Diagnostic Required for the currently loaded tape cartridge, close this ticket and follow the resolution steps for ticket T056 - Drive TapeAlert 39 - Diagnostic Required.

6   If ticket T056 - Drive TapeAlert 39 - Diagnostic Required is not reported, retry the operation with the same tape cartridge in a different drive, or if a different drive is not available, clean this drive and retry the operation. If the retry attempt fails, copy all required data to a new tape cartridge and discontinue use of the faulty tape cartridge.

7 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR045 - Resolve Drive TapeAlert 1, 5, 6 - Read/Write Problem

This DR provides customer resolution steps for:

- **T035 on page 233**
- **T036 on page 234**
- **T180 on page 352**
- **T187 on page 359**

Problem: A drive reported a read or write problem. While TapeAlert 1 and 2 identify a warning, indicating severe trouble reading or writing, TapeAlert 5 and 6 indicate read or write failures. The problem requires further analysis, as it may be caused by the specific tape cartridge or drive, or interaction of the tape cartridge and drive.

1 Note the ticket details to determine the drive location and reason details.

2 If the reason details do not indicate an undetermined root cause of the issue, but actually isolated the problem to the drive or tape cartridge due to saved historical information, consider media or drive replacements to prevent the issue in the future.

3 If the ticket identifies Drive Tape Alert 5 and the reported drive error code lists error 7122 for a drive, the Format Identification Dataset (FID) is not properly recorded and data cannot be written to tape. The tape cartridge does not contain data and needs to be discarded and replaced.

4 If step 3 does not apply, check whether ticket T034 - Drive TapeAlert 4 – Media Error has also been reported for this tape cartridge.

    a. If T034 - Drive TapeAlert 4 – Media Error has been reported:

      • Attempt to copy all required data to another tape cartridge.

      • Discontinue use and discard the faulty tape cartridge.

      • Restart the current operation with the new tape cartridge.

    b. If T034 - Drive TapeAlert 4 – Media Error has not been reported:

      • Collect a tape drive log.

      • Retry the operation with the same tape cartridge in a different drive.

      • If the operation continues to cause this failure in more than one drive, copy all required data to a new tape cartridge and discontinue use of the defective media.

      • If the tape cartridge is read fine in other drives, use a known good tape cartridge to test the drive by performing read/write operations from a host application or utility.

      • If the problem is also reported for the known good tape cartridge, perform a drive cleaning operation, then re-test the drive.

5 If the problem is not resolved, contact Service for assistance in analyzing the drive log, as well as assistance regarding a possible tape drive firmware update.

6 You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR046 - Resolve Drive TapeAlert 8 - Suspect Data Grade Tape

This DR provides customer resolution steps for **T037** on page 235.

Problem: A tape drive has determined that a tape cartridge is not data grade, and therefore data should not be written to it. There can be several possible causes of this problem. Not all of the causes are a genuine bad tape, but in some cases, a tape cartridge should be retired.

1 Attempting invalid operations with a cleaning tape may cause this problem. If the tape cartridge is a cleaning tape, remove it from the host application inventory of valid data tape cartridges.

2 If the tape cartridge is brand new, the tape cartridge may not have been formatted by the tape cartridge manufacturer. The drive will automatically attempt to format the tape cartridge. If successful, all other operations to the tape cartridge will continue without incident, and this problem can be closed.

3 The LTO tape memory chip may be corrupted. Using host application utilities, force a read of the entire tape. When the tape cartridge is unloaded, the drive should repair the memory chip corruption. Monitor this tape cartridge for recurrence of a TapeAlert 8. Retire this tape cartridge if the problem occurs again.

4 You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR047 - Resolve Drive TapeAlert 15 - Cartridge Memory Failure

This DR provides customer resolution steps for **T040** on page 238.

Problem: A tape drive has determined that the memory in cassette (MIC) has failed. This will reduce performance. The tape memory may be repairable.

1 Attempt to repair the tape cartridge memory by using host backup application utilities to read the entire tape. When the tape cartridge is unloaded, the drive may be able to repair the tape cartridge memory.

2 To verify that the tape cartridge memory is repaired, attempt to use the tape again for normal read/write operations. If this tape cartridge fails again, retire the tape cartridge.

3 You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR048 - Resolve Drive TapeAlert 16 - Forced Eject

This DR provides customer resolution steps for **T041** on page 239.

Problem: A tape cartridge was manually ejected from a drive while it was actively reading or writing. This typically occurs when a user is servicing the drive and has not stopped all host operations to the drive.

1   Reload the tape cartridge back into the drive.

2   Restart the failed host application.

3   You have three options:

      a.   Select **Close** to close the ticket now.

      b.   Select **Exit** to leave the ticket open for future troubleshooting.

      c.   Select **Back** to return to the Diagnostic Resolution.

DR049 - Resolve Drive TapeAlert 30, 31 - Drive Hardware Error

This DR provides customer resolution steps for:

- **[T049](#) on page 246**
- **[T050](#) on page 247**

Problem: The tape drive has detected an internal hardware error that requires a power cycle of the tape drive to recover.

1   Note the drive sled coordinates from the ticket details.

2   Collect a tape drive log for the noted tap drive via the Web client **Tools > Drive Operations** menu selection.

3   Contact Service for assistance in obtaining an e-mail address to which to send the tape drive log, as well as assistance regarding a possible tape drive firmware update.

4   If the drive reported TapeAlert 30 and a tape cartridge is still mounted in the drive, attempt a drive unload operation. (Continue to the next step, even if the unload operation fails.)

5   Consult the user documentation regarding a drive reset operation or drive removal and replacement procedure. Then, either perform a drive reset operation via the **Tools > Diagnostics** menu selection, or remove and reinsert the drive sled as follows:

      a.   From the remote user interface **Operations > Drive > Change Mode** menu selection, take the drive offline.

      b.   After the drive is offline, the blue LED on the rear of the drive sled turns solid blue. At this point, remove the drive sled from the library.

      c.   Wait 1 minute, then re-insert and secure the drive sled. Wait for the drive sled to display its operational LED states:

           •   Green LED blinks once per second

           •   Amber LED is off

      d.   Using the remote interface, take the drive online with the **Operations > Drive > Change Mode** menu selection.

6   Continue operations and monitor for recurrence of the issue. Contact Service if the issue persists or repeats.

7   You have three options:

      a.   Select **Close** to close the ticket now.

      b.   Select **Exit** to leave the ticket open for future troubleshooting.

      c.   Select **Back** to return to the Diagnostic Resolution.

DR050 - Resolve Invalid Tape Location]

This DR provides customer resolution steps for **T086** on page 287.

Problem: While performing an inventory, the library determined that a tape cartridge is located in an invalid location. In any library that is 23U or taller, the two top slots in storage columns 4 and 5 cannot be accessed by the robot and therefore cannot be used for tape cartridge storage. It is likely that this tape was placed into the slot manually by a user. The library will not place tape cartridges into these slots based on host or user commands.

1 Determine the barcode label of the tape cartridge from the ticket details.

2 Open the library main access door(s) and remove this tape cartridge. As you face the library, columns 4 and 5 are on the right side of the library. The very top slots of these columns cannot be used for tape cartridges.

3 Close the main access door(s) and resume operations.

4 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR051 - Resolve Library SN Label Detection

This DR provides customer resolution steps for **T087** on page 288.

Problem: The library cannot read one of the module serial number labels, but has already validated that the barcode scanning system is working properly.

There are two likely scenarios:

    • The line of sight from the scanner to the module serial number barcode label is blocked by foreign material, such as a media barcode label.

    • The module serial number barcode label is damaged, and the barcode scanner cannot read it reliably.

1 Open the main library doors and look for any obstructions in front of the module serial number barcode labels.

2 If no obvious foreign material is found, the module serial number is damaged, and the EM or CM will need to be replaced. The library is still operational, but correction should be scheduled as soon as possible.

3 Contact Service for possible CM or EM replacement.

4 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR052 - Resolve Library Service Tag Detection

This DR provides customer resolution steps for **T088** on page 289.

Problem: The library cannot read the module service tag, but has already validated that the barcode scanning system is working properly.

There are two likely scenarios:

- Line of sight from the scanner to the module service tag barcode label is blocked by foreign material, such as a media barcode label.
- The module service tag barcode label is damaged and the barcode scanner cannot read it reliably.

1 Open the main library doors and look for any obstructions in front of the module service tag barcode labels.

2 If no obvious foreign material is found, the module service tag is damaged and the EM or CM will need to be replaced. The library is still operational, but a correction should be scheduled as soon as possible.

3 Contact Service for possible CM or EM replacement.

4 You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR053 - Resolve Network Configuration Issue

This DR provides customer resolution steps for

Problem: The library has attempted to send an e-mail to the specified address, but has encountered an error with the network configuration.

1 Check the e-mail and mail server settings on the library to ensure that all values are correct.

2 If the settings are correct, check to make sure the library is properly connected to the network, and make sure the network cable is not damaged.

3 If there are no problems found, contact your network administrator for assistance.

4 You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR054 - Resolve Open Drive Bay

This DR provides customer resolution steps for

Problem: The library has detected that a drive bay has been opened in the rear of the library, and a cover plate has not been installed. For safety reasons, the robot will run at a slower speed until a drive sled or a drive cover plate is installed.

1 If a drive sled removal or drive bay cover plate removal was intentional, reinstall a drive sled or install a drive bay cover plate to resolve this issue. The robot will again move at full speed.

2 If a drive sled removal or drive bay cover plate removal was not intentional, check the back of the library for any unsecured drive sleds and loose, missing, or damaged drive bay cover plates.

3 Secure all drive sleds and drive cover plates. Contact Service if any drive cover plates are damaged or missing, or drive sleds or cover plates cannot be secured.

4 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR056 - Resolve Module Communication

This DR provides customer resolution steps for **T096** on page 297.

Problem: The library has encountered an error when trying to communicate with its modules.

1 Turn off the library.

2 Remove both the top and bottom terminators and carefully inspect them for bent pins. If any are found, contact Service for replacement.

3 Remove all module-to-module connectors and carefully inspect them for bent pins. If any are found, contact Service for replacements.

4 If no bent pins are found on any of these parts, contact Service for further assistance.

5 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR057 - Resolve Noisy Fibre Channel Link

This DR provides customer resolution steps for **T097** on page 298.

Problem: The FC I/O blade has detected excessive noise on a specific Fibre Channel port. This includes, but is not limited to, abnormal communication retries and data errors.

1 Ensure that the fiber cables are properly connected to both the host and the FC I/O blade.

2 Check the fiber cable for any damage or debris in the connectors.

3 Reset the port on the FC I/O blade via the local or remote user interface.

4 If the problem still persists, contact Service for further assistance in resolving the issue.

5 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR058 - Resolve Data Path Failure

This DR provides customer resolution steps for **T098** on page 299.

Problem: The FC I/O blade has detected a communication error with the target drive. The drive does not respond to commands and may no longer be connected.

1 Ensure that the fiber cables are properly connected to both the FC I/O blade and the drive.

2 Check the fiber cable for any damage or debris in the connectors.

3 Reset the port on the FC I/O blade via the local or remote user interface.

4   If the problem still persists, contact Service for further assistance in resolving the issue.

5   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR059 - Resolve FC I/O Blade Memory Error

This DR provides customer resolution steps for **T099** on page 300.

Problem: A problem with onboard FC I/O blade memory has been detected.

1   Check that the FC I/O blade is installed properly. It should not be loose, and it should be powered up.

2   If it is not installed properly, remove and reinsert the FC I/O blade.

3   If the problem still persists, contact Service for further assistance in resolving the issue.

4   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR060 - Resolve FC I/O Blade Watchdog Reboot

This DR provides customer resolution steps for **T100** on page 301.

Problem: The FC I/O blade firmware encountered a problem that caused it to reboot unexpectedly.

1   Check that the FC I/O blade is installed properly. It should not be loose, and it should be powered up.

2   If not installed properly, remove and reinsert the FC I/O blade.

3   If the problem still persists, contact Service for further assistance in resolving the issue.

4   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR061 - Resolve FC I/O Blade Host Check

This DR provides customer resolution steps for **T101** on page 302.

Problem: The FC I/O blade has detected that its connection with a host has failed.

1   Ensure that the host is turned on and is running correctly.

2   Ensure that the fiber cables are properly connected to both the host and the FC I/O blade.

3   Check the fiber cable for any damage or debris in the connectors.

4   Reset the port on the FC I/O blade via the local or remote user interface.

5   If the problem still persists, contact Service for further assistance in resolving the issue.

6   You have three options:

     a. Select **Close** to close the ticket now.

     b. Select **Exit** to leave the ticket open for future troubleshooting.

     c. Select **Back** to return to the Diagnostic Resolution.

DR062 - Resolve Host Port Failover

This DR provides customer resolution steps for **T102** on page 303.

Problem: The FC I/O blade has detected that its active link has failed, and has switched to a secondary link on another port.

1   Check to see that the fiber cables connecting the host with the FC I/O blade are intact and properly connected at both ends.

2   Remove and reinsert the fiber cable on both ends to verify proper insertion.

3   Examine the fiber cable for breaks or cuts.

4   Examine cable ends for breakage or dirt, and reconnect.

5   If the connections look good, go to **Setup > I/O Blade > Host Port Failover**. Select the FC I/O blade that reported the problem, based on the FC I/O blade location listed in the ticket details.

6   Check if port connections are still "Offline," indicating a connection failure.

7   If all ports are "Online," check to see if the ports require user intervention.

8   If user intervention is required, select the **Enable** button to allow the port to be available for future failovers.

9   Continue to monitor for an intermittent problem in the SAN. After the connection is repaired, the port goes to a disabled (user intervention required) state.

10 If a port is still failed ("Offline"), check if the SAN hardware or software was reconfigured or rebooted just prior to the ticket display. The library could have detected that the configuration change interrupted the connectivity with the library, either permanently or temporarily.

11 Verify that the reconfiguration or reboot was done correctly.

12 If a port is still failed ("Offline"), verify the following host side issues:

     a. Verify that the host is operational.

     b. Verify that the HBAs are operating correctly.

     c. If the host hardware and software seem to operate normally and an intermediate device such as a switch or router is installed in the SAN, verify that the switch or router is operating correctly.

     d. Verify any zoning configurations to make sure the connection is set up properly.

13 If the library continues to report a problem after cable issues and host-side issues have been corrected and resolved, call Service for further assistance.

14 You have three options:

     a. Select **Close** to close the ticket now.

     b. Select **Exit** to leave the ticket open for future troubleshooting.

     c. Select **Back** to return to the Diagnostic Resolution.

DR063 - Resolve FC I/O Blade Connection Failure

This DR provides customer resolution steps for **T103** on page 304.

Problem: The LCB detected an Ethernet connection failure with the FC I/O blade.

1 Note the ticket details, to determine FC I/O blade location and failure reason.

2 If a CAN and Ethernet connection failure is detected, ensure that the FC I/O blade is installed properly, fully latched, secured, and powered on.

3 If the FC I/O blade has been removed from the library, select **Setup > FC I/O Blades > FC I/O Blade Control > Remove** to exclude the FC I/O blade from library-initiated health check monitoring.

4 If only an Ethernet connectivity issue is reported, ensure that the Ethernet cable is properly connected to both the appropriate port in the 9U Expansion Module that contains the FC I/O blade, and to one of the 4 ports on the library control blade. Inspect the Ethernet cable for any damage, and disconnect and reconnect as needed.

5 If the problem still persists, contact Service for further assistance.

6 You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR064 - Resolve FC I/O Blade CAN Failure

This DR provides customer resolution steps for **T104** on page 305.

Problem: The LCB has lost its CAN connection with the FC I/O blade.

1 Check that the FC I/O blade is installed properly. It should not be loose, and it should be powered up.

2 Ensure that both module terminators are properly installed in the rear of the library.

3 Check the module terminators for any bent pins or other damage.

4 If the problem still persists, contact Service for further assistance.

5 You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR065 - Resolve FC I/O Blade Temperature Alert

This DR provides customer resolution steps for **T105** on page 306.

Problem: A Fibre Channel I/O blade temperature exceeded the operating temperature limit.

1 Check the temperature of the room in which the library is installed. Ensure that it is below 32 ºC (89.6 ºF).

2 Ensure that there are no open tickets indicating a problem with the FC I/O blade fan. If so, resolve that ticket first, as a temperature alert can be caused by a faulty fan.

3 Otherwise, contact Service for further assistance in resolving the issue.

4 You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR066 - Resolve FC I/O Blade Fan Alert

This DR provides customer resolution steps for **T106** on page 307.

Problem: The FC I/O blade has detected a problem with its fan blade fan speed.

1 Ensure that the fan blade is properly installed.

2 If no problem is found, contact Service for further assistance in resolving the issue.

3 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR067 - Resolve FC I/O Blade Auto-Level Failure

This DR provides customer resolution steps for **T107** on page 308.

Problem: The FC I/O blade failed to auto-level its firmware image.

1 Check that the FC I/O blade is installed properly. Make sure it is fully inserted and powered up, as indicated by the green LED on the back of the FC I/O blade.

2 If no issue is found, close the ticket and reload the library firmware image.

3 If the problem persists, contact Service for further assistance in resolving the issue.

4 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR068 - Resolve Incompatible Drive Brand

This DR provides customer resolution steps for **T108** on page 309.

Problem: The installed drive sled reports a drive sled brand that is not compatible with the library brand. The drive sled appears to be programmed for a different library product.

1 View the ticket details to determine the drive location of the compatible drive sled.

2 Remove the incompatible drive sled from the library.

3 Determine how an incorrect drive sled brand could have been obtained, and then either obtain and install a drive sled that is compatible with the library brand, or contact Service for assistance.

4 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR069 - Resolve Tape Drive Firmware Update Failure

This DR provides customer resolution steps for **T109** on page 310.

Problem: An attempt to update the firmware of a drive was not successful.

1. Verify that the drive firmware version being used for the upgrade is different from the version that the drive is currently using. If not, close this ticket and retry the upgrade with the correct drive firmware version.

2. If the upgrade is being performed via a firmware upgrade tape, ensure that the tape cartridge contains the correct firmware for the type and generation of the drive being updated. Also, check that the firmware upgrade tape data is not corrupted. If so, close this ticket and upgrade again with the correct firmware upgrade tape.

3. If the update was not performed using a firmware upgrade tape, ensure that the file containing the drive firmware image is not corrupt or incomplete. If so, close this ticket and upgrade again with the correct file.

4. If none of these conditions applies, close this RAS ticket and attempt the upgrade a second time.

5. If this ticket reappears after retrying the upgrade, contact Service for further assistance in resolving this issue.

6. Choose one of the following options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR071 - Resolve FC I/O Blade Product Mismatch

This DR provides customer resolution steps for **T111** on page 311.

Problem: An installed FC I/O blade has a product designation that does not match the product designation of the library.

1. Remove or replace the FC I/O blade with an FC I/O blade with the correct product designation.

2. The library will continue to monitor the location where the FC I/O blade was removed. If another FC I/O blade is not added, stop the monitoring by removing the FC I/O blade, using **Setup > FC I/O Blades > FC I/O Blade Control > Remove**, and then replace the FC I/O blade cover plate.

3. Contact Service for assistance with resolving this issue.

4. You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR072 - Resolve Tape Drive Auto-Level Failure

This DR provides customer resolution steps for **T112** on page 312.

Problem: The automatic update of tape drive firmware failed. The code image stored on the library appears to be invalid.

1. Download a new tape drive firmware image through the remote UI.

2. Close this ticket, and either reboot the library so that the tape drive upgrade is performed again upon initialization, or remove and reinsert the drive sled.

3. If this ticket reappears, contact Service for further assistance.

4   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR073 - Resolve FC I/O Blade Voltage Alarm

This DR provides customer resolution steps for **T113** on page 313.

Problem: An FC I/O blade has detected a voltage problem that has exceeded normal operating limits.

1   Check the ticket details for the location of the FC I/O Blade.

2   Close this ticket, and monitor for recurrence.

3   Check whether other power-related tickets have been generated:

    a.   If there are other active tickets that alert of a voltage problem with library components, the problem lies with the power supply to the library. Contact Service for assistance with a possible Power Supply replacement.

    b.   If there are no other tickets alerting of voltage problems, the problem lies with the FC I/O Blade itself. If the issue is affecting operation and is recurring, contact Service for assistance with a possible FC I/O Blade replacement.

4   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR074 - Resolve Unassigned Inaccessible Tape Cartridge

This DR provides customer resolution steps for **T114** on page 314.

Problem: At least one tape cartridge has been detected in a slot that is not assigned to any partition, and is therefore not accessible by any host application.

1   Display the library configuration by selecting **Reports > Library Configuration**.

2   Make note of the location of any tape cartridges present in slots that are not assigned to a partition.

3   Open the main library door and manually remove these tape cartridges. If desired, import them back into the library.

4   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR075 - Resolve Installation & Verification Test Warning

This DR provides customer resolution steps for **T115** on page 315.

Problem: The Installation & Verification Test returned a result indicating that one of the tests was not successful. The library is still functional and can be used normally; however, this may be an indication of a developing problem.

1. Review the ticket details and the Installation & Verification Test logs to determine which library component failed.

2. Check if any new tickets have been generated against this component. If so, contact Service for further assistance in resolving this issue.

3. Monitor the library for any further problems with this component. If no further tickets are generated, the library can continue to be used normally.

4. You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR076 - Resolve Get Failure

This DR provides customer resolution steps for

Problem: The library robot has failed during a move media, while trying to get a tape cartridge. Operations can continue, but the tape cartridge should be manually removed.

1. Open the library main access door and inspect the picker assembly for damaged fingers or any other obstruction. If found, remove the obstruction, or contact Service for picker assembly replacement.

2. View the ticket details for the tape cartridge location. Inspect the tape cartridge and slot for any damage that may cause the tape cartridge to get stuck in the slot. If the tape cartridge is damaged, replace the tape cartridge with a good one. If the slot is somehow damaged, contact Service for replacement.

3. If the tape cartridge is located in a drive, inspect the drive for any damage that would prevent tape cartridge ejection. If found, contact Service for drive replacement.

4. You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR077 - Resolve Invalid Cleaning Tape

This DR provides customer resolution steps for

Problem: The library detected that a non-cleaning tape was used to clean a drive.

1. Using the barcode listed in the ticket details, locate the tape cartridge in the library.

2. If the tape cartridge is configured for automatic library-initiated cleaning operations, consult your user guide to export a cleaning tape from the library and import a valid cleaning cartridge for future use.

3. If the cleaning tape was configured for application use, consult your user's guide to export the tape cartridge and import a valid cleaning tape for future use.

4. If a manual drive cleaning was performed, replace the tape cartridge with a valid cleaning tape and repeat the drive cleaning operation.

5. You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR078 - Resolve Tape Load/Unload Failure

This DR provides customer resolution steps for:

- **T061** on page 257
- **T091** on page 293

Problem: A tape drive did not load or unload a tape cartridge correctly. Library recovery attempts were not successful, and user intervention is required.

1   Note the ticket details to determine the drive location and reason details.

2   If the reason details do not indicate an undetermined root cause of the issue, but actually isolated the problem to the drive or tape cartridge due to saved historical information, consider media or drive replacements to prevent the issue in the future.

3   To recover from the load or unload failure, attempt to unload the tape cartridge from the drive via the remote or local user interface.

4   If the unload fails, open the library main access door closest to the drive and use the push button on the front of the drive to trigger an unload operation. Press and hold the button continuously for 10 seconds.

5   If the tape cartridge is ejected, retrieve it and inspect it for any damage. If tape cartridge defects are found, discontinue use of the tape cartridge; otherwise import the media back to the respective partition.

6   If the tape cartridge is not ejected, contact Service for further assistance in resolving this issue.

7   You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR079 - Resolve Key Server Request Issue

This DR provides customer resolution steps for:

- **T026** on page 224
- **T027** on page 225
- **T028** on page 226

Problem: The library is not able to successfully communicate with its connected EKM servers. This does not indicate a problem with the library, but rather indicates a network issue or EKM server configuration, setup, or functionality issue.

1   Note the ticket details to determine whether the issue is related to EKM server communication or to the EKM configuration.

2   If the issue is an EKM server configuration problem, a separate ticket has been generated and requires resolution. Close this ticket and resolve the respective EKM server communication ticket(s).

3   If the issue is a communication problem, perform the following steps:

a. Ensure that the library is properly connected to the network, and that the network cable is not damaged.

b. Ensure that the library's IP address settings are correct, and that the key server IP and port configuration are configured appropriately.

c. Verify that the key server is powered on, operational, and properly connected to the network.

d. Ensure that the key server's IP and port configuration are set properly and responding.

e. If no problems are found with any of these items, there is a configuration problem with your network. Contact your network administrator for assistance with troubleshooting this issue.

4 If the issue cannot be resolved, contact Service for further assistance.

5 You have three options:

a. Select **Close** to close the ticket now.

b. Select **Exit** to leave the ticket open for future troubleshooting.

c. Select **Back** to return to the Diagnostic Resolution.

DR081 - Resolve AutoClean Failure

This DR provides customer resolution steps for **T093** on page 294.

Problem: The library's automatic drive cleaning process encountered an error and did not clean a drive.

1 View the ticket details to determine the drive and/or cleaning tape location and failure reason.

2 If the failure reason indicates that the configured cleaning tapes are expired or invalid, consult the user documentation to export and import cleaning media via the **Operations > Cleaning Media** menu selection to configure valid cleaning tapes for continuous, uninterrupted automatic cleaning operations.

3 If the failure reason does not indicate expired or invalid cleaning tapes:

a. Check and resolve other unopened tickets.

b. View the **Reports > Library Configuration** report to locate all configured cleaning slots and validate proper cleaning tape presence.

c. Make sure cleaning media was not manually placed, but has been properly imported via the **Operations > Cleaning Media** menu.

d. Open the main library door(s), if needed, and inspect the configured cleaning slots to verify that all tape cartridges occupying the cleaning slots are valid cleaning tapes.

4 Select the **Tools > Drive Operations** menu selection to perform a manual drive cleaning operation of the drive requesting cleaning.

5 You have three options:

a. Select **Close** to close the ticket now.

b. Select **Exit** to leave the ticket open for future troubleshooting.

c. Select **Back** to return to the Diagnostic Resolution.

DR082 - Resolve Library Calibration Failure

This DR provides customer resolution steps for:

- **T019** on page 216
- **T020** on page 217

Problem: The library encountered a problem during calibration. This ticket can be caused by a blocked or obscured line of sight of the calibration sensor, or a damaged white calibration target. This ticket may also be caused by a brightly colored tape cartridge located in a slot immediately above a white I/E station calibration target.

1   Note the ticket details to determine the library module, as well as any I/E or storage column, or drive location; then close the ticket.

2   If the ticket details identified a module's I/E station column, perform the following steps:

    a. Ensure that the I/E station in the identified module was firmly closed, to allow proper calibration.

    b. If it was properly closed, open the I/E station and inspect the white I/E station calibration target(s) for any damage, such as scratches in the white calibration target square.

    c. If no damage is found, inspect the slot above the I/E station calibration target(s) for a brightly colored tape cartridge (such as yellow or orange), and if such brightly colored tape cartridge is present, ignore this ticket and continue.

3   If the ticket details identified a storage location, perform the following steps:

    a. Open the module's access door identified in the ticket details; locate all white calibration targets of the identified storage column, and inspect them for any damage.

    b. If no damage is found, open the bottom module's main access door; gently move the picker assembly toward the door opening, and rotate it gently as far clockwise as possible.

    c. Open and fully extend the bottom I/E station door, then reach through the main access door and locate the picker assembly's recessed calibration sensor in the picker base, just slightly to the right of the picker's center line. Gently wipe the surface of the calibration sensor, using a soft, lint-free cloth.

    Note to Service: The picture below shows the location of the calibration sensor. If you are guiding a customer by phone, you may want to copy the picture and e-mail it to them.
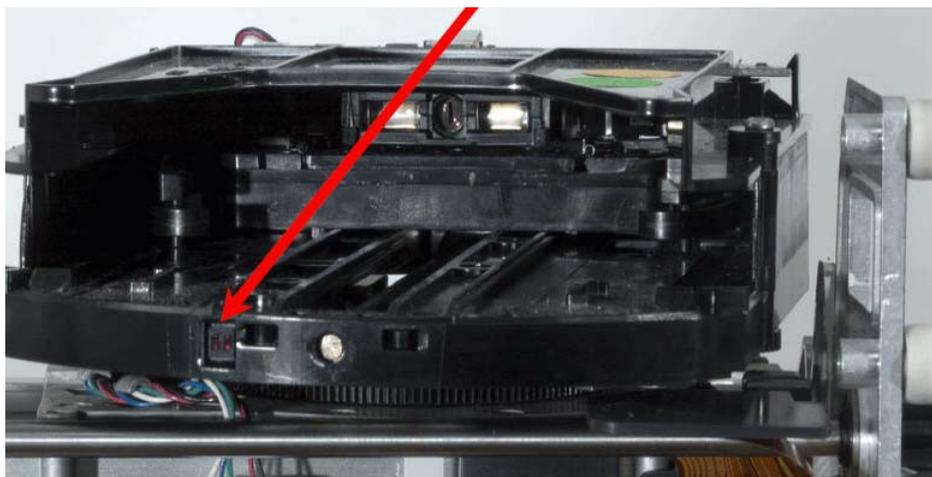
4   If the ticket details identify a drive sled, remove the identified drive and inspect the drive's calibration bracket's horizontal white stripe for any damage.

5   If inspections identified any damage, contact Service for part replacement; otherwise, close all doors and retry the initialization sequence.

6   You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR083 - Resolve Drive Voltage Problem

This DR provides customer resolution steps for **T055** on page 251.

Problem: A tape drive detected a voltage problem. This problem may occur when another drive is being activated.

1   Close this ticket, then remove and reinsert the drive sled to clear the fault.

2   If this ticket reoccurs, ensure that the facility AC power cable is secured to the power supplies. Ensure that no fault condition is indicated on the power supplies' LEDs. If a fault is present, contact Service for possible power supply replacement.

3   If no power supply faults are indicated, and this ticket has reoccurred against the same drive, contact Service for possible drive sled replacement.

4   You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR084 - Resolve Robotics Firmware Image Error

This DR provides customer resolution steps for **T116** on page 316.

Problem: The normal robotics firmware auto-level process was not attempted. This problem is caused by a missing or corrupt robotics firmware image file.

1   Close this ticket, and then perform a library firmware upgrade to the current firmware revision.

2   If this ticket reoccurs following the library firmware upgrade operation, contact Service for additional help with resolving this issue.

3   You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR085 - Resolve Robotics Auto-Level Failure

This DR provides customer resolution steps for **T117** on page 317.

Problem: The normal robotics firmware auto-leveling process did not complete successfully. This problem may be caused by one of the following:

- A robotics flash image failed validation by the robot controller firmware.

- A flash programming error occurred on the robot controller board.

- An error occurred when updating the picker assembly's scanner firmware.

1   View the ticket details and note which firmware image failed.

2   Close this ticket.

3   Retry the auto-level process by re-initializing the robot (open and close the main access door).

4   If this ticket reoccurs, view the ticket details and:

    a.   If "Robot" firmware is identified, contact Service for a robot controller board replacement.

    b.   If "Scanner" firmware is identified, contact Service for a picker assembly replacement.

5   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR086 - Resolve Robotics Degraded Flash Warning

This DR provides customer resolution steps for **T118** on page 318.

Problem: One of the robot controller board's flash partitions could not be updated, but since one of the two flash partitions is properly functioning, auto-leveling can still occur, and the robotics subsystem can go ready.

Flash is in a degraded mode, since the backup image is unavailable. Contact Service as soon as possible.

1   Call Service for robot controller board replacement.

2   Close this ticket and monitor for recurrence.

3   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR088 - Resolve Robotics Y-Axis Motion Failure

This DR provides customer resolution steps for:

- **T120 on page 319**
- **T121 on page 320**

Problem: The library robot has failed to perform a motion in the y-axis. The detected failure is likely to be a genuine hardware failure.

1   Open the main access door(s) and look for any obvious problems, such as damage to the robot assembly, or tape cartridges and debris that may have collected on the floor of the library.

2   Reposition any tape cartridges found extending from storage locations.

3   Remove any tape cartridges found in the picker assembly.

4   Inspect any recovered tape cartridges for damage.

5   Close this ticket.

6   Close the doors, and wait for the system to complete initialization.

7   Make sure the logical libraries are online and continue normal library operations. Monitor for recurrence of the problem.

8   Admin users can use the **Tools > Diagnostics > Robotics > Get/Put Test** to determine that the robot is functioning properly or whether the issue repeats. Service users can use the **Service > System > Robotics** test to further verify that the robotics is functioning properly.

9   If the problem occurs again immediately on the next move. or becomes chronic, contact Service for Y-carriage assembly or Robot Controller Board hardware replacement.

10   You have three options:

   a.   Select **Close** to close the ticket now.

   b.   Select **Exit** to leave the ticket open for future troubleshooting.

   c.   Select **Back** to return to the Diagnostic Resolution.

DR089 - Resolve X, Z, Theta Axis Motion Failure

This DR provides customer resolution steps for:

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   •

Problem: The library robot has failed to perform a motion in the x, z, or theta axis. The detected failure is likely to be a genuine hardware failure.

1   Open the main access door(s) and look for any obvious problems, such as damage to the robot assembly, binding of the picker assembly, or tape cartridges and debris that may have collected on the floor of the library.

2   Reseat any tape cartridges found extending from storage locations.

3   Remove any tape cartridges found in the picker assembly, and inspect for damage.

4   Close this ticket.

5   Close the doors and wait for the system to complete initialization.

6   Make sure the partitions are online and continue normal library operations. Monitor for recurrence of the problem.

7   Admin users can use the **Tools > Diagnostics > Robotics > Get/Put Test** to determine whether the robot is functioning properly or whether the issue repeats. Service Users can use the **Service > System > Robotics** test to further verify that the robot is functioning properly.

8   If the problem reoccurs or becomes chronic, contact Service for a replacement of the robot controller board or picker assembly.

9   You have three options:

   a.   Select **Close** to close the ticket now.

   b.   Select **Exit** to leave the ticket open for future troubleshooting.

   c.   Select **Back** to return to the Diagnostic Resolution.

DR090 - Resolve Robotics Hardware Error - RCB

This DR provides customer resolution steps for .

Problem: The robotics firmware has reported a specific hardware error identifying the Robot Controller Board as the failed component. This problem may be caused by an electrical hardware failure.

1   Close this ticket and re-initialize robotic motion by opening and closing the main access door(s).

2   If this ticket reoccurs after the robot re-initializes, contact Service for a replacement of the robot controller board.

3   You have three options:

      a. Select **Close** to close the ticket now.

      b. Select **Exit** to leave the ticket open for future troubleshooting.

      c. Select **Back** to return to the Diagnostic Resolution.

DR091 - Resolve Robotics Hardware Error - Picker

This DR provides customer resolution steps for **T125** on page 324.

Problem: The robotics firmware has reported a specific hardware error identifying the robot assembly as the failed component. This problem may be caused by an electrical hardware failure at the picker assembly, or at the robot controller board.

1   Close this ticket and re-initialize the robot by opening and closing the main access door(s).

2   If this ticket reoccurs after the robot re-initializes, contact Service for a replacement of the picker assembly or robot controller board.

3   You have three options:

      a. Select **Close** to close the ticket now.

      b. Select **Exit** to leave the ticket open for future troubleshooting.

      c. Select **Back** to return to the Diagnostic Resolution.

DR092 - Resolve Robotics Hardware Error - Scanner

This DR provides customer resolution steps for **T126** on page 325.

Problem: The robotics firmware has reported a specific hardware error identifying the robot's scanner as the failed component, but this may also be caused by one or more of the following conditions:

- An obstruction in the viewing path of the scanner.

- An electrical hardware failure within the robot assembly.

1   Open the main access door(s) and check for any obvious obstruction blocking the scanner vision, or scratches on the scanner's viewing surface.

2   Make sure that the cable spool connection to the robot assembly's J1 hook connector is properly engaged and secured.

3   Close this ticket and re-initialize the robot by opening and closing the main access door(s).

4   If this ticket reoccurs after the robot re-initializes, and no obstructions are found, contact Service for a replacement of the robot controller board or picker assembly.

5 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR093 - Resolve Robotics Communication Error

This DR provides customer resolution steps for:

- **T127 on page 326**
- **T139 on page 338**

Problem: The library firmware did establish communication with the robotics subsystem, but encountered a communication failure during operation. This problem may be caused by one or more of the following conditions:

- Power loss to the robot assembly.
- Cable spool or connection failure.
- Electrical hardware failure.

1 Check if other tickets exist that may identify a power or robot initialization error, and resolve such tickets before continuing to the next step.

2 Check if the picker assembly is powered, by opening and looking through an I/E station closest to the robot position to determine whether the green picker assembly LED is lit or blinking.

3 If the LED is OFF, continue as follows:

    a. Check that the module terminators are fully connected and secured, and that all main access doors are fully closed.

    b. If terminators are secured and main doors are closed, open and close each main access door one by one, and observe if the robot initializes after the doors are closed.

    c. If the robot initializes, close the previously opened I/E station and observe whether the robot scans the I/E elements.

    d. If the I/E station scan succeeds, the issue is resolved; close this ticket and continue operation.

4 If the previous step did not resolve the issue, or the LED is ON, close this ticket, power off the library, and continue as follows:

    a. Remove and inspect both module terminators and connectors for pin damage, then reattach and secure.

    b. If the library consists of multiple library modules, remove and inspect all module-to-module cables and connectors for pin damage, then reattach and secure.

    c. Open the library's main doors; inspect the cable spool for visible damage, and ensure that it is properly connected and secured at the robot assembly's J1 hook connector.

    d. Close all main doors, power up the library, and observe library initialization.

5 If no issue was found, and this ticket reoccurs, contact Service for assistance.

6 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR094 - Resolve Drive Power Fuse Failure

This DR provides resolution steps for **T066** on page 264.

Problem: A problem has been detected and isolated to a fuse that protects a tape drive power circuit. The fuse is blown and requires replacement. The blown fuse may have been caused by a defective drive or some other failed hardware.

Users should contact Service to replace the fuse. Note that you must shut down the library and disconnect the library power completely before replacing the fuse.

1   View the ticket details to determine in which module the blown fuse is located.

2   Contact Service to obtain and replace the fuse (see Removing and Replacing the Drive Power Fuse on page 148).

3   Close the ticket.

4   Shut down the library and disconnect the library power completely before replacing the fuse.

5   Power up the library. Did the new fuse blow and create a ticket? If NOT, the problem was likely a weak or defective fuse. Monitor for recurrence.

6   If the new fuse DID blow, close the ticket, shut down the library, disconnect the library power, remove all the drives in the module, and replace the fuse again.

7   Power up the library. Did the fuse blow again? If YES, the problem is isolated to the module. The module must be replaced.

8   If the new fuse DID NOT blow, install drive sleds one at a time. Check for this ticket after each drive sled installation to determine which drive sled is causing the fuse to blow.

9   You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR095 - Resolve Drive Sled Auto-Level Failure

This DR provides customer resolution steps for **T129** on page 328.

Problem: The library is not able to auto-level any of the drive sleds. This problem may be caused by a missing or corrupt firmware update image file.

1   Close this ticket and perform a library firmware upgrade to the current production firmware revision.

2   If this ticket reoccurs following the library firmware upgrade, contact Service for additional diagnostic steps.

3   You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR096 - Resolve Drive Cleaning Failure

This DR provides customer resolution steps for **T130** on page 329.

Problem: After the tape drive was cleaned and the cleaning tape cartridge was removed from the tape drive, the tape drive continues to request drive cleaning. This could indicate a problem with the tape drive.

1   Close this ticket and perform a manual drive cleaning operation with a different cleaning tape.

2   If this ticket reoccurs following the manual cleaning, take the tape drive offline.

3   Contact Service for additional diagnostic steps.

> ✒ Note   It is recommended that the tape drive not be used for read/write operations, because continued cleaning requests could exhaust the cleaning tape supply.

4   You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR097 - Resolve Invalid EKM Configuration

This DR provides customer resolution steps for **T131** on page 330.

Problem: The library firmware detected that the number of encryption-capable tape drives, which are configured in LME partitions, exceeds the number of tape drives that may be encryption enabled under the current encryption license. If the violation is not corrected within 120 days from the first instance of this ticket, the library firmware will reconfigure all LME partitions and tape drives to use AME encryption.

1   To prevent or correct disabling of LME capabilities, reconfigure partitions to allow LME configurations that are in line with the installed encryption license.

2   Alternatively, contact your technical sales representative to purchase and install an encryption license that permits your current usage.

3   You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR098 - Resolve Hardware Clock Failure

This DR provides customer resolution steps for **T132** on page 331 and T000 on page 195.

Problem: The library firmware detected that the library initialization sequence is not progressing. The library will not initialize and needs to be restarted.

1   Power off the library, wait 1 minute, and then power on the library.

2   If the problem reoccurs:

   a. Power off the library, open a main library access door, then power on the library.

   b. Wait 5 minutes, then close the main access door(s) to allow robot initialization.

3   If the issue persists, contact Service for assistance.

4   You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR099 - Resolve Barcode Label Mapping

This DR provides customer resolution steps for **T133** on page 332.

Problem: There was a barcode scanning error detected during an attempt to inventory the library. Possible causes:

- Improper application of barcode label(s)

- Magazine(s) improperly seated

1 Verify that all library and tape cartridge barcode labels are properly attached, and that no overlapping barcode labels are visible.

2 Ensure that all magazines are properly installed, and that all barcode labels are visible.

3 Close this ticket.

4 Open and close the access door, to cause the library to perform another inventory.

5 If the problem persists after the library attempts to re-inventory, contact Service for additional diagnostic steps.

6 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR100 - Resolve Barcode Scanner Malfunction

This DR provides customer resolution steps for **T134** on page 333.

Problem: The barcode scanner is communicating properly, but it cannot read any barcodes. There are two likely scenarios:

- The line of sight from the scanner to the module branding label is blocked by foreign material such as a media barcode label.

- The barcode scanner is damaged.

1 Open the library door to gain access to the robot. Look for any obstructions in front of the barcode scanner (inside the picker assembly).

2 If no foreign material is found, close the access door and wait for the library to complete initialization.

3 If the initialization fails, or if the barcode scanner still does not read system barcode or cartridge barcode labels, contact Service for assistance with replacement of the picker assembly.

4 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR101 - Resolve Tape Drive Type Change

This DR provides customer resolution steps for **T135** on page 334.

Problem: The library firmware detected that a drive sled change occurred, but the replacement drive is not of the expected type. A tape drive's type is defined by its vendor, drive generation, interface type, or functionality purpose. There are two options to activate the assigned drive:

1 From the Main Menu, select **Setup> Partitions**.

2 From the **Setup - Partitions** menu, choose the partition to be modified and select **Modify**.

3 From the **Modify Partition** menu, deselect the original tape drive from the drives list and select **Apply**.

4 From the **Setup - Partitions** menu, choose the partition to be modified and select **Modify**.

5 From the **Modify Partition** menu, select the new drive from the drives list and select **Apply**.

6 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR102 - Resolve Robotics Z Axis Motion Failure

This DR provides customer resolution steps for **T136** on page 335.

Problem: The library robot has failed to perform a motion in the z-axis. The detected failure is likely to be a genuine hardware failure.

1 Open the main access door(s) and look for any obvious problems, such as unplugged cables or damage to the picker assembly.

2 Remove any tape cartridges from the picker assembly or the path of robot motion.

3 Close the access doors and wait for the system to complete initialization.

4 Admin users can use the **Tools > Diagnostics > Robotics > Get/Put Test** to determine that the robot is functioning properly or whether the issue repeats. Service users can use the **Service > System > Robotics** test to further verify that the robot is functioning properly.

5 If the test fails, contact Service for a replacement of the picker assembly.

6 If the test passes, monitor for recurrence and contact Service if the issue repeats or becomes chronic.

7 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR103 - Resolve Display Assembly Communication Failure

This DR provides customer resolution steps for **T137** on page 336.

Problem: A problem has been detected and isolated to a communication link failure to the library's local display assembly. The nature of the problem indicates that replacement of the display assembly may be required. Your library should remain operational from the remote user interface.

1 If this ticket and T064 - LCB Hardware Failure are generated within a few minutes of each other, the problem lies with one of the power supplies in the control module. Contact Service for replacement of a power supply.

2 Otherwise, close the ticket(s), power off the library, and examine all cabling at the back of the display assembly and within the control module for proper connectivity or damage.

3 If no cabling problems are found, and no concurrent tickets have been posted against the LCB, power up the library and check if the issue is still reported. If so, contact Service for a replacement of the display assembly.

4   You have three options:

      a. Select **Close** to close the ticket now.

      b. Select **Exit** to leave the ticket open for future troubleshooting.

      c. Select **Back** to return to the Diagnostic Resolution.

DR104 - Resolve EKM License Violation

This DR provides customer resolution steps for

Problem: The library firmware detected that the grace period for exceeding the current encryption license has expired. The number of encryption-capable tape drives configured in LME partitions exceeds the number allowed under the current encryption license. All LME capabilities have been disabled.

1   Do one of the following:
   - To enable partitions for LME again, reconfigure partitions for LME configurations, observing the respective LME licensed drive count.

   - Alternatively, contact your technical sales representative to purchase and install an encryption license that meets your current usage needs.

2   You have three options:

      a. Select **Close** to close the ticket now.

      b. Select **Exit** to leave the ticket open for future troubleshooting.

      c. Select **Back** to return to the Diagnostic Resolution.

DR105 - Resolve HPF Connection Failure

This DR provides customer resolution steps for

Problem: A Fibre Channel I/O blade has detected that its secondary host port failover (HPF) port connection has failed.

1   Note the Fibre Channel I/O blade location, and identify the Fibre Channel cable connection.

2   Ensure that the fiber cables are properly connected to both the switch and the FC I/O blade, and that the cable connections are undamaged and free of debris.

3   Reset the port on the FC I/O blade via the local or remote user interface.

4   If the problem persists, contact Service for further assistance.

5   You have three options:

      a. Select **Close** to close the ticket now.

      b. Select **Exit** to leave the ticket open for future troubleshooting.

      c. Select **Back** to return to the Diagnostic Resolution.

DR106 - Resolve Media Security Notification

This DR provides customer resolution steps for:

Problem: The library has been configured to report unexpected and/or expected tape cartridge removal:

- Media removal is expected whenever an exported tape cartridge has been physically removed by an operator from an I/E area element.

- Media removal is NOT expected if a tape cartridge was previously detected in a storage, drive, or I/E element without having been exported/moved by the robot to a respective I/E area element for operator access and removal.

1   If the media removal was expected, I/E area elements may be available for operator-initiated tape cartridge insert/import operations.

2   If the media removal was unexpected, tape cartridge removal authorization may need to be validated.

3   To view which tape cartridges have been removed, select the **Media Security Log** from the **Reports > Log Viewer** menu selection.

4   You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR110 - Resolve Drive Control Failure

This DR provides customer resolution steps for **T153** on page 349.

Problem: A tape drive reported that a specific configuration request could not be enabled or disabled.

1   Note the ticket's drive sled coordinate and reason details, then close this ticket.

2   If the reason details indicate an encryption configuration failure, perform the following operations before continuing with Step 4:

   a. Make sure the referenced tape drive is not loaded with a tape cartridge. If a tape cartridge is present, unload the drive.

   b. Verify that the tape drive firmware version is at least at the firmware version referenced in the release notes for the currently installed library firmware version. Update the tape drive firmware if a newer version is required.

3   If the reason details indicate a connectivity or communication issue, verify that the drive is properly installed and connected. Check for other drive-related tickets and resolve such tickets before continuing with the resolutions steps below.

4   Consult your user documentation regarding a drive reset operation or drive sled removal and replacement procedure.

5   Either perform a drive reset operation, or remove the drive sled, wait 30 seconds, and then re-insert and secure the same drive sled back in its drive bay location.

6   Wait for the drive to initialize and become ready.

7   If this ticket is not reported again, and the previous reason details indicated an encryption configuration failure, perform the following operations:

   a. From the remote user interface, view the library configuration by selecting **Reports > Library Configuration**.

   b. Click on the respective drive coordinate and verify that the drive encryption method is set correctly.

8   If this ticket is generated again, contact Service for further assistance.

9 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR111 - Resolve Drive Encryption Service Request Monitoring

This DR provides customer resolution steps for

Problem: A tape drive reported that an encryption request needed to be serviced, but the drive did not indicate required encryption key request details. The drive sled controller suspended encryption key exchange request monitoring until the tape cartridge is unloaded.

1 Note the drive sled coordinate from the ticket details, and close the ticket.

2 Unload the tape cartridge from the drive.

3 Reload the tape cartridge and restart the host application.

4 If the ticket displays again, close the ticket and unload the drive.

5 Consult your user documentation to reset the drive.

6 After the drive is operational again, reload the tape cartridge and restart the host application.

7 If the problem persists, contact Service for further assistance.

8 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR112 - Resolve Encryption Key Exchange Failure

This DR provides customer resolution steps for

Problem: The library control firmware detected that an encryption key exchange operation to a tape drive failed. The tape drive either

• Timed out waiting for the library control firmware to provide the requested encryption key, **or**

• Rejected the retrieved encryption key as being invalid.

1 Note the drive sled coordinate and failure reason from the ticket details, then close the ticket.

2 If the failure reason indicates that the drive timed out waiting for a response, consult your user documentation regarding host application timeout settings.

3 If the ticket details do not indicate a timeout issue, restart the host application and retry the operation.

4 If the issue persists, contact Service for further assistance.

5 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR118 - Resolve EKM Path Test Delay

This DR provides customer resolution steps for **T149** on page 348.

Problem: The library attempted to perform an Automatic EKM Path Diagnostics Test via an available encryption-capable tape drive per the test interval setting. However, all configured tape drives are either loaded, unavailable, or otherwise busy, and cannot initiate the diagnostic test to determine proper EKM server connectivity and operability.

1   View the ticket details to determine which EKM server cannot be tested due to drives not being available to initiate an EKM Path Diagnostics Test.

2   Determine whether all tape drives configured for such EKM server access are currently mounted or otherwise unavailable and can therefore not initiate an EKM Path Diagnostics Test.

3   If none of the configured tape drives are available to initiate an EKM Path Diagnostics Test, ignore and close this ticket. If applicable, configure the testing interval time and/or warning threshold to a less frequent testing period, to avoid drive access contention and ticket generation.

4   If a tape drive is available to initiate a test, consult your user documentation to initiate a manual EKM Path Diagnostics Test:

   a. If the test succeeds, close this ticket and observe for further occurrences.

   b. If the test fails, analyze the issue and correct the problem, or contact Service for further assistance.

5   You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR128 - Resolve Drive TapeAlert 58 - Microcode Failure

This DR provides customer resolution steps for **T184** on page 356.

Problem: The tape drive detected and reported a tape drive firmware problem. The drive automatically reset and recovered from the fault.

1   Consult the user documentation to retrieve a tape drive log for problem analysis. Contact Service for assistance in obtaining an e-mail address to which to send the tape drive log, as well as assistance regarding a possible tape drive firmware update.

2   If the tape drive did not become functional, reset the tape drive again. and wait for the drive to complete drive initialization.

3   If new tape drive firmware is available, update tape drive firmware via the **Tools > Drive Operations** menu selection.

4   Monitor this issue for reoccurrence, and contact Service if the issue repeats.

5   You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR129 - Resolve Drive TapeAlert 59 - WORM Integrity Check

This DR provides customer resolution steps for **T185** on page 357.

Problem: The tape drive detected and reported an inconsistency during the WORM medium integrity checks. It appears that someone tampered with the WORM medium.

1   Attempt to copy all required data from the WORM tape cartridge to another tape cartridge.

2   Use the host application to export the tape cartridge, or select **Operations > Media > Export**, to remove the tape cartridge from the library.

3   Discontinue use and discard the faulty WORM tape cartridge.

4   Monitor this issue for recurrence.

5   You have three options:

      a.   Select **Close** to close the ticket now.

      b.   Select **Exit** to leave the ticket open for future troubleshooting.

      c.   Select **Back** to return to the Diagnostic Resolution.

DR130 - Resolve Drive TapeAlert 60 - WORM Overwrite Attempt

This DR provides customer resolution steps for **T186** on page 358.

Problem: The tape drive received and rejected a write operation for the loaded WORM media, due to the write operation attempting to overwrite data instead of appending data to the WORM media.

1   Consult your host application user documentation to determine if it recognizes and supports WORM media.

2   If the host application supports WORM media, the issue should be reported to the host application vendor.

3   If the host application does not support WORM media, only non-WORM tape cartridges should be used. Use the host application or a host utility to read all WORM data cartridges, and copy the data to non-WORM media for continued and successful write operations.

4   You have three options:

      a.   Select **Close** to close the ticket now.

      b.   Select **Exit** to leave the ticket open for future troubleshooting.

      c.   Select **Back** to return to the Diagnostic Resolution.

DR131 - Resolve Tape Drive Connection Failure

This DR provides customer resolution steps for **T178** on page 351.

Problem: The library detected an Ethernet connection failure to a tape drive. If no other drive-related tickets are reported, drive control is still functional; however, secure encryption key communication is no longer operational, and tape drive I/O will fail if the tape drive is configured for library managed encryption and an encryption key in FIPS mode and a request is made.

1   Note the ticket details to determine drive location and failure reason.

2   If ticket **T177** is not displayed:

      a.   Ensure that the drive sled is properly installed, secured, and powered up.

      b.   Ensure that the Ethernet cable is properly connected to both the appropriate port on the EEB (if installed) or one of the 4 ports on the LCB, if an EEB is not installed.

      c.   Inspect the Ethernet cable for any damage, and disconnect and reconnect as needed.

3   Close this ticket and select **Tools > Diagnostics** and perform a drive reset operation.

4   If the problem cannot be corrected, contact Service for further assistance.

5   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR133 - Resolve Drive TapeAlert 3 - Hard Error

This DR provides customer resolution steps for **T033** on page 231.

Problem: A tape drive reported TapeAlert 3, which indicates a hard error occurred during a read or write operation that the drive cannot correct. This problem may be caused by one of the following:

- A specific tape cartridge

- A specific drive

- Interaction of the tape and drive

1   Note the ticket details to determine the drive location and reason details.

2   If the reason details do not indicate an undetermined root cause of the issue, but actually isolated the problem to the drive or tape cartridge due to saved historical information, consider media or drive replacements to prevent the issue in the future.

3   If the drive error code lists error 7075 or 7076 for a drive, the media does not have an End of Data (EOD) written to tape, and data can no longer be written or appended to tape. Either rewrite all existing data on tape and then continue to append; or copy all existing data on tape to a new tape cartridge, then reformat and reuse the tape cartridge for new write.

4   If the drive error code lists error 7122 for a drive, the Format Identification Dataset (FID) is not properly recorded, and data cannot be written to tape. The tape cartridge does not contain data and needs to be discarded/replaced.

5   If steps 3 or 4 do not apply, check whether any of tickets T034, T035, T036, or T180 have also been reported for this tape drive.

6   If the same drive reports any of the tickets listed above for the currently loaded tape cartridge, close this ticket and follow the resolution steps for the respective other ticket(s).

7   If none of the above listed tickets is reported, contact Service for assistance.

8   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

DR136 - Resolve EKM Server Connectivity Issue

This DR provides customer resolution steps for **T029** on page 227.

Problem: The library is not able to successfully communicate with one or more of its connected EKM servers. This does not indicate a problem with the library, but rather indicates a network problem or EKM server configuration, setup, or functionality issue.

1   Note the ticket details to determine whether the issue is related to an EKM server configuration problem or a communication failure with one or more EKM servers.

2 If the issue is a specific EKM server configuration problem, a separate RAS ticket has been generated and requires resolution. Close this ticket and resolve the respective EKM server configuration ticket(s).

3 If the issue is a communication problem, perform the following steps:

   a. Ensure that the library is properly connected to the network, and that the network cable is not damaged.

   b. Ensure that the library's IP address settings for the EKM servers are correct, and that the Key Server IP and port configurations are configured accordingly.

   c. Verify that the EKM servers are powered on, operational, and properly connected to the network.

   d. Verify that the Key Servers' IP and port configurations are properly set and responding to "ping" requests.

   e. If no problems are found with any of these items, there is a configuration problem with your network. Contact your network administrator for assistance with troubleshooting this issue.

4 If the issue cannot be resolved, contact Service for further assistance.

5 You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR137 - Resolve Media Threshold Notification

This DR provides customer resolution steps for **T147** on page 346 and **T148** on page 347.

Problem: The library has been configured to report when a tape cartridge capacity and/or tape cartridge load count threshold is exceeded. A threshold has been met or exceeded.

1 Note the ticket details to determine which tape cartridge exceeded the media capacity or load count threshold.

2 Depending on which threshold was exceeded, initiate any action that should be performed upon such threshold notification warning.

3 You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

DR146 - Resolve Drive Tape Alert 54 - No Start of Data

This DR provides customer resolution steps for **T188** on page 360.

Problem: A drive reported an issue during the start of data detection. This problem may be spurious, and the drive may have recovered and now be reading the tape just fine; or the this problem may require further analysis, as it may be caused by the specific tape cartridge, drive, or interaction of the media and drive.

1 View the ticket details and note the tape cartridge, drive type, and location, as well as the drive error code.

2 If the drive error code lists error 7122 for a drive, the Format Identification Dataset (FID) is not properly recorded, and data cannot be written to tape. The tape cartridge does not contain data and needs to be discarded/replaced.

3 If step 2) does not apply, and the drive did not recover (host application failed to access media):

    a. Check that a correct format tape is used.

    b. If the media does not contain data, discard/replace the tape cartridge.

4 If the issue is not resolved, collect a tape drive log; then contact Service for assistance in analyzing the drive log, as well as assistance regarding a possible tape drive firmware update.

5 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

DR147 – Resolve Suspect Drive Command

This DR provides customer resolution steps for

Problem: The library detected that a tape drive experienced conflicting drive commands from multiple hosts/ initiators. This issue is most likely due to multiple initiators requesting drive operations without properly reserving the drive for Input/Output (I/O) operations.

1 Note the drive sled coordinate and initiator identification in the ticket details.

2 Use the issue description to determine whether the conflicting host is supposed to issue command requests to the drive.

3 Determine whether multiple hosts are supposed to issue concurrent or overlapping drive requests, then perform one of the following:

    • Configure the respective applications to reserve and release the tape drive, so that command requests are not conflicting, **OR**

    • Configure/remove any respective application from accessing the tape drive if the interfering operations are not intentional. If needed, use host access control or switch zoning to assure proper device access.

4 You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

Remove and Replace Resolutions

There is not an online remove and replace resolution for every FRU or CRU. Certain resolutions are omitted, because none of the system RAS Tickets isolate to the FRU or CRU. Others are omitted because an online resolution may not be useful when the library power must be off at the time of resolution. Resolutions such as module, display, and cable spool would not be useful online, since system power must be dropped out.

RR001 - Remove and Replace Drive Sled

This RR provides customer resolution steps for:

- **T022** on page 220
- **T023** on page 221

Problem: A problem has been detected and isolated to a drive sled. A drive sled replacement is required.

1   Make note of the part number on the rear of the drive sled, and contact Service for a drive sled replacement.

2   When the new drive sled is available, use the **Operations > Change Drive Mode** menu on the local display, or the **Operations > Drives > Change Mode** menu on the remote user interface to take the drive sled offline.

When the blue LED on the rear of the drive sled is lit solid, the drive sled is ready to be removed.

3   Insert the new drive sled and wait for the drive sled firmware to load. The drive sled's green LED will blink for 3 seconds on, followed by two short blinks while firmware is loaded.

4   Use the **Operations > Change Drive Mode** menu on the local display or the **Operations > Drives > Change Mode** menu on the remote user interface to take the drive sled online.

5   You have three options:

   a.   Select **Close** to close the ticket now.

   b.   Select **Exit** to leave the ticket open for future troubleshooting.

   c.   Select **Back** to return to the Diagnostic Resolution.

RR002 - Remove and Replace LCB

This RR provides resolution steps for **T064** on page 262.

Problem: A problem has been detected and isolated to the Library Control Blade. The nature of the problem indicates that replacement may be required.

1   Remove the drives in the Control Module and check the cable connections to the board behind the lower drive. If they are loose, firmly push them back into place, and close this ticket. If this problem occurs again, proceed with the following step.

2   If both this ticket and a T067 - Display Assembly Hardware Failure are generated within a few minutes of each other, the problem lies with one of the power supplies in the Control Module. Contact Service for replacement of a Power Supply. Otherwise, proceed with the following steps.

3   Contact Service to order an LCB.

4   Save the library configuration via the **Tools > Save/Restore** menu selection.

5   When the new LCB is received, follow the instructions delivered in the package.

Your original compact flash file system should allow the new LCB to immediately recognize your library and be operational.

The saved configuration is only necessary if there are additional problems with your compact flash.

6   If this problem persists after replacing the LCB, the problem may lie with the display. Contact Service to replace the display assembly.

7   You have three options:

   a.   Select **Close** to close the ticket now.

   b.   Select **Exit** to leave the ticket open for future troubleshooting.

   c.   Select **Back** to return to the Diagnostic Resolution.

RR003 - Remove and Replace Power Supply

This RR provides instructions for **T025** on page 223**.**

Problem: An internal hardware problem has been detected in a power supply, which may require replacement of the supply.

1   Inspect all module terminators and module-to-module cables for any broken or bent pins. Contact Service to replace any damaged parts.

2   If none of these parts appear damaged, proceed as follows:

    a.   Remove the defective power supply. Replacement of a redundant supply can be performed while the library is powered on and operational. When removing the old supply or installing the new supply, the AC switch should be off and the cord should be disconnected from the facility receptacle.

    b.   Install the supply, tighten the thumb screws, install the cord, and turn on the power switch.

3   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

RR004 - Remove and Replace Picker Assembly

This RR provides instructions for **T082** on page 283.

Problem: A hardware problem has been detected in the robot picker that requires replacement of the picker assembly.

1   Contact Service to arrange for the replacement of the picker assembly.

2   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

RR005 - Remove and Replace Compact Flash

This RR provides instructions for **T192** on page 363.

Problem: A hardware problem has been detected that requires replacement of the Compact Flash on the Library Controller Board.

1   Save the library configuration via the **Tools > Save/Restore** menu selection.

2   Contact Service to arrange for the replacement of the Compact Flash.

3   You have three options:

    a.   Select **Close** to close the ticket now.

    b.   Select **Exit** to leave the ticket open for future troubleshooting.

    c.   Select **Back** to return to the Diagnostic Resolution.

RR007 - Remove and Replace LCB Hardware Clock

This RR provides instructions for T132 on page 331.

Problem: The library firmware detected that the hardware real time clock (RTC) has failed. The library system time may appear to be set correctly, but accurate time will be lost following a power cycle or reboot.

1 The hardware real time clock (RTC) is part of the LCB hardware. Call Service for a replacement of the LCB.

2 You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

RR008 - Remove and Replace Tape Cartridge

This RR provides instructions for:

- **T044 on page 241**
- **T047 on page 244**
- **T048 on page 245**
- **T058 on page 254**
- **T059 on page 255**
- **T181 on page 353**
- **T182 on page 354**

Problem: The library or a drive identified a problem with a tape cartridge. The tape cartridge should be retired from service.

1 View the ticket details to determine the specific tape cartridge and tape drive involved in the problem.

2 If the tape cartridge is a data cartridge, use the host application to gather and copy all required data from the tape, then use the host application to export the tape cartridge, or select **Operations > Media > Export** to remove the tape cartridge from the library.

3 If the tape cartridge is a cleaning tape managed by a host application, use the host application to export the tape cartridge, or select **Operations > Media > Export** to remove the cartridge from the library.

4 If the tape cartridge is a cleaning tape managed by the library, select **Operations >Cleaning Media > Export** to remove the cleaning tape from the library.

5 Discontinue further use of the tape cartridge.

6 You have three options:

   a. Select **Close** to close the ticket now.

   b. Select **Exit** to leave the ticket open for future troubleshooting.

   c. Select **Back** to return to the Diagnostic Resolution.

RR009 - Remove and Replace Defective Tape Cartridge

This RR provides resolution steps for **T183** on page 355.

Problem: A tape drive detected and reported that the mounted tape cartridge experienced a mechanical cartridge failure. The tape may be snapped, split, or cut, and the tape cartridge's mechanical failure may prevent the tape cartridge from being properly unloaded and ejected.

CAUTION: Do not attempt to unload or move the tape cartridge, but follow the instructions below.

1   Note the drive location from the ticket details.

2   Temporarily discontinue use of the tape drive and loaded tape cartridge.

3   Collect a tape drive log via the **Tools > Drive Operations** menu selection, and select **Retrieve tape drive log** for the previously noted tape drive.

4   Contact Service for assistance in obtaining an e-mail address to which to send the tape drive log, as well as to get assistance regarding a possible tape drive firmware update and tape cartridge removal from the tape drive.

5   You have three options:

   a.   Select **Close** to close the ticket now.

   b.   Select **Exit** to leave the ticket open for future troubleshooting.

   c.   Select **Back** to return to the Diagnostic Resolution.

RR013 - Remove and Replace Display Assembly

This RR provides resolution steps for **T067** on page 265.

Problem: A problem has been detected and isolated to the local library display assembly hardware. The nature of the problem indicates that a replacement may be required. Your library should be operational from the remote user interface.

1   If both this ticket and ticket **T064 - LCB Hardware Failure** are generated within a few minutes of each other, the problem lies with one of the power supplies in the control module. In this case, contact Service for a replacement of a control module power supply.

2   Otherwise, check the ticket details to determine whether the issue is temperature related:

   a.   If a temperature limit has been exceeded, check the user documentation for temperature specifications, and adjust the room temperature accordingly.

   b.   If the issue is not related to external temperature conditions, contact Service for a replacement of the display. When the new display is available, follow the replacement instructions delivered in the enclosed package.

3   You have three options:

   a.   Select **Close** to close the ticket now.

   b.   Select **Exit** to leave the ticket open for future troubleshooting.

   c.   Select **Back** to return to the Diagnostic Resolution.

RR015 - Remove and Replace FC I/O Blade

This RR provides resolution steps for **T191** on page 362.

Problem: The library detected a FC I/O Blade issue that requires replacement of the blade.

1   Note the ticket details regarding the location of the defective blade.

2   Contact Service to arrange for the replacement of the FC I/O Blade.

3   You have three options:

   a.   Select **Close** to close the ticket now.

   b.   Select **Exit** to leave the ticket open for future troubleshooting.

   c.   Select **Back** to return to the Diagnostic Resolution.

RR016 - Remove and Replace Incompatible Robot

This DR provides customer resolution steps for **T128** on page 327.

Problem: The library firmware has detected that an incompatible robot has been installed. This problem occurs when a robot assembly has been replaced with an incorrect type.

1   Replace the installed robot assembly with the required, originally installed, robot assembly model type.

2   You have three options:

   a.   Select **Close** to close the ticket now.

   b.   Select **Exit** to leave the ticket open for future troubleshooting.

   c.   Select **Back** to return to the Diagnostic Resolution.

RR017 - Remove and Replace Un-calibrated Picker

This RR provides resolution steps for **T141** on page 340.

Problem: The library is unable to read the picker calibration offsets from the EEPROM/FLASH location.

1   Close this ticket and open/close the main door to have the library attempt another calibration.

2   If the problem still persists, contact Service to arrange for a replacement of the Picker Assembly.

3   You have three options:

   a.   Select **Close** to close the ticket now.

   b.   Select **Exit** to leave the ticket open for future troubleshooting.

   c.   Select **Back** to return to the Diagnostic Resolution.

RR018 - Remove and Replace Robotics Y-Carriage Assembly

This RR provides resolution steps for **T142** on page 341.

Problem: The robot assembly is unable to properly move in the y-axis due to a degradation of the Y-axis gear.

1   Contact Service to arrange for the replacement of the Y-carriage assembly of the robot assembly.

2   You have three options:

   a.   Select **Close** to close the ticket now.

   b.   Select **Exit** to leave the ticket open for future troubleshooting.

   c.   Select **Back** to return to the Diagnostic Resolution.

RR019 - Remove and Replace Unlabeled Tape Cartridge

This RR provides resolution steps for **T143** on page 342.

Problem: The library has been configured to detect unlabeled tape cartridges, and at least one unlabeled tape cartridge or unreadable barcode label was found. Note, though, that tape cartridges in tape drives, and in the top and bottom library slots, may have readable barcode labels that may be temporarily unreadable in these locations.

1   Display the current library configuration by selecting **Reports > Library Configuration**.

2   Make a note of all locations showing "No_Label" as the tape cartridge barcode label information.

3   If a tape cartridge location is noted for a drive, or for a top or bottom library slot, perform a tape cartridge move operation to a library storage slot not located in the top or bottom row. The tape cartridge barcode label will be rescanned at the new location. If the tape cartridge barcode label is still not readable at the new location, continue with step 4.

4   Do one of the following:

    •   Perform an export operation of all noted tape cartridge locations, and inspect and correct affixed barcode labels, **OR**

    •   Alternately, remove such noted cartridges from the library by opening a main library door and manually removing the identified tape cartridges for barcode label inspection and correction.

5   You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution.

RR020 – Remove and Replace Duplicate Tape Cartridge

This RR provides resolution steps for **T194** on page 365.

Problem: The library detected a duplicate barcode label. A duplicate tape cartridge may be intentional, but it may lead to confusion for operator-requested export and import operations or tape recovery operations.

1   Note the tape cartridge locations and barcode label information.

2   Determine whether one of the duplicate tape cartridges should be removed or relabeled, then perform one of the following corrections:

    •   Consider replacing the tape cartridge with a different tape cartridge.

    •   Consider relabeling one of the duplicate tape cartridges with a different, unique barcode label.

3   Perform an export operation of one of the duplicate tape cartridges, and replace or relabel it accordingly

4   You have three options:

    a. Select **Close** to close the ticket now.

    b. Select **Exit** to leave the ticket open for future troubleshooting.

    c. Select **Back** to return to the Diagnostic Resolution..

Interpreting LEDs

Light emitting diodes (LEDs) provide a visual indication about the status of certain library components. LEDs can sometimes communicate that a problem exists when RAS tickets cannot. For example, an LED can indicate a firmware problem that prohibits the library from generating RAS tickets.

The following components of the library have LEDs:

- Library Control Blade
- FC I/O Blades
- FC I/O Fan Blades
- Tape drives
- Power supplies

Some of these components may also include a fiber port link LED.

Blade Status LEDs

Library control blade (LCB) and FC I/O blade LEDs indicate status by the rate at which they blink. The color of the LED identifies the area of the component being reported.

Figure 28 shows the location of the blade LEDs. Table 11 describes how to interpret the current status of the blade.

Figure 28 Location of Blade LEDs

Library Control Blade
Status LEDs
• Left = Blue
• Middle = Amber
• Right = Green
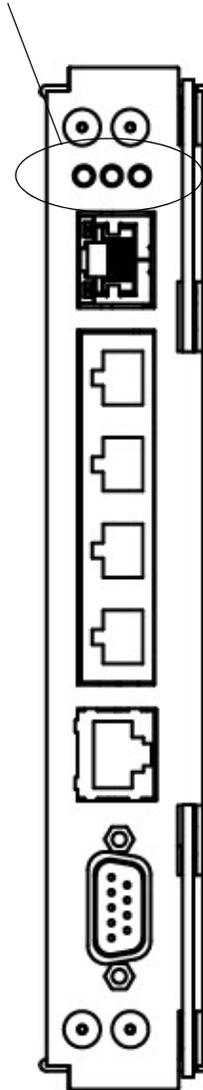
Port
Link
LEDs
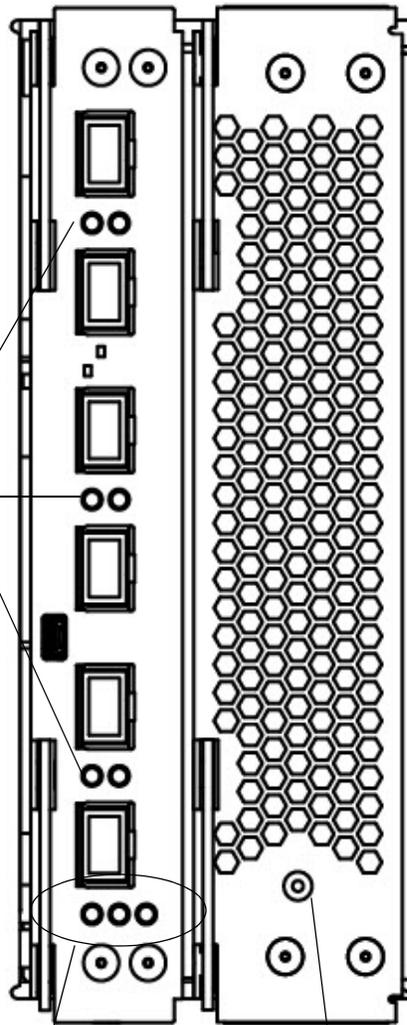
FC I/O Blade Status
LEDs
• Left = Green
• Middle = Amber
• Right = Blue

FC I/O Fan
Blade LED =
Amber

Table 11   Blade Status LEDs.

LED Color	Represents	Blade Status
Green	Library application code/Blade processor status	• Blinks once per second — Normal operation. • Solid ON — Not operational. • Solid OFF — Not operational (or blade is booting). • Solid ON for 3 seconds, then blinks twice (FC I/O blade only) — Blade firmware is downloading. • Blinks 10 times per second (FC I/O blade only) — Identify mode.

Amber	Health status	• Solid OFF — Normal operation.
		• Blinks once per second (LCB only) — Library application code is not operating, or firmware upgrade/downgrade is in progress on existing compact flash.
		• Solid ON —
		  • LCB — Failure, **or** blade is booting up, **or** initial firmware update on new compact flash. If solid ON for more than 10 minutes, the LCB may need to be replaced.
		  • FC I/O Blade — Failure, **or** blade is booting up, **or** blade firmware is autoleveling.
		  • FC I/O Fan Blade — There may be one or more problems, including: fan speed is too high or too low; temperature is too high; there is a faulty fan speed sensor; or there is a power control problem.
		
		Note: In most cases, solid ON means a failure; however, in conjunction with the blue LED blinking once every 10 seconds, an amber LED solid ON can be a normal condition for a short period of time. Autoleveling takes about three minutes per blade, and blades autolevel in series.
		
		Never remove a blade when the amber LED is solid ON, unless it has been on continuously for at least 10 minutes.
		
		Never remove an LCB while the library is powered on.

Blue	Power control status	• Blinks once every 10 seconds — Normal. Blade is powered on.
		• Solid ON —
		  • LCB — Error condition. Power off library before removing or replacing the LCB.
		  • FC I/O blade — Swap modeBlade is ready to be removed or replaced.
		• Solid OFF — Blade is not receiving power.
		• Blinks once per second (Ethernet Expansion blade) — Powered off. Ready to remove.

Blade Port LEDs

LCB Ethernet Hub Port LED

The LED for an Ethernet hub port is located above the port. Use Table 12 to interpret Ethernet hub link activity on an LCB.

Table 12   LCB Ethernet Hub Link Activity

LED Color	Represents	Fibre Channel Port Link Status
Amber	Link and activity	• Solid on — The link is up. • Blinks — The link is up and currently transmitting commands.

Fibre Channel I/O Blade Port Link LED

A port link LED on a tape drive or a Fibre Channel I/O blade shows the current state of a Fibre Channel link and indicates whether or not the link is ready to transmit commands.

The link LED for an I/O blade Fibre Channel port is located either below or above the port. For each link LED pair on the I/O blade, the LED on the left belongs to the FC port below. The LED on the right belongs to the FC port above. Black lines on the I/O blade faceplate may indicate which LED belongs to which port.

Use Table 13 to interpret Fibre Channel link activity on an I/O blade.

Table 13   Fibre Port Link LED on I/O Blade

LED Color	Represents	Fibre Channel Port Link Status
Green	Link and activity	• Blinking — Link with activity. • OFF — No link, or link with constant activity*. • Solid ON — Blade is initializing.
* LED flashing increases as the activity increases and can actually appear off if the activity is high enough. Also, when the blade boots up, the link LEDs are all on until firmware initializes the ports, at which time they turn off until the port transmitter is enabled and a link is acquired.		

Tape Drive LEDs

RAS tickets typically report all problems related to tape drives, including error codes and TapeAlerts. By observing the blinking pattern of LEDs on tape drives, you can see what operation the tape drive is currently performing.

Figure 29 shows where the tape drive LEDs and the FC port link LED are located.

Figure 29   Location of Tape Drive LEDs
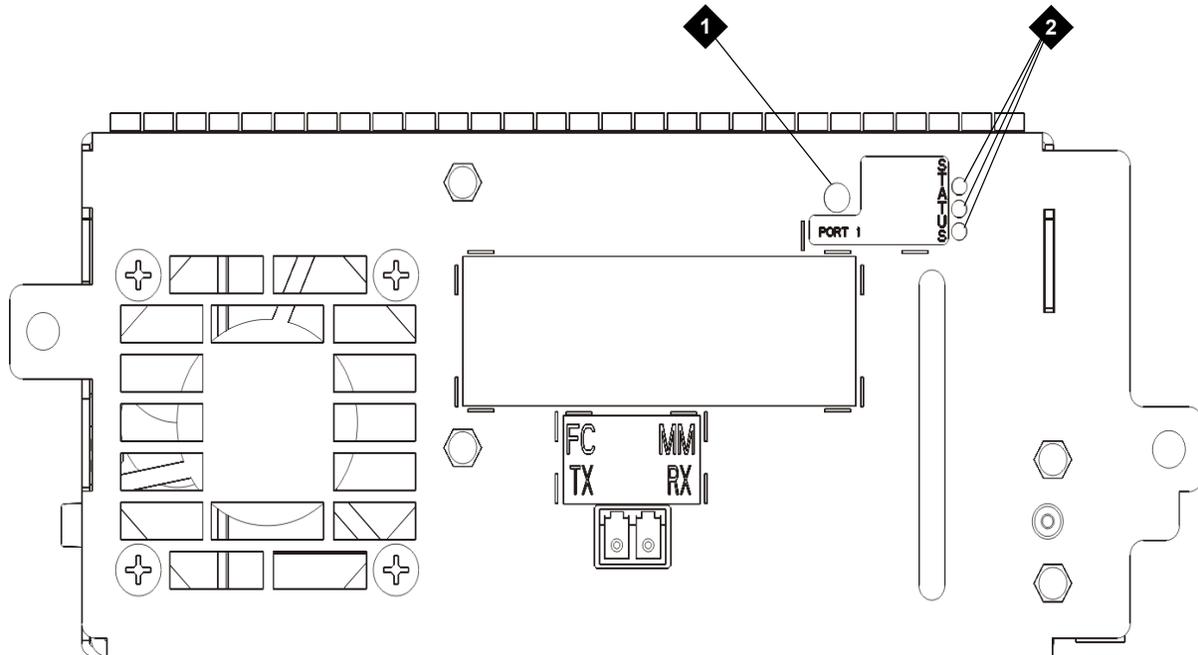
1	FC port link LED	**2**	Tape drive LEDs

Use Table 14 to interpret tape drive activity:

Table 14   Tape Drive LEDs

LED Color	Represents	Tape Drive Status
Green	Processor activity	• Blinks once per second — Normal operation. • Solid ON/ Solid OFF — Tape drive's main processor is not operating. • 10 blinks per second — Identify mode. • Blinks 3 times in 3 seconds, then pauses (solid off), and then repeats — Tape drive is initializing. • Solid on for 3 seconds, then blinks twice — Tape drive firmware is downloading. • 2 quick blinks within 1.25 seconds; then on solid for 1.25 seconds; repeat — Drive sled firmware is downloading.
Amber	Health of the drive	• Solid OFF — Normal operation. • Solid ON — Drive has failed.
Blue	Power control	• Blinks once every 10 seconds — Normal operation. • Solid ON — Offline. Ready to be removed or replaced. • Solid OFF — Tape drive is not receiving power.

Tape Drive FC Port Link LED

A Fibre Channel port link LED on a tape drive shows the current state of a Fibre Channel link and indicates whether or not the link is ready to transmit commands.

The FC port link LED on a tape drive is located on the rear of the tape drive.

Use Table 15 to interpret Fibre Channel link activity on a tape drive:

Table 15   Fibre Port Link LED on Tape Drive

LED Color	Represents	FC Port Link Status
Green	Loop initialization protocol (LIP) and activity	• Solid ON — Loop initialization protocol (LIP) has occurred. • Blinks at regular intervals — Host command/data activity is occurring.
Amber	Online and light detected	• Solid ON — The library has enabled the tape drive data bus, and it can detect light through a fiber optic cable.
No color	No activity or no light detected	• Solid OFF — Either the tape drive is off, or the tape drive cannot detect light through a fiber optic cable (which is equivalent to a missing FC cable). If the tape drive is offline, the tape drive's blue status LED will be solidly lit.

Power Supply LEDs

RAS tickets typically report all problems related to power supplies. You can also observe the blinking pattern of LEDs on power supplies to see if the they are functioning correctly.

Power supply LEDs indicate status by the rate at which they blink. The color of the LED identifies the area of the component being reported.

Use Table 16 to interpret power supply activity.

Table 16   Power Supply LEDs

LED Color	Represents	Power Supply Status
Green	AC OK (top)	• Solid ON — The power supply's AC input is above the minimum requirements to operate. • Solid OFF — The power supply's AC input is below the minimum requirements to operate.
Green	DC OK (middle)	• Solid ON — The power supply's output voltage is within regulation. • Solid OFF — The power supply's output voltage is not within regulation.
Blue	Standby (bottom)	• Solid OFF — Normal. • Solid ON — Swap mode: Ready to be removed or replaced.

In the RAS tickets associated with the defective power supply, record both the number of the module and the number of the power supply connected to that module.

Each module can have up to two power supplies. The power supply on the left is #1, while the power supply on the right is #2.

The 9U Expansion Modules are numbered according to their position in relation to the 5U Library Control Module:

- The 5U Library Control Module is assigned the number 0.

- All 9U Expansion Modules stacked beneath the 5U Library Control Module are assigned a negative number.

- 9U Expansion Modules stacked above the 5U Library Control Module are assigned a positive number.

For example, 9U Expansion Modules -2 is the second 9U Expansion Modules beneath the 5U Library Control Module, while 9U Expansion Modules +2 is the second 9U Expansion Modules above the 5U Library Control Module.

Interpreting "Library Not Ready" Messages

The operator panel and Web client user interfaces each include a header that contains the company logo, the product name, and the three main navigation buttons: **Home**, **Help**, and **Logout**. In addition, a message in the header alerts you when the library is not ready. (No message displays in the header when the library is in a ready state.)

On the operator panel, **LIBRARY NOT READY** flashes at regular intervals whenever the library robotics are not yet ready to perform library functions. To view more information about the library's condition, select **Tools > About Library**. The **State** field on the **About Library** screen will display **Not ready**, followed, when applicable, by a brief explanation. For example, if the library door is open, the **State** field will display: **Not ready, door is open**.

The header in the Web client user interface also alerts you when the library is not ready. For instance, if the library door is open, the header will display the following message: **Library's door is open**.

"Library not ready" messages appear in the header in the operator panel and the Web client user interfaces under the following circumstances:

- The robot is in the process of calibrating. When the robot has finished calibrating, the "library not ready" message will no longer appear.

- The robot cannot calibrate. For example, a fiducial label is missing, preventing the robot from calibrating.

- The robot requires manual intervention. For example, the picker contains a tape cartridge that it cannot unload.

- The library door is open. The robot will not operate if the door is open.

- If none of the above situations apply, but the library is still not ready to operate, the header will display a "library not ready" message without additional detail. The library generates a RAS ticket whenever the library enters a "not ready" state. The RAS ticket may provide information that can help you troubleshoot the problem. See How the Library Reports Problems on page 193 for more information.

"Library not ready" messages continue to display in the header, as well as on the **About Library** screen until the issue has been resolved, and the robot has completed its calibration.

Note
You may not see the "library not ready" message in the Web client user interface until the browser refreshes. Similarly, even if the problem has been resolved, the "library not ready" message will not disappear from the Web client user interface until the browser refreshes.

6

Library Drawings

This chapter covers the following topics (some of which include more than one drawing):

-
-
-
-
-
-
-

Component Diagrams

The following diagrams show many of the library's components. Become familiar with the location of each of these components, and how they can be accessed for service.

Library, Front View

Figure 30   ML6020, Front View
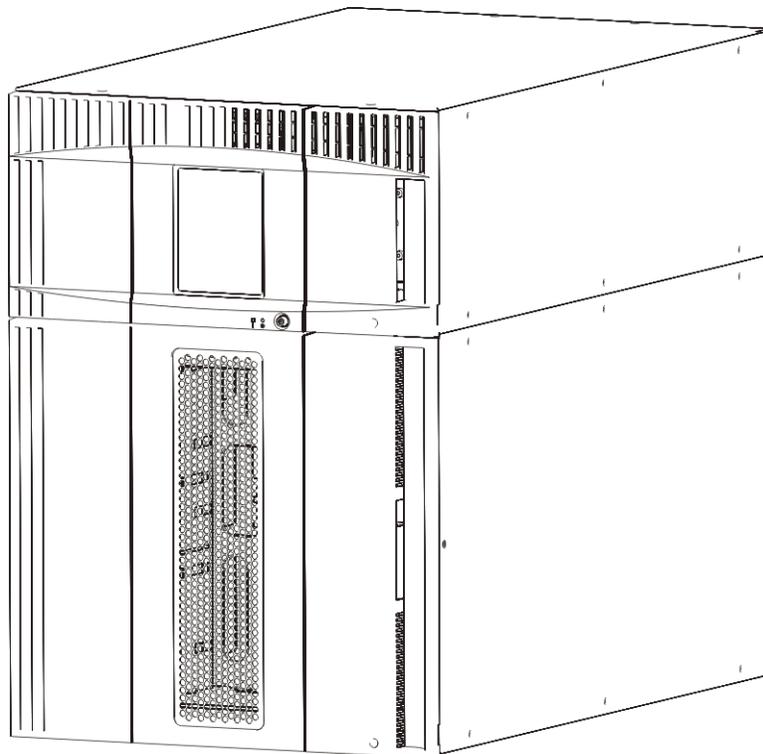
Library, Front View Showing Front Bezels

Figure 31   Library, Front View Showing Front Bezels
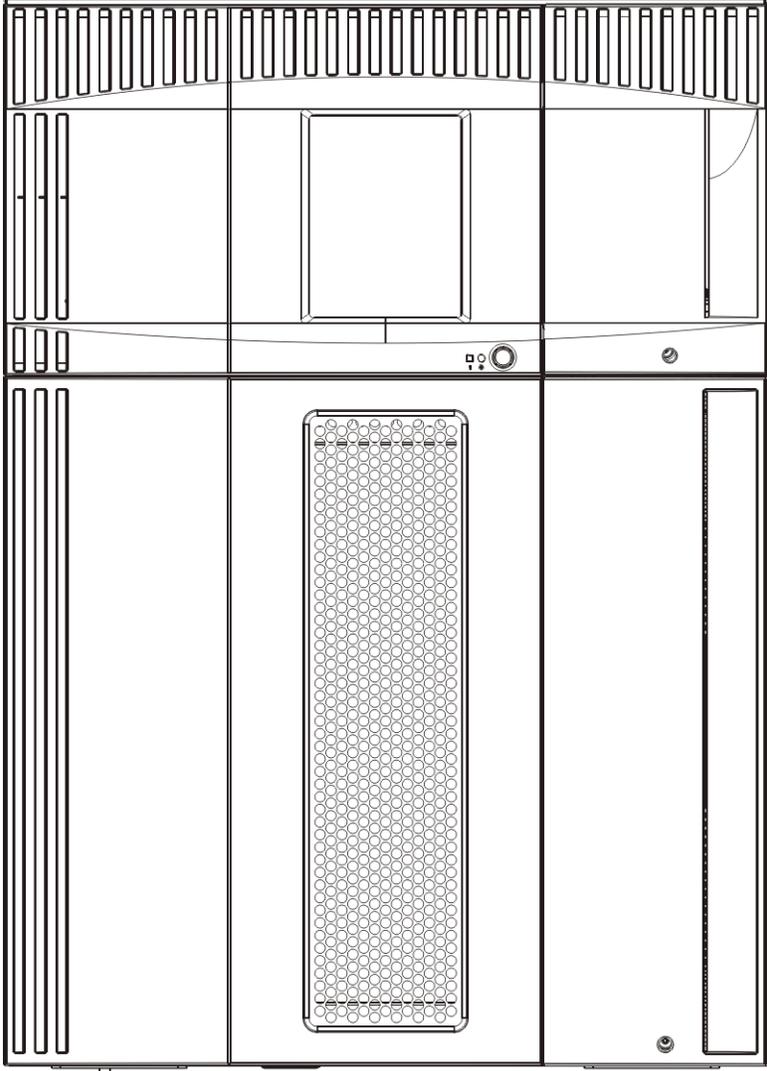
Library Rear View

Figure 32   ML6020, Rear View
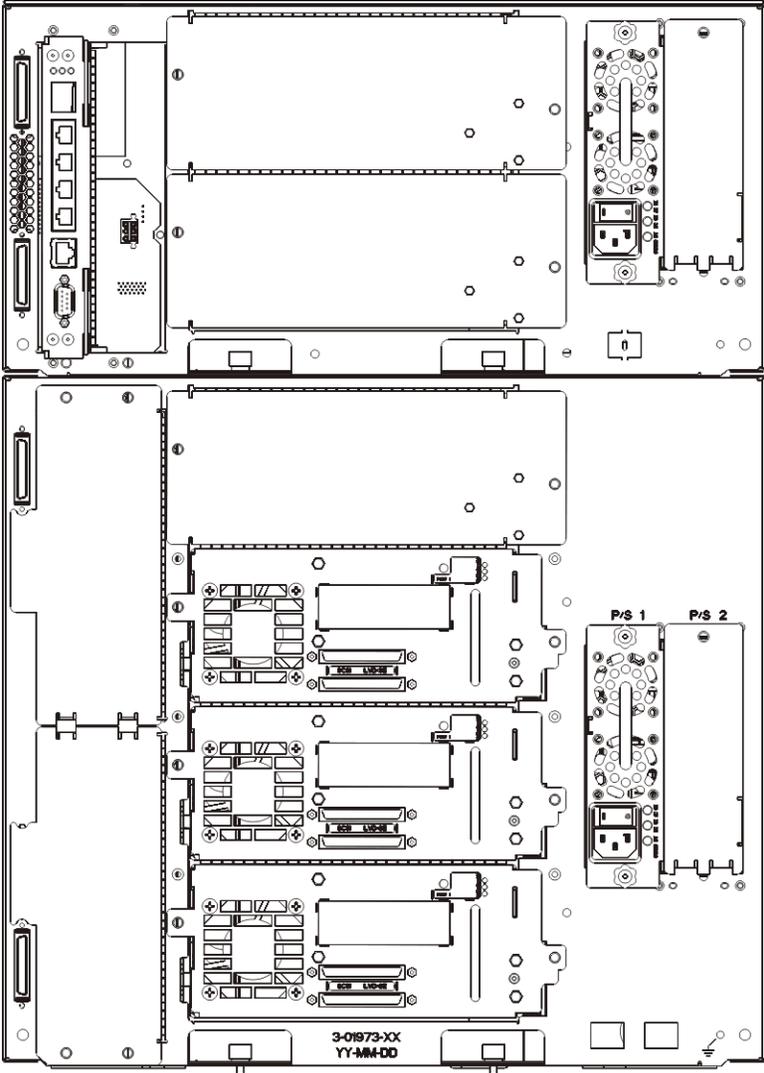
5U Library Control Module

Figure 33   5U Library Control Module, Front
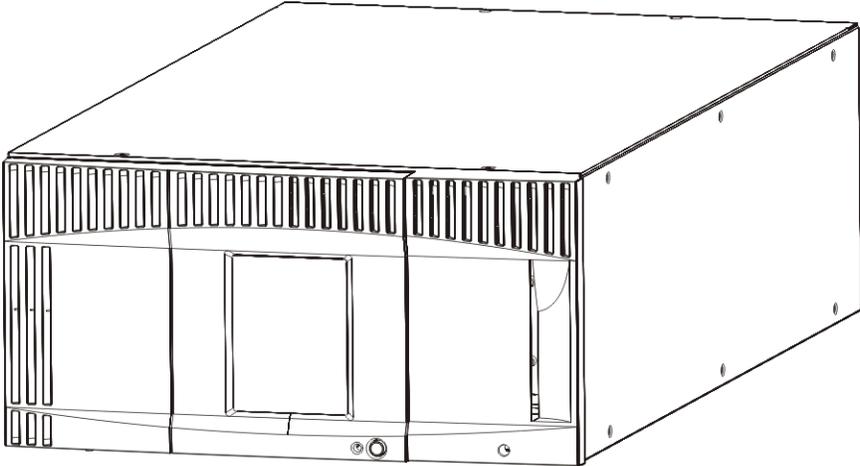
Library, Front View, I/E Station Door Open

Figure 34   Library, Front View, I/E Station Door Open
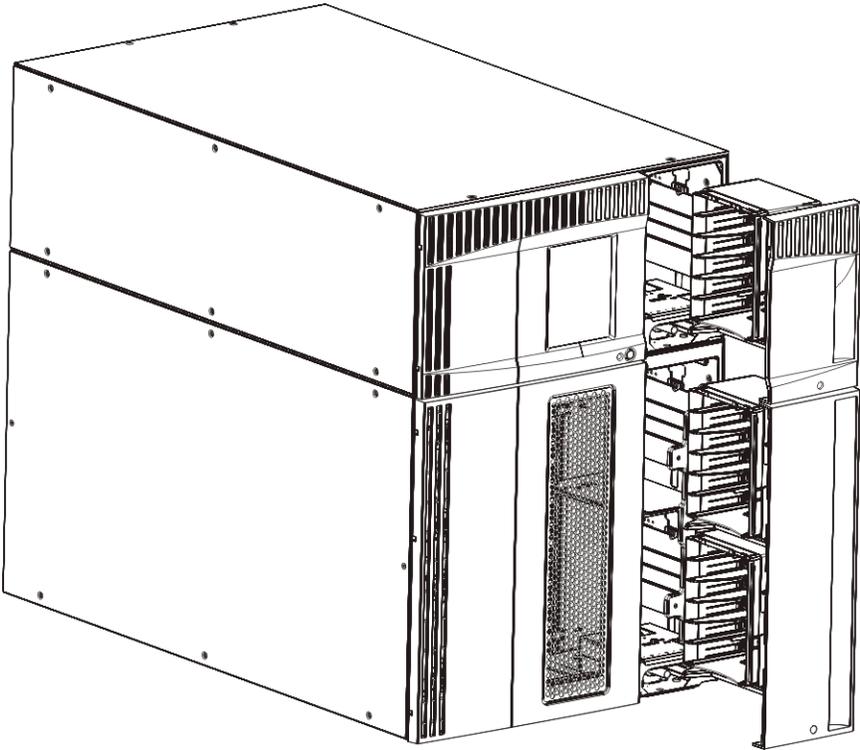
Library, Front View, Access Door, and I/E Station Door Open

Figure 35   Library Front View, Access Door, and I/E Station Door Open
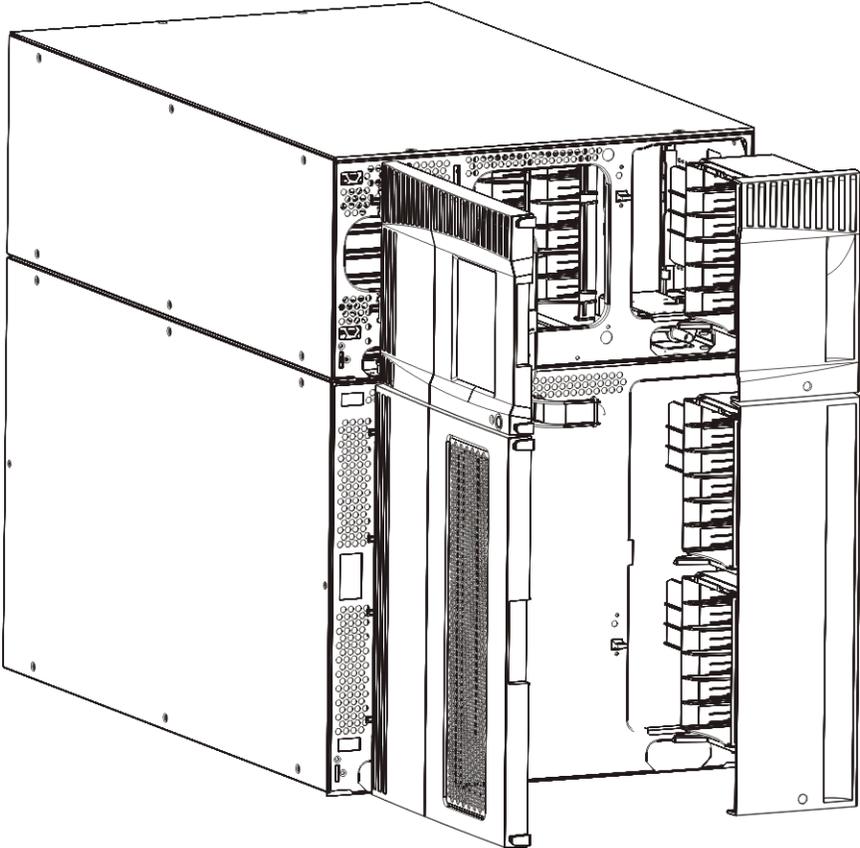
I/E Station Lock Assembly

Figure 36   I/E Station Lock Assembly
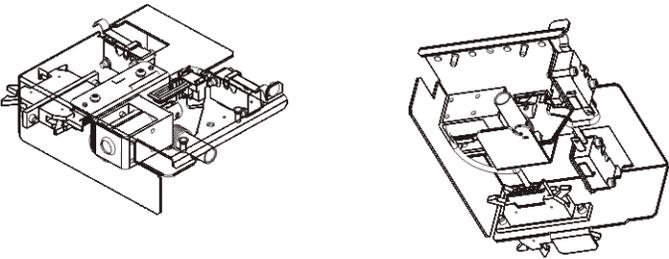
I/E Station Slide Assembly

Figure 37   I/E Station Slide Assembly (removed from module)

front
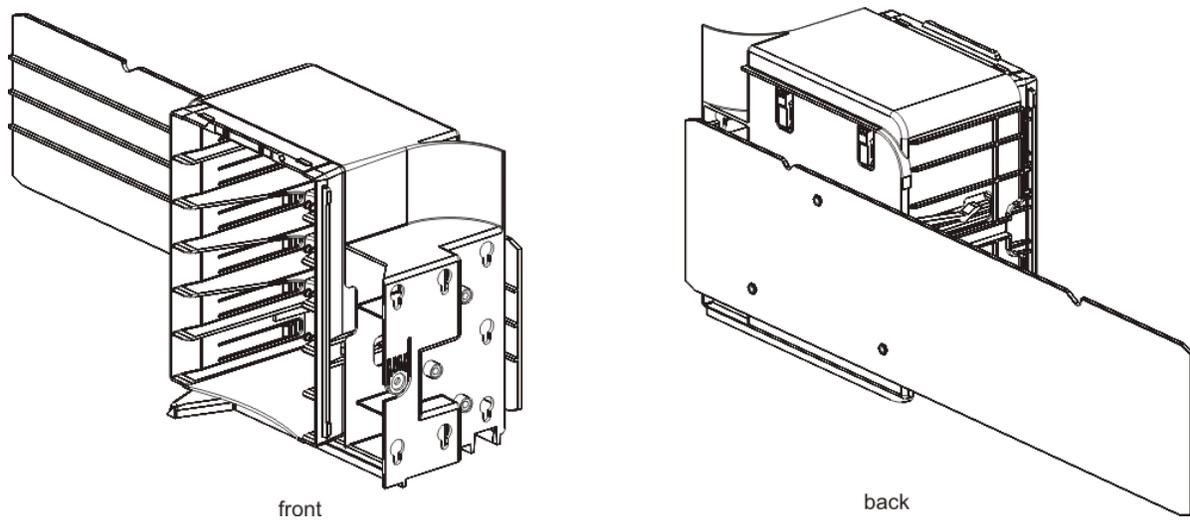
back

Access Door, Inside, With Operator Panel

Figure 38   Access Door, Inside (showing back of Operator Panel)
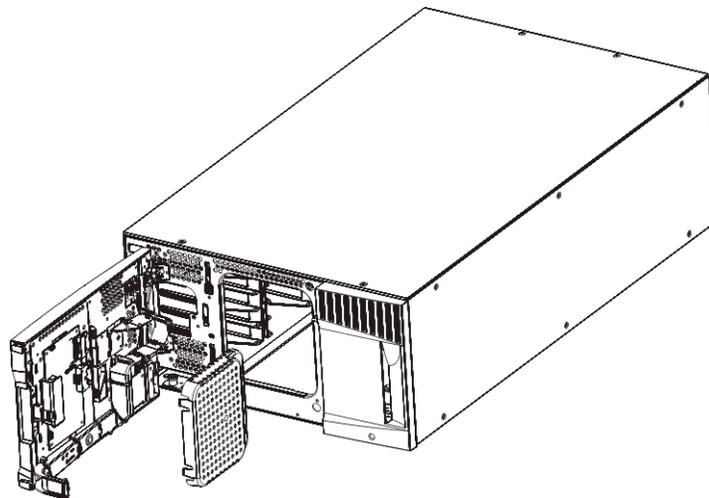
Figure 39   Operator Panel
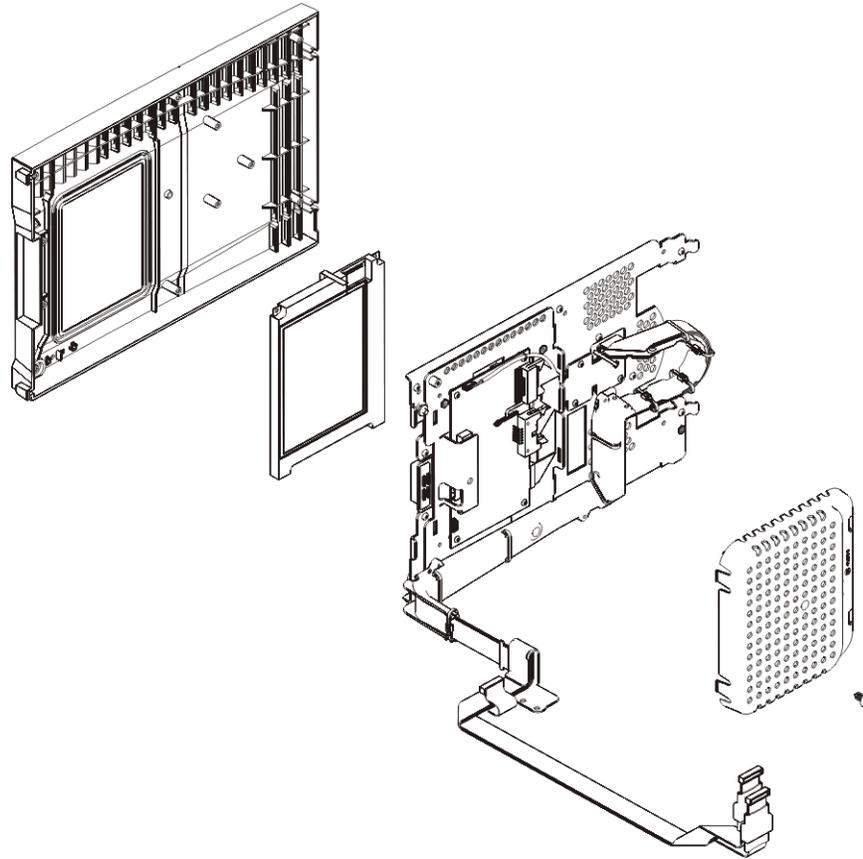
Robot Assembly

As of November 2008, the robot assembly changed. The two robots are identified as follows:

- Pre-November 2008 - Model 1 robot.

- November 2008 and after - Model 2 robot. This robot has an "M2" label on one end to identify it. Also, the robot controller board is visible on top of the Y-carriage assembly.

Both robot assemblies are shown below. Note that the actual cable spool may look slightly different from the one shown in .

Figure 40   Model 1 Robot Assembly with Original Cable Spool
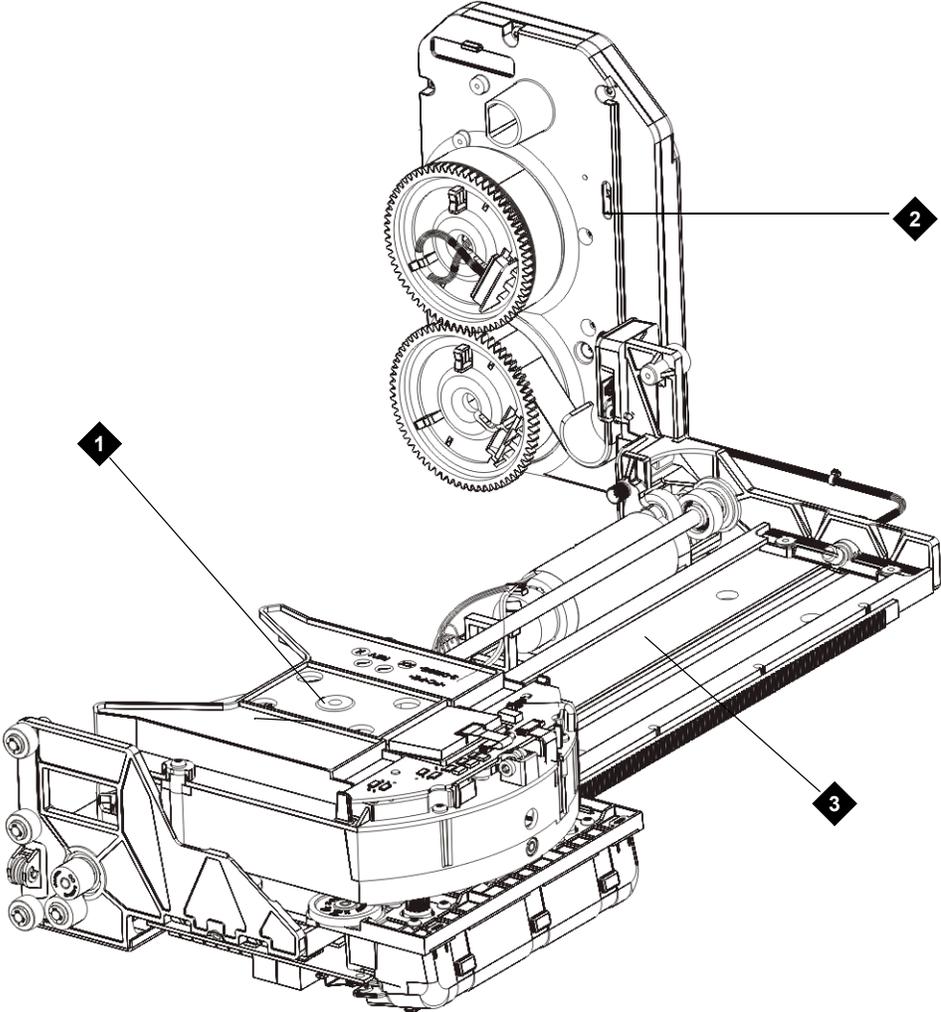
1	Picker	**3**	Y-carriage assembly
2	Cable spool		

Figure 41 Model 2 Robot Assembly (Picker Assembly and Y-Carriage Assembly)

Robot controller board

Y-carriage assembly

Picker Assembly

M2 label
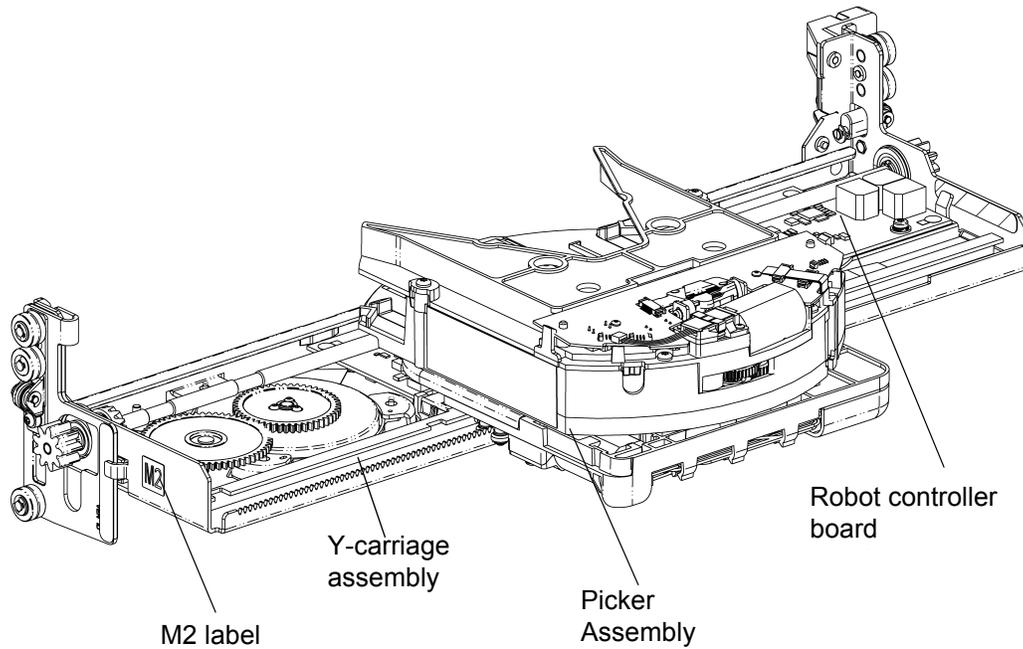
Picker Assembly

As of November 2008, the picker assembly changed as part of the robot change. The two pickers are identified as follows:

- Pre-November 2008 - Model 1 picker assembly
- November 2008 and after - Model 2 picker assembly

Both picker assemblies are shown below.

Figure 42 Model 1 Picker Assembly
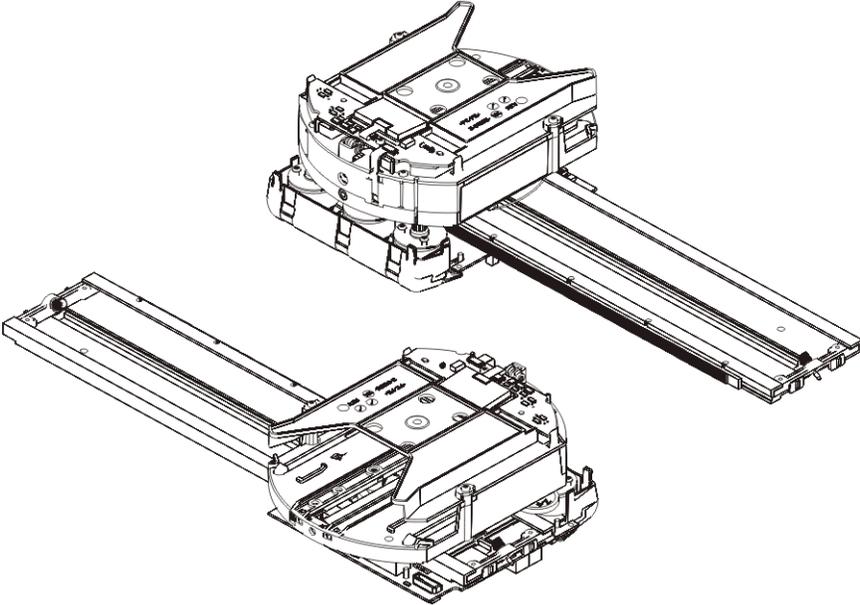
Figure 43 Model 2 Picker Assembly
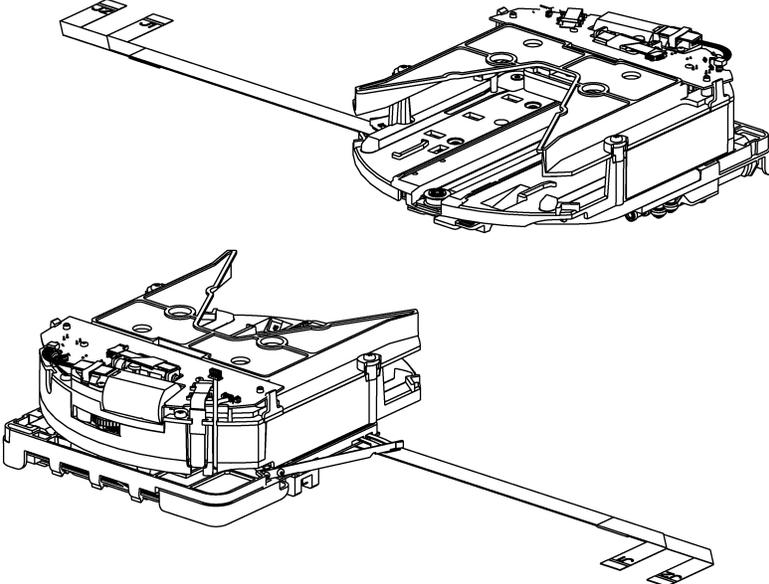
Model 1 Y-carriage Assembly

As of November 2008, the Y-carriage assembly changed as part of the robot change. The Model 2 Y-carriage assembly is included as part of the Model 2 Robot Assembly (see).

Model 1 robot
Y-carriage assembly
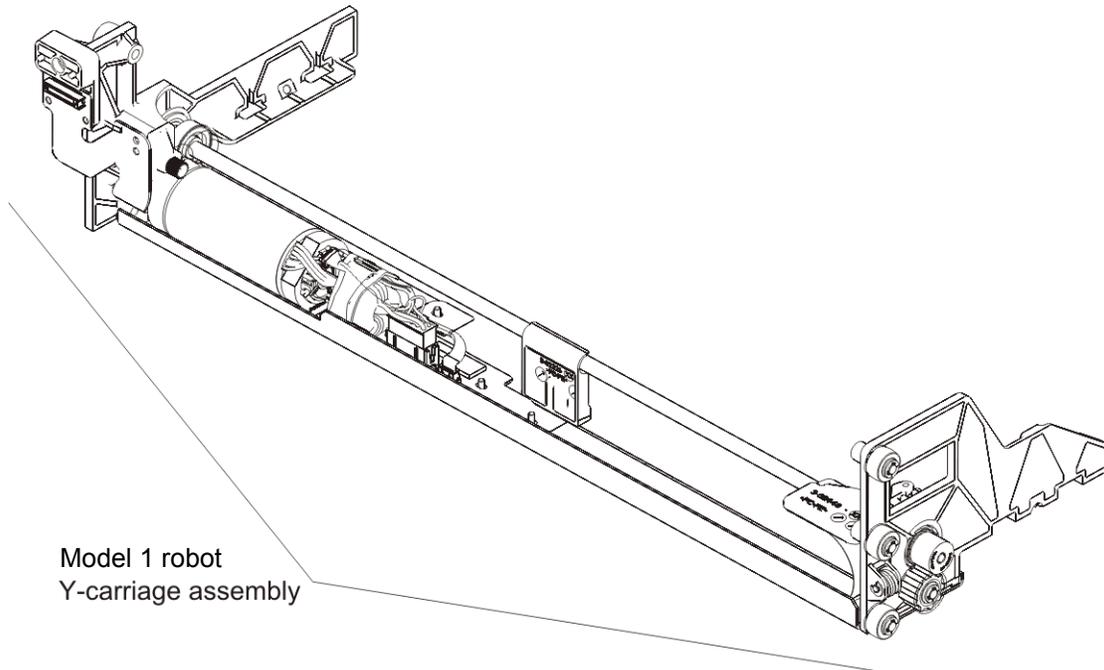
Cable Spool

On August 27, 2007, the cable spool changed. The cable spools look very similar to each other and function exactly the same way. The gears are different sizes, but the location of the components is the same.

Figure 44   Original Cable Spool.
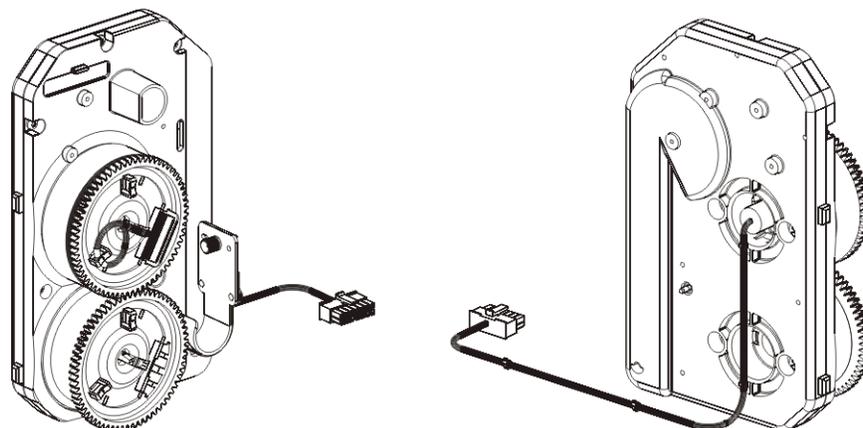
Figure 45   Cable Spool as of August 27, 2007
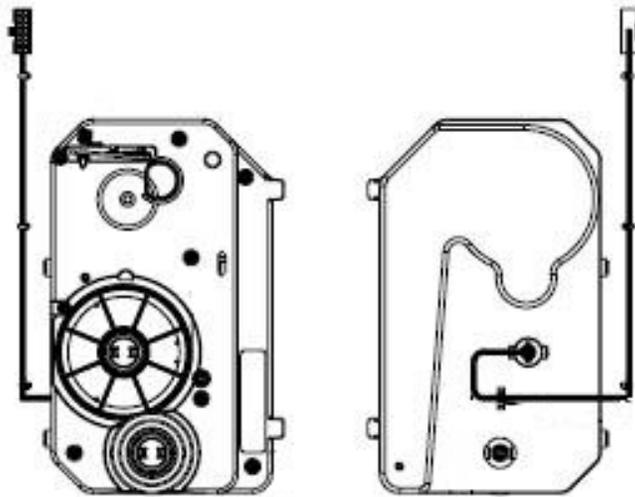
Parking Tab

As of November 2008, the robot assembly was changed. This change affected the parking tab. The Model 2 robot has spring-loaded roller sliders that extend below the Y-carriage assembly and which could be caught and bent on the lower chassis when removing the control module if the old parking tab was used. The new parking tab sticks up 1 inch vertically and holds the robot up high enough that the roller sliders will not get caught. Also, the tab swivels in the opposite direction. The two parking tabs are identified as follows:

- Pre-November 2008 - The parking tab will be referred to as the "Model 1 parking tab."

- November 2008 and after - The parking tab will be referred to as the "Model 2 parking tab."

> Note   The Model 2 parking tab was actually deployed in the field a few months before the Model 2 robot. This means that you may see some Model 2 parking tabs on libraries containing Model 1 robots. The Model 2 parking tab works with Model 1 robots; however, the Model 1 parking tab does NOT work with Model 2 robots.

Table 17   Differences between the parking tabs:

Feature	Model 1 Parking Tab	Model 2 Parking Tab
Color	Grey	Black
Shape	Flat	Vertical
Movement	Clockwise to hold-robot position	Counter-clockwise to hold-robot position

Figure 46   Model 1 Parking Tab, Parked
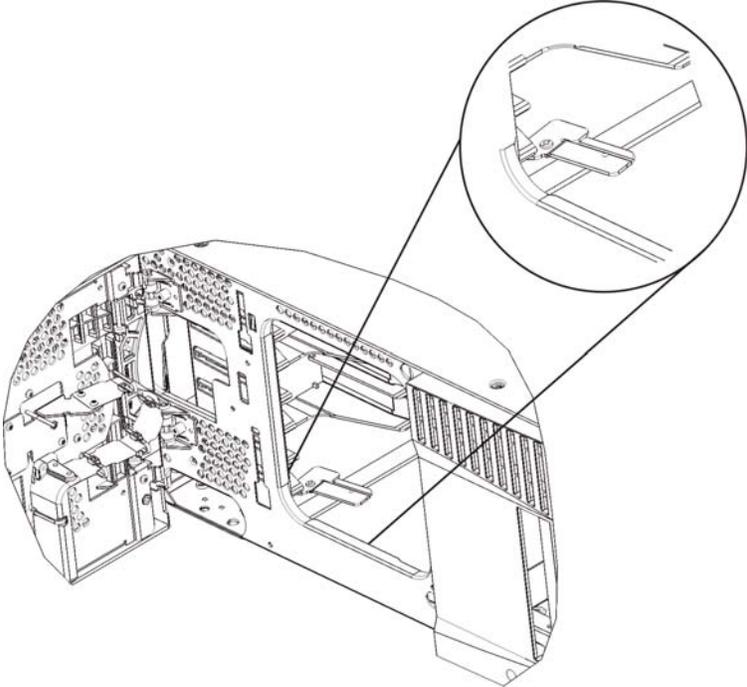
Figure 47   Model 2 Parking Tab, Parked
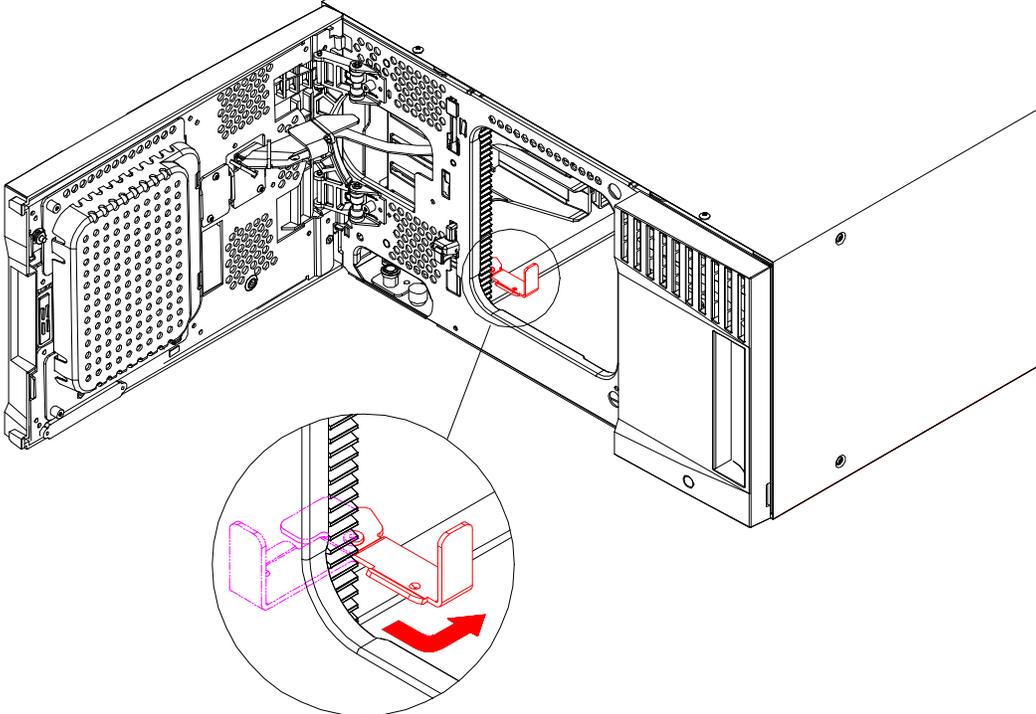
Library Control Blade (LCB)

Figure 48   Library Control Blade

LCB Compact
Flash Card
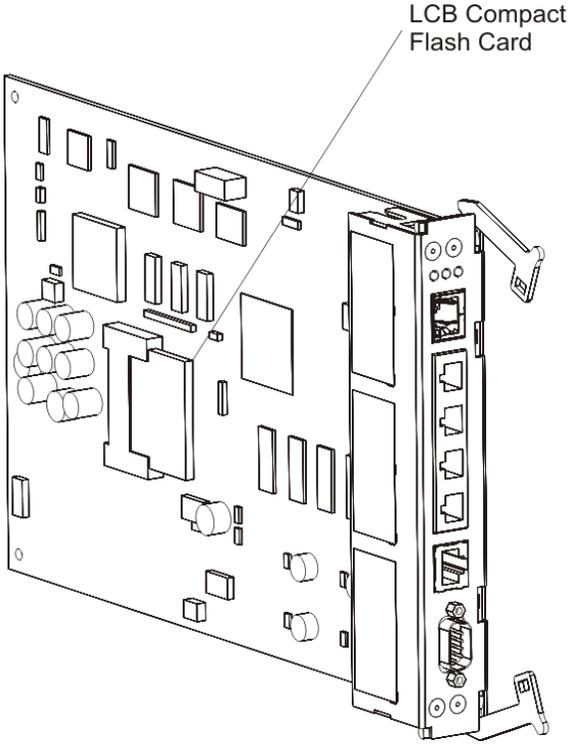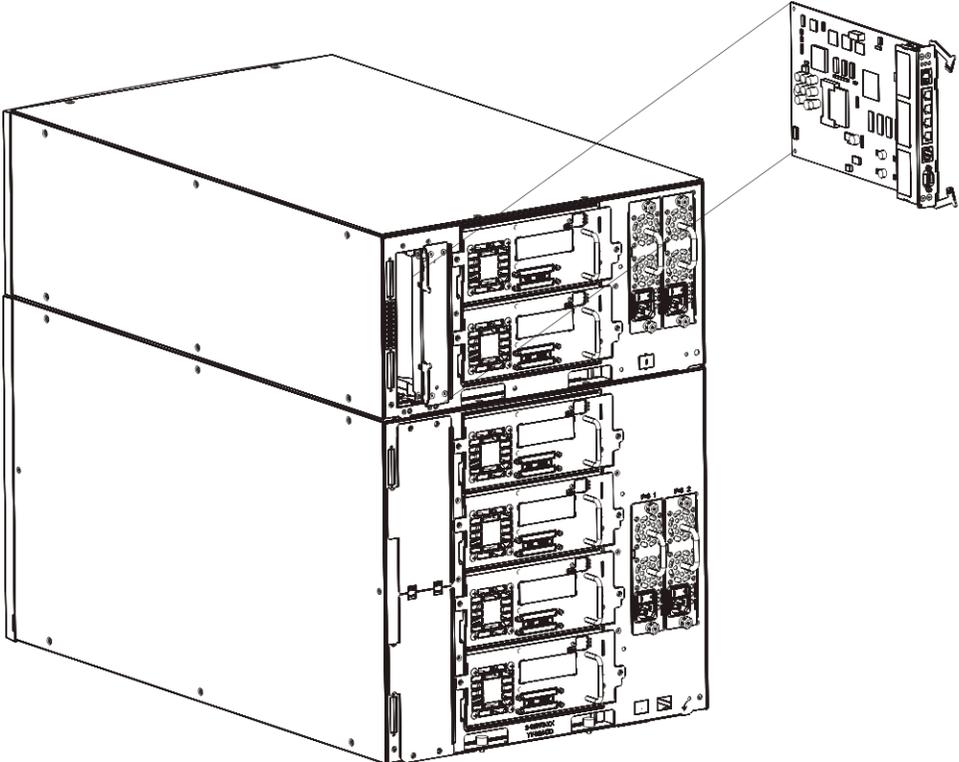
Power Supplies

Figure 49   Power Supplies
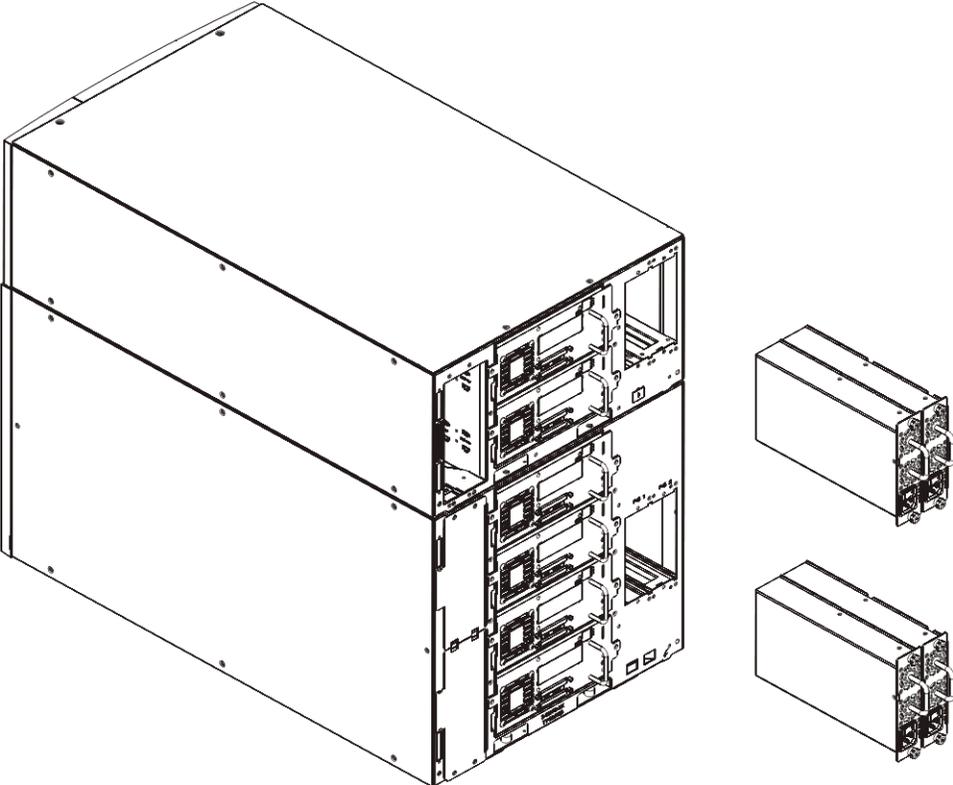
Figure 50   Power Supplies, Back View
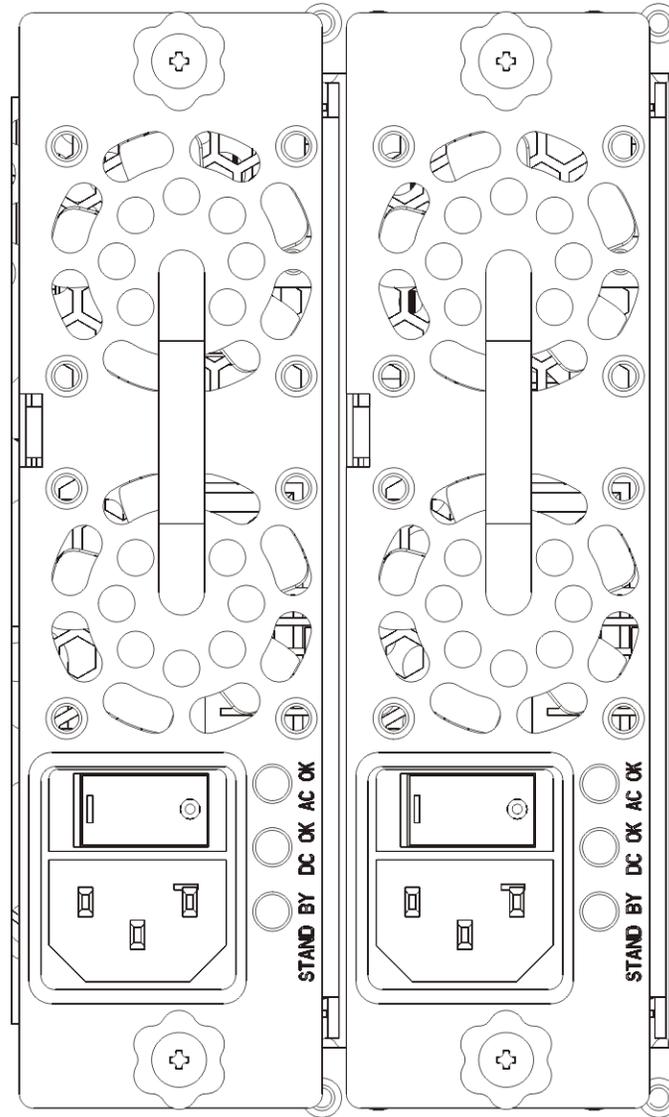
Tape Drive, Front

![Note icon] **Note**   In this document, *tape drive* is used as a collective term to describe the universal drive sled (UDS) and the tape drive itself. The UDS houses the tape drive. The tape drive itself is also sometimes called the *drive brick* to differentiate it from the *drive sled*.

Figure 51   Tape Drive, Front View
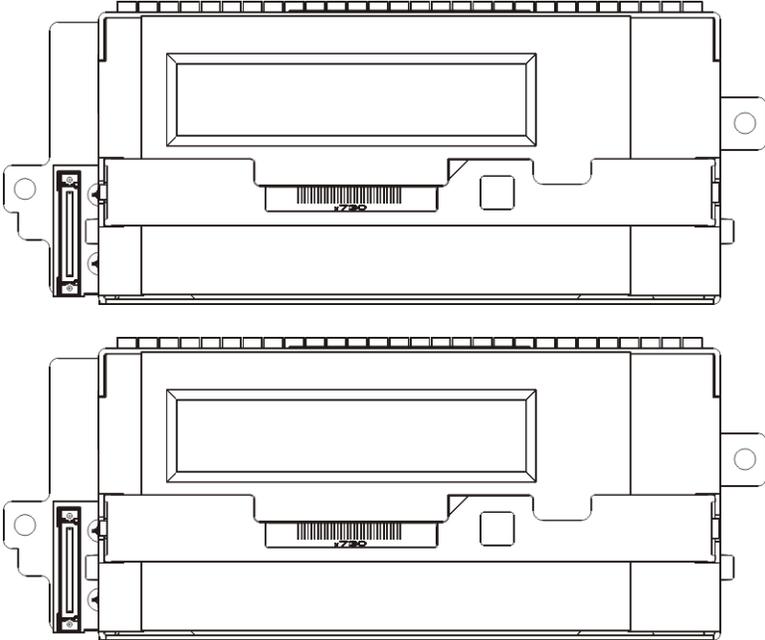
Tape Drive, Rear

Figure 52   Fibre Channel Tape Drive, Rear View
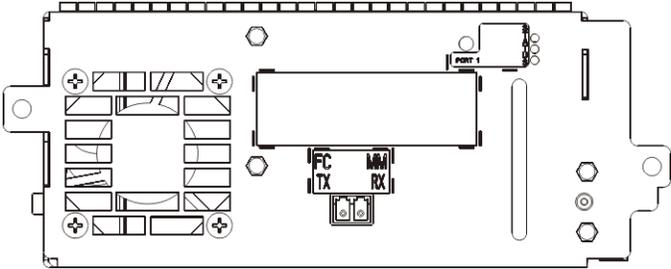
Figure 53   SCSI Tape Drive, Rear View
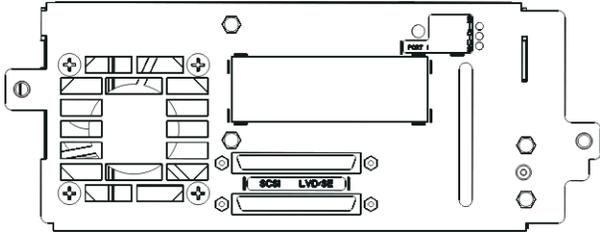
Rack-mount Kit Accessories

Table 18   Rack-mount Kit Contents
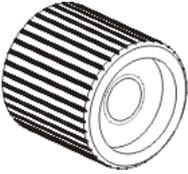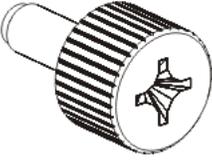
Component	Description	Quantity
	Small ferrule — Used in racks with round holes	10 (8 required; 2 spares)
	Large ferrule — Used in racks with square holes	10 (8 required; 2 spares)
	Thumbnut — Secures the rack shelves to the rack	8
	M5 thumbscrew — Secures the rack ears	4
	Rack ear, left — Holds the modules in the rack	1

Table 18   Rack-mount Kit Contents
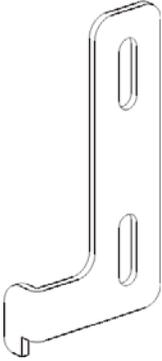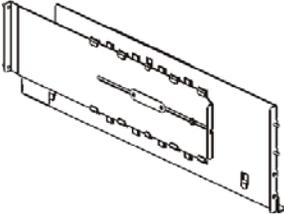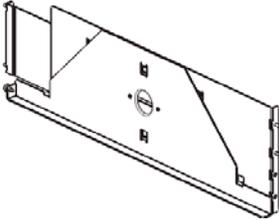
Component	Description	Quantity
	Rack ear, right — Holds the modules in the rack	1
	Rack shelf, left — Secures the modules in the rack	1
	Rack shelf, right— Secures the modules in the rack	1

Table 19   Rack Ear Kit Contents
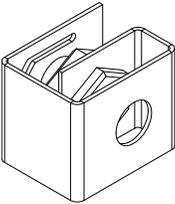
Component	Description	Quantity
	Nut clip — Used in racks with square holes	4

Table 19   Rack Ear Kit Contents
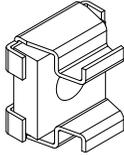
Component	Description	Quantity
	Cage nut — Used in racks with round holes	4
	M5 thumbscrew — Secures the rack ears	4
	Rack ear, left — Holds the modules in the rack	1
	Rack ear, right — Holds the modules in the rack	1
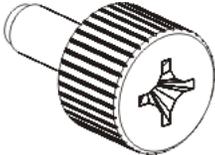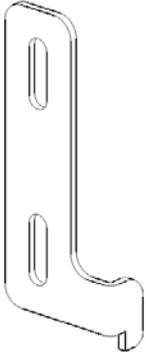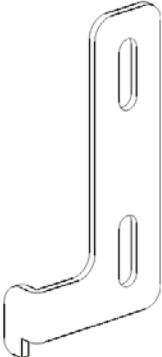
Rack-mount Rails in Rack

Figure 54   Rack-mount Rails in Rack (as viewed from the front, showing studs installed in rack)
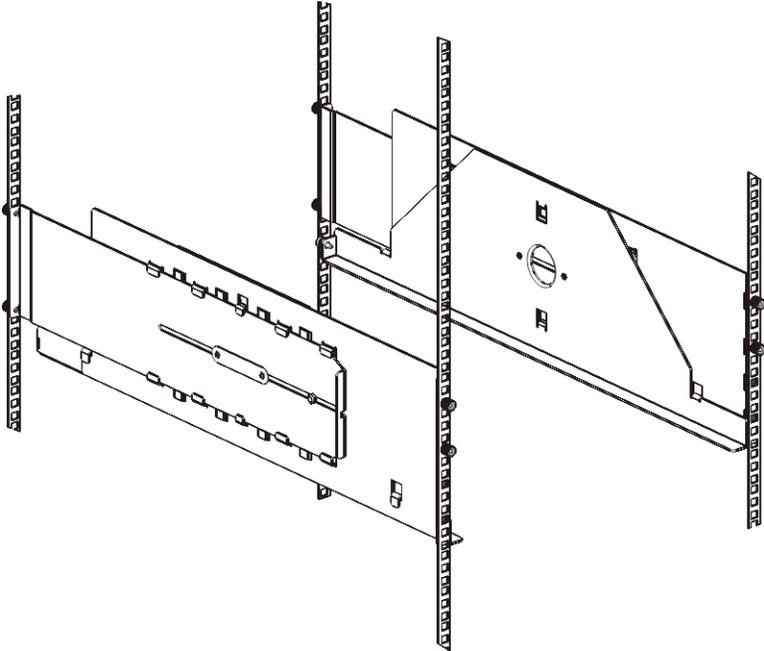
Figure 55   Rack-mount Rails in Rack (as viewed from the back, showing studs installed in rack)
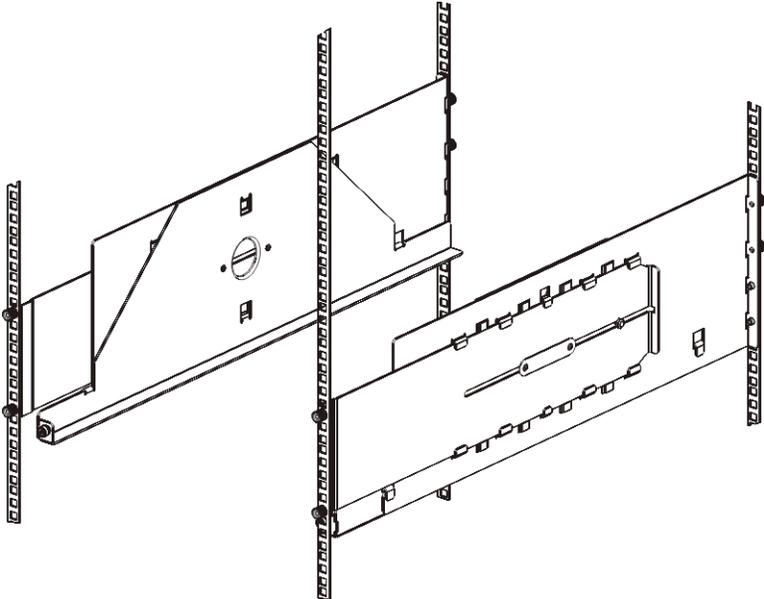
Rack-mounted Library

Figure 56   Rack-mounted Library, Front
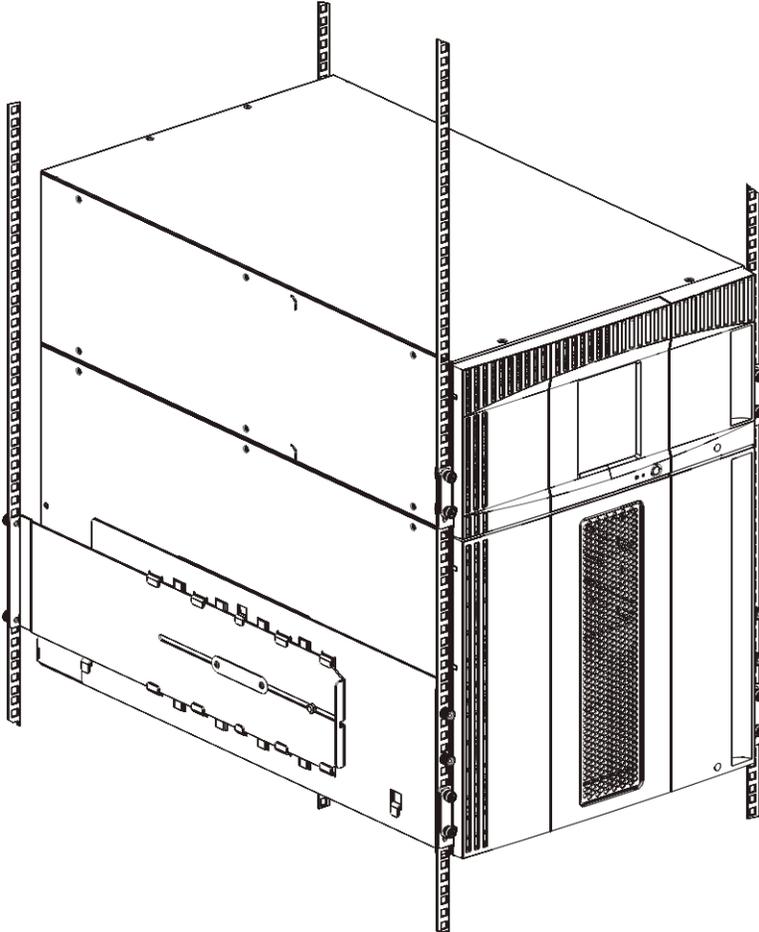
Figure 57   Rack-mounted Library, Back
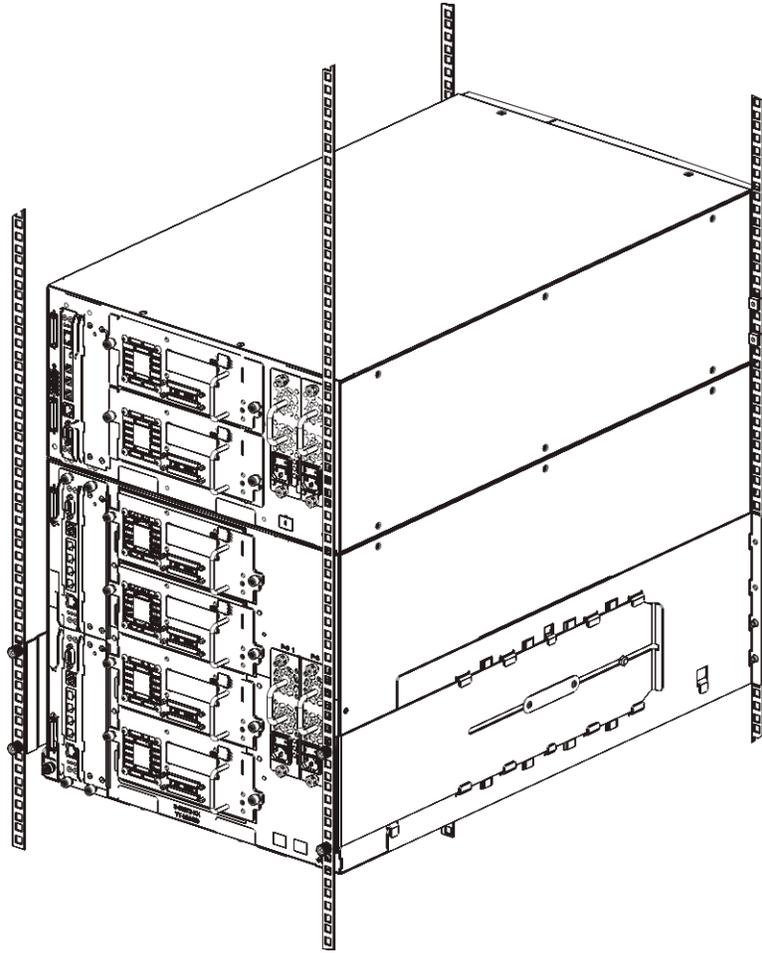
System Diagrams

The following diagrams illustrate the library's main connection points, which enable the library to communicate with components within the library, and with other servers on the SAN. Become familiar with the location of each of these connection points, and how they may be configured for use.

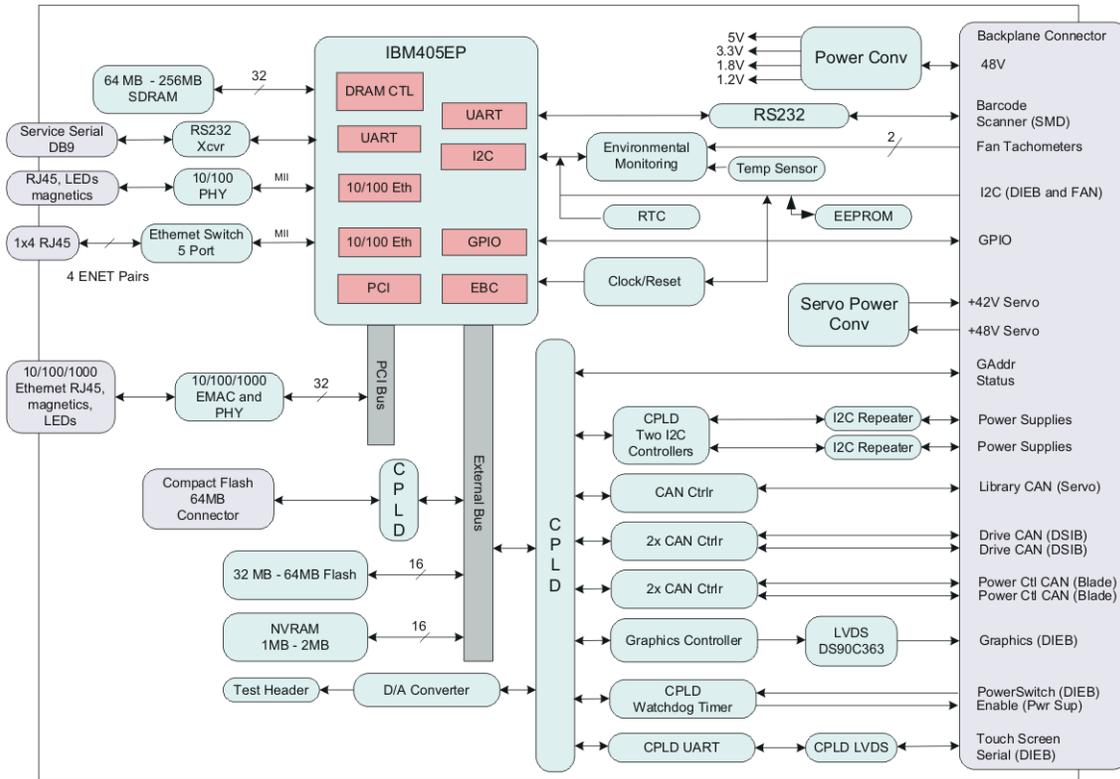**Figure 58**   Electrical System, 5U Library Control Module
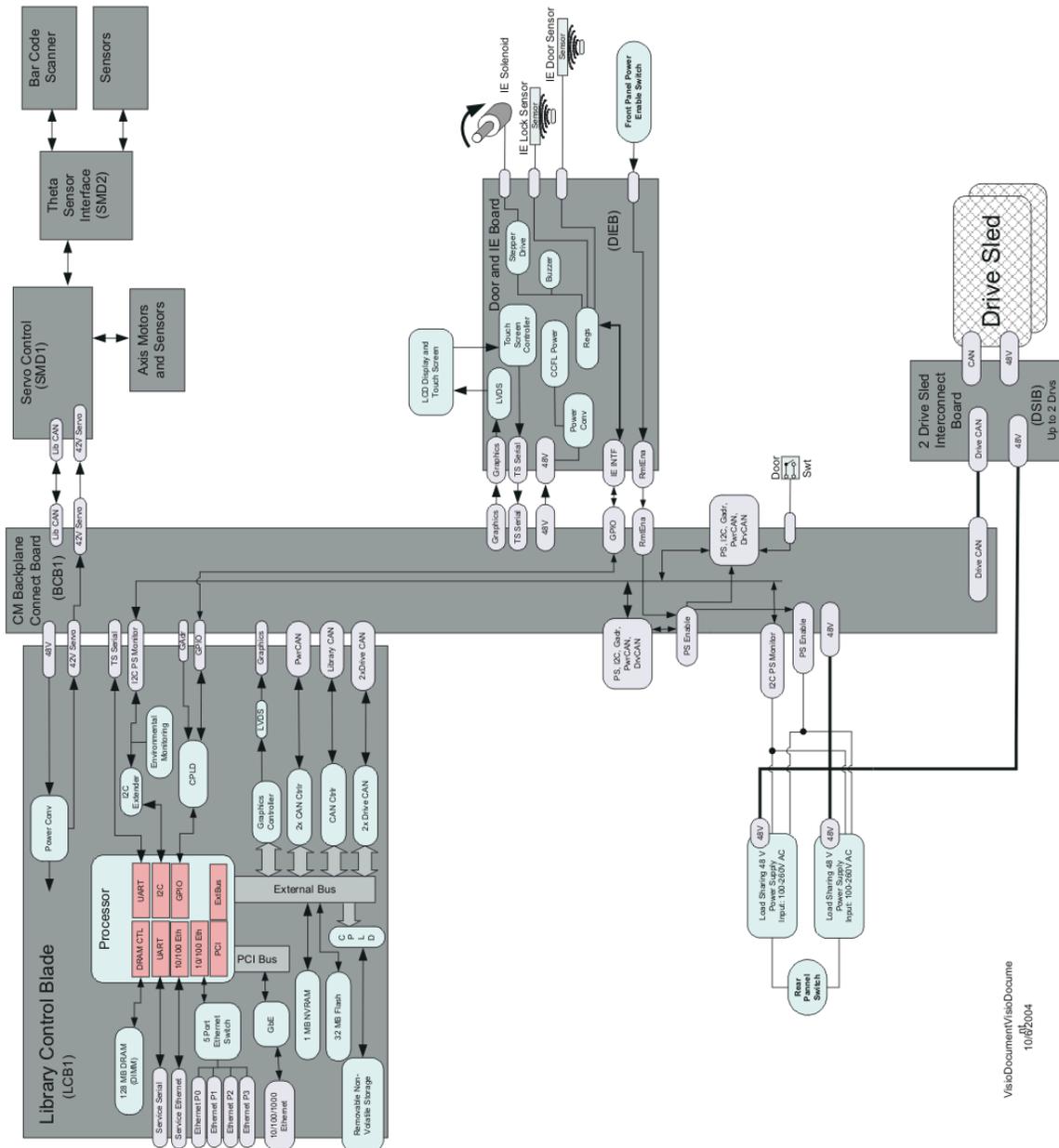
Figure 59   LCB Functions

Library Drawings
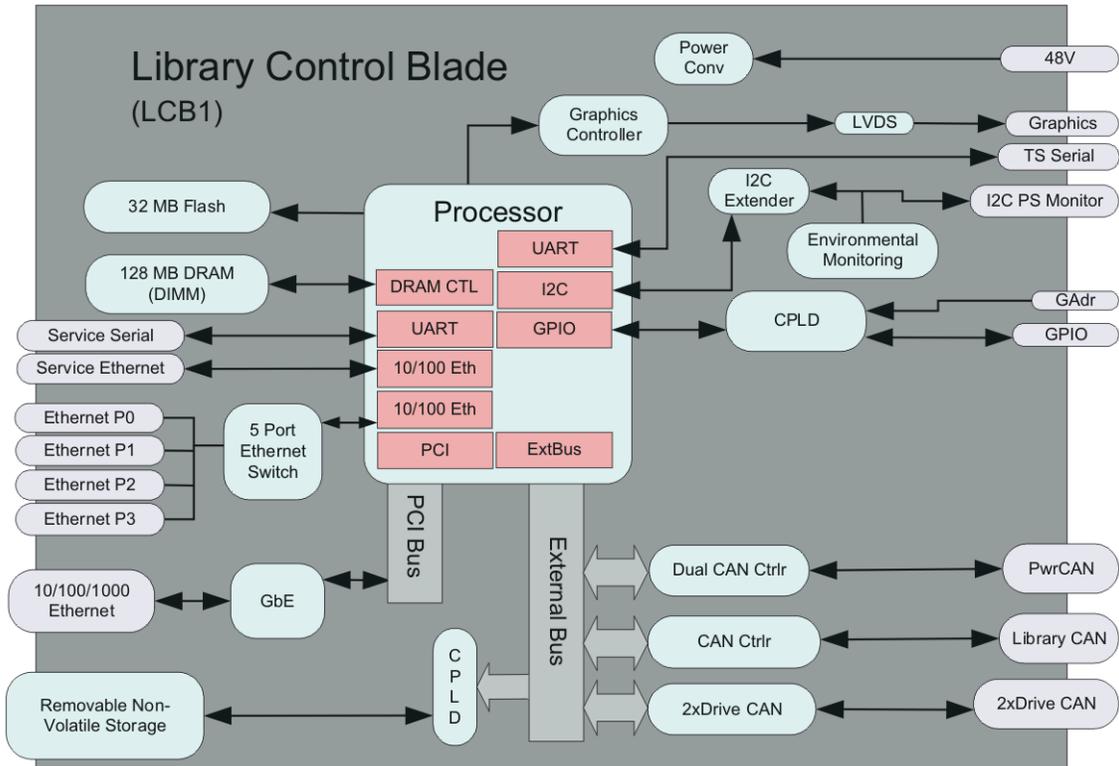
Library Control Blade

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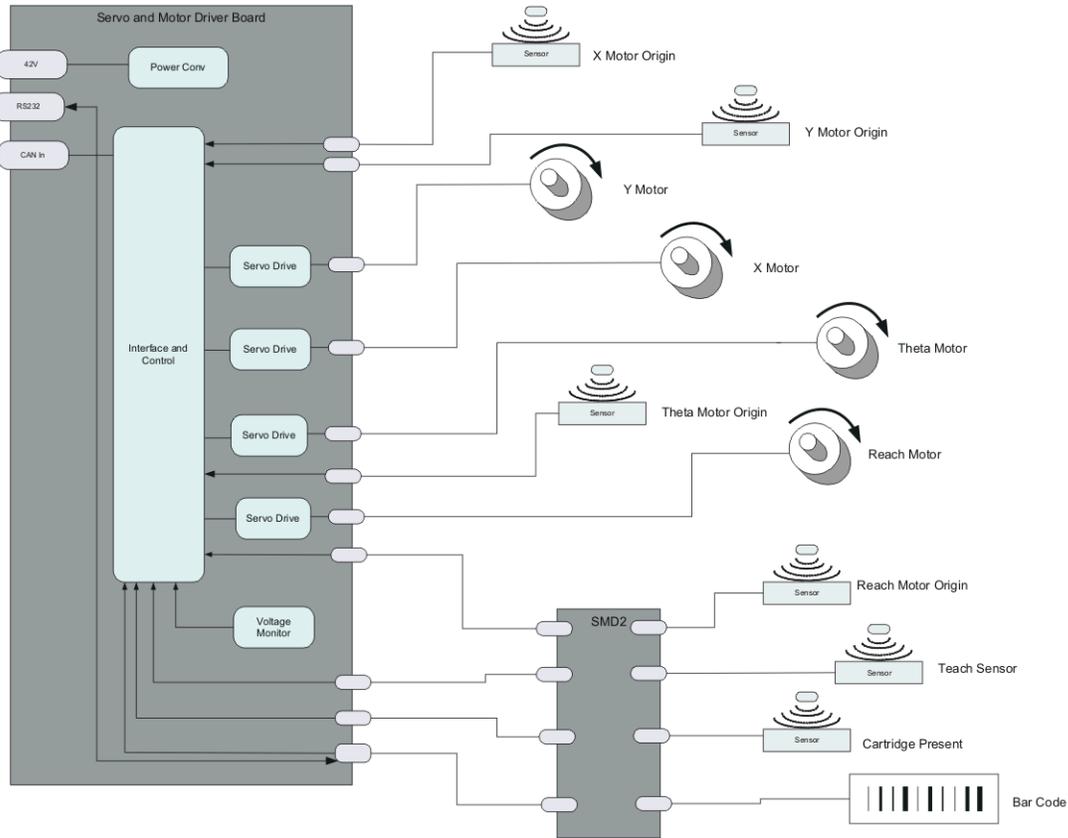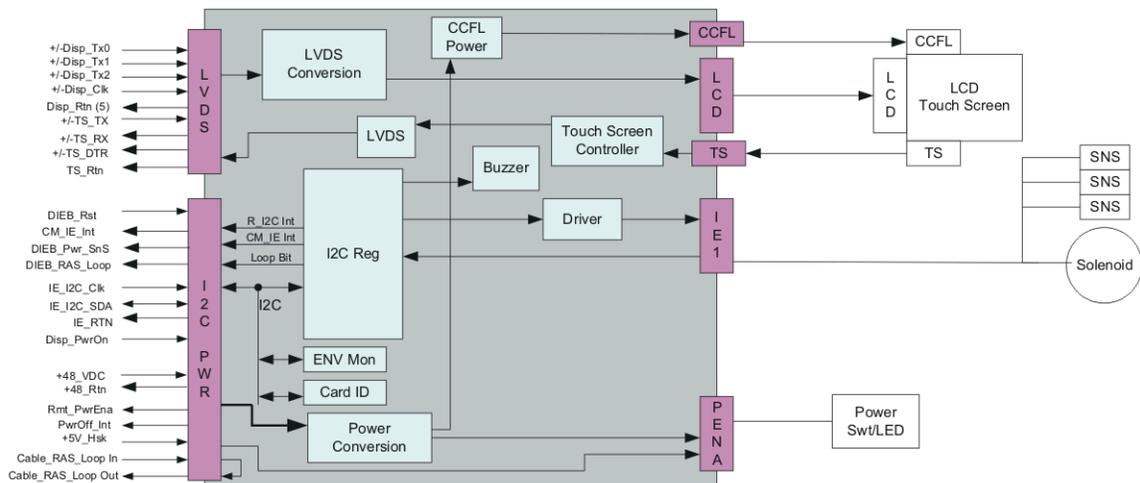**Figure 60**   Accessor Control Block

Figure 61   Door and Import/Export Board (DIEB)

VisioDocumentVisioDocument
10/07/04
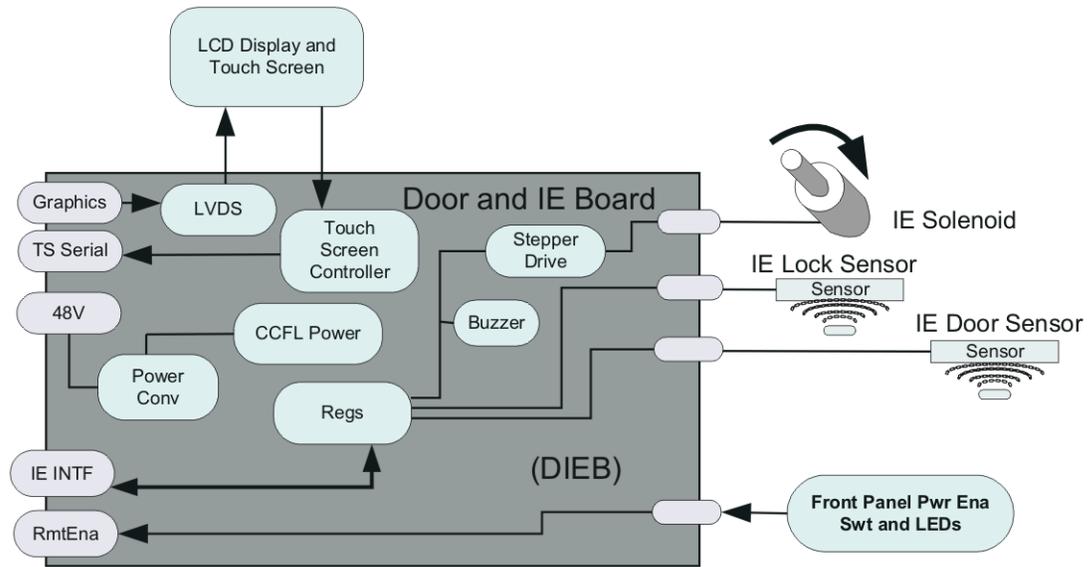
Figure 62   Door and Display Block
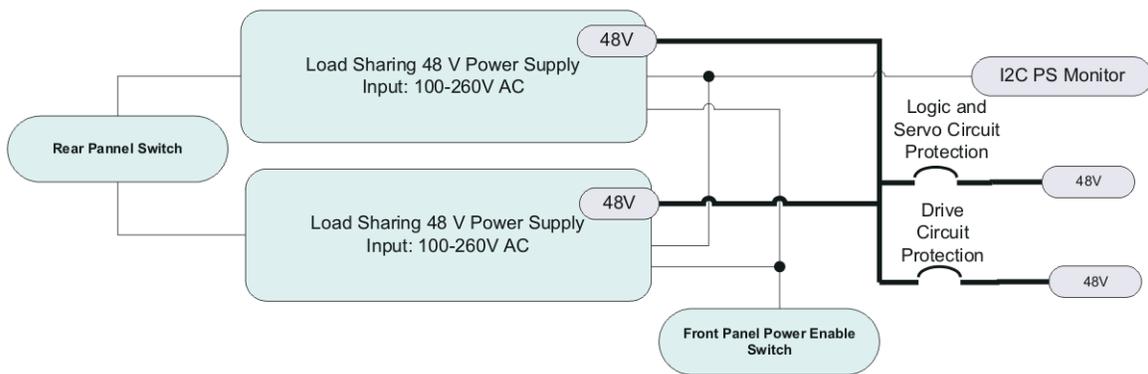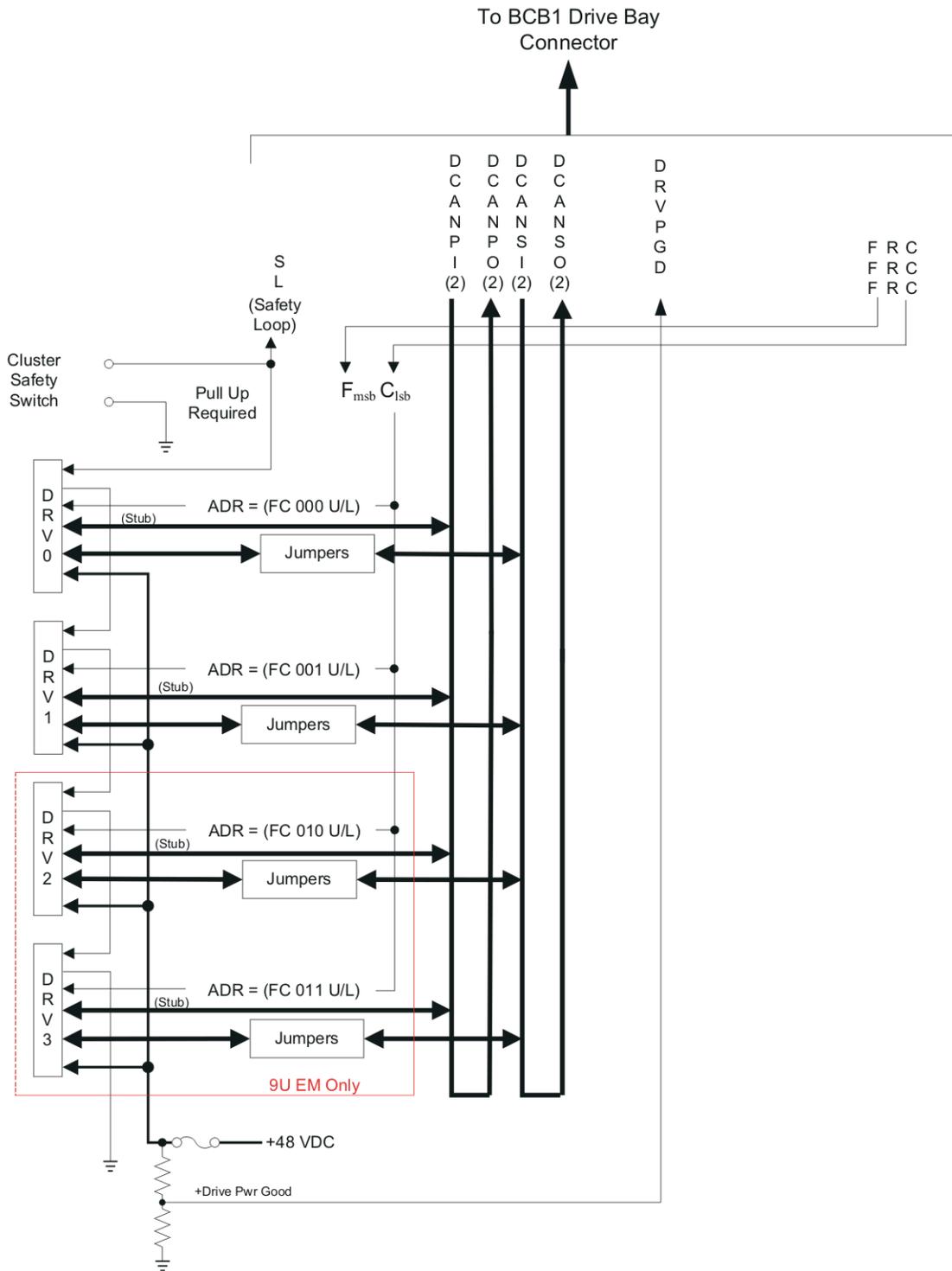

Figure 63   Power System Block
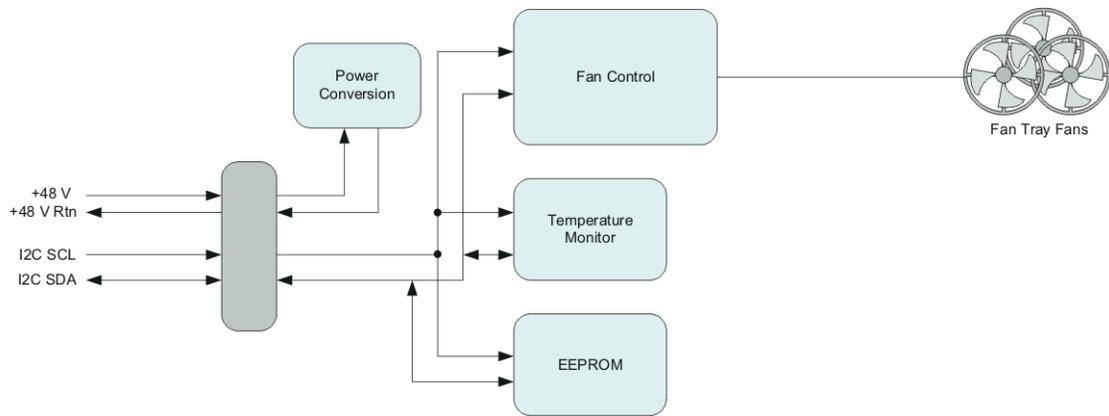
Figure 64   Fan Control Board

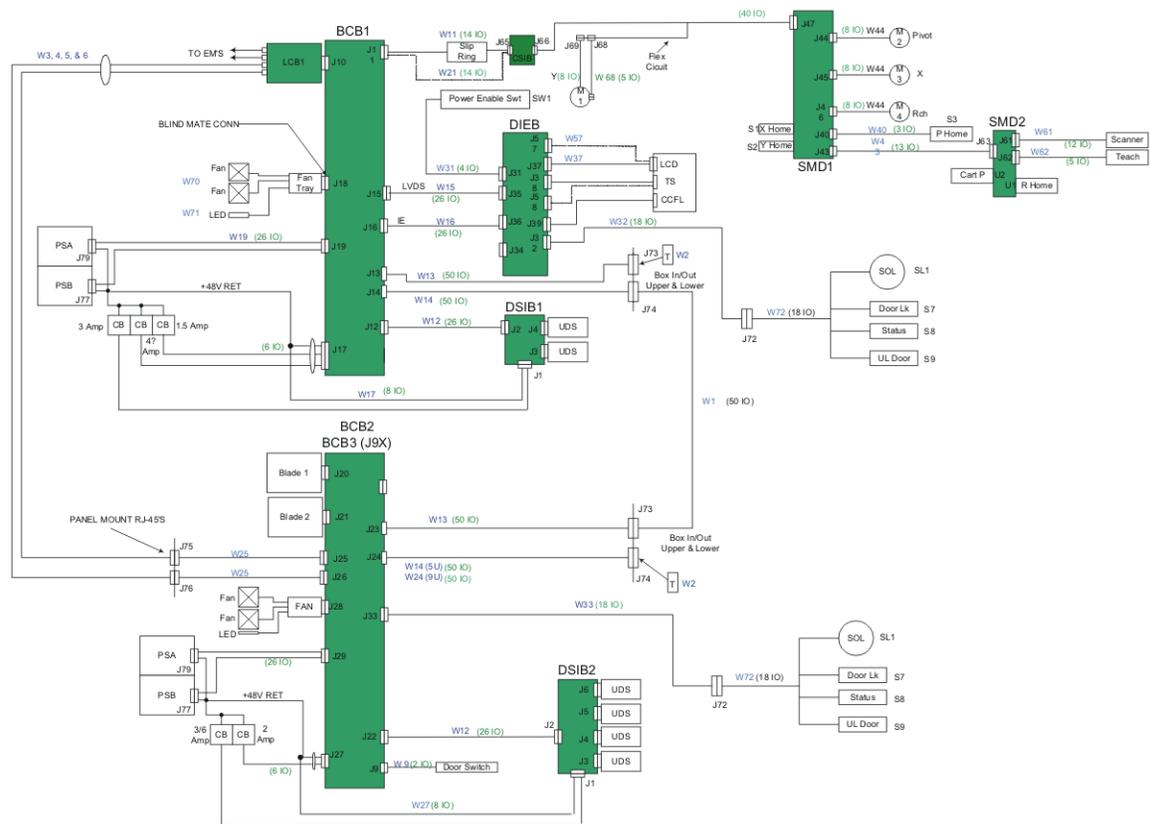**Figure 65** Library Cables

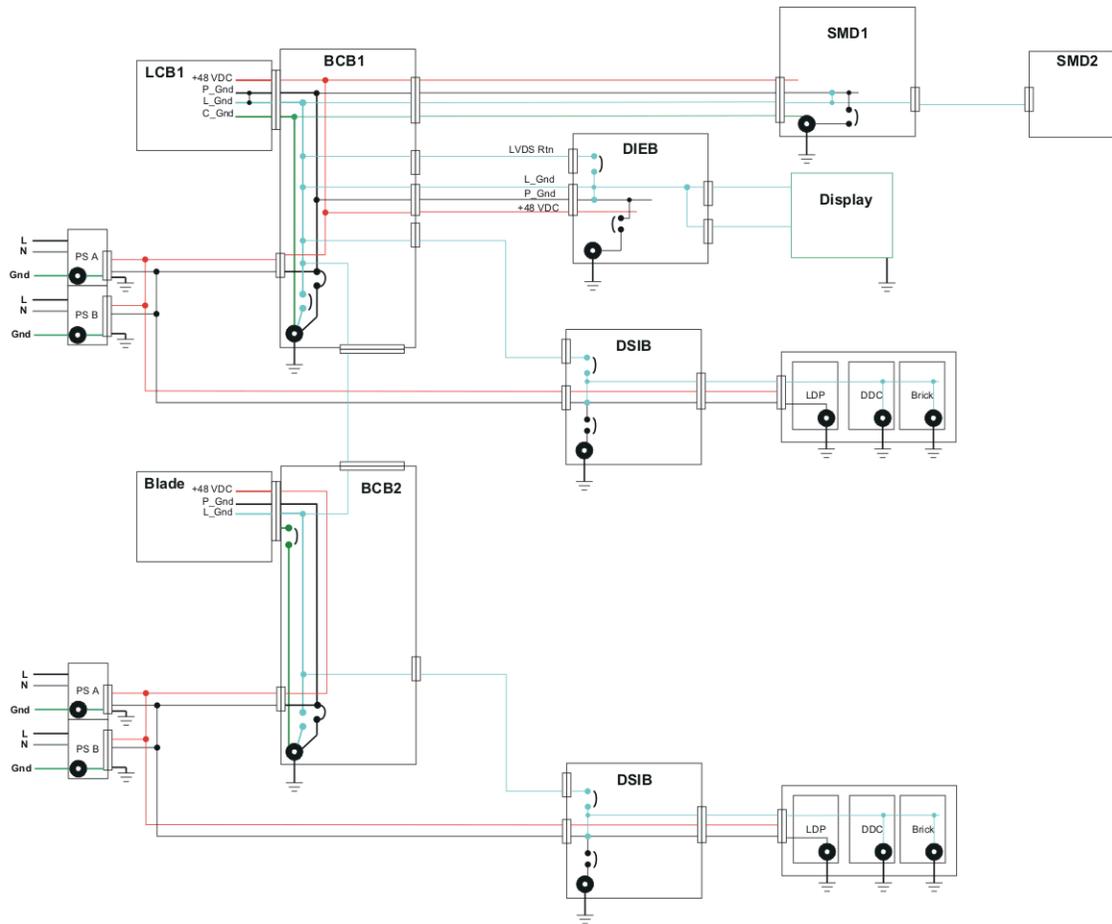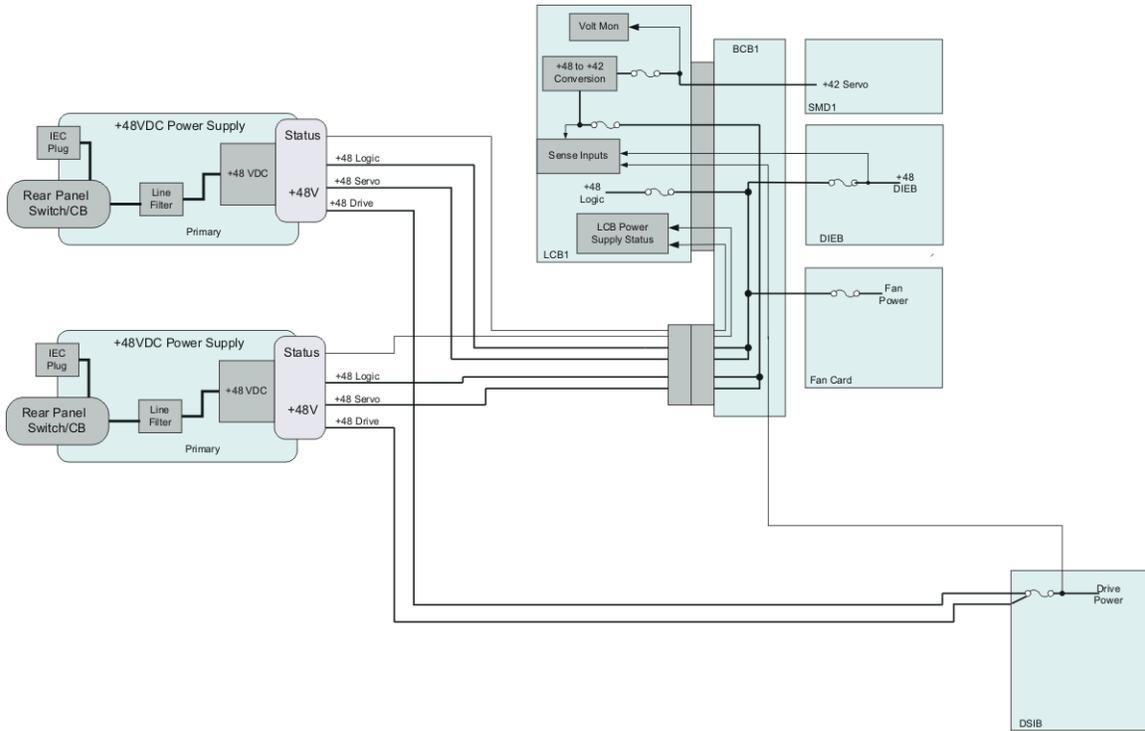**Figure 66**   Library System Grounding

Figure 67   Library Power System

7

Glossary

arbitrated loop
A Fibre Channel configuration that attaches multiple communicating ports in a loop. Two or more ports can interconnect, but only two ports can communicate simultaneously.

arbitration
The submission of a request to gain access to an arbitrated loop by a device, so that it can transmit data in the loop.

availability
A RAS attribute that refers to the accessibility of a system resource in a timely manner; for example, the measurement of a system's uptime.

barcode
A printed array of varied rectangular bars and spaces that can be scanned and read for object identification.

bus
A transmission channel through which electrical signals are carried from one device to another device.

CAN (controller area network)
A serial bus network of microcontrollers that connects devices, sensors, and actuators in a system or sub-system for real-time control applications. There is no addressing scheme used in controller area networks, as in the sense of conventional addressing in networks (such as Ethernet). Rather, messages are broadcast to all the nodes in the network using an identifier unique to the network.

cartridge
A container that is a protective housing for storage media, such as cartridges for tapes or optical disks.

channel zoning
A method of subdividing a storage area network into disjoint zones on a per-channel basis to enhance security and qualify access.

cleaning tape/cleaning cartridge
A tape used to clean recording heads and reading heads on a tape drive.

cleaning slot
The physical home where a cleaning tape or cartridge resides.

CLI (command line interface)
A method of interfacing with a file system in which the user types commands, using a specific command syntax, from a command line.

COD (Capacity on Demand)
A library feature that allows users to have a large physical library, but only be licensed to use a subset of its total capacity. Users pay only for what they are currently using. License upgrades enable more capacity without causing a system interruption.

compact flash
A card on the LCB that stores information about a library's contents and configuration.

connectivity
The method by which hardware devices or software communicate with other hardware or software.

control module
The first module of the library. It consists of an operator panel touch screen, library control blade (LCB), storage, tape drives, power supplies, and I/E station.

control path
The connection between a partition and host application. The control path connection is made through a designated tape drive. Only one tape drive can be selected as the control path per partition.

controller
The PCB or system that translates computer data and commands into a form suitable for use by the storage disks.

CRU (customer replaceable unit)

The smallest hardware component that can be replaced at a customer installation by a customer.

default
A value or setting that is selected by the hardware or software unless specified otherwise by the user.

DHCP (Dynamic Host Configuration Protocol)
A protocol for assigning dynamic IP addresses to devices on a network. DHCP supports a mix of static and dynamic IP addresses.

directory
A file that contains a list of other files. *Directory* is short for *directory file*.

drivers
Software programs that enable a computer to communicate with hard drives, CD ROM drives, printers, and other peripherals. Drivers are stored on a hard disk and loaded into memory at boot up.

EDLM (Enterprise Data Life Management)
An automated set of policies and processes that provide long-term data protection and data integrity by checking the data stored on tape. EDLM identifies candidate media, invokes media scans, processes the results, and takes appropriate actions to preserve data integrity.

element ID - logical
An address used by a library to locate and track a library component. The address is specified in programming logic rather than on the physical location of a component within a library. When a logical library is used, the logical element ID masks the physical element ID.

element ID - physical
An address used by a library to locate and track a library component. The address is based on the physical location of a component within a library. Applications expect to see resources at specific IDs.

Ethernet
A type of local area network designed to transport data at rates up to 10 million bits per second. Other software, such as TCP/IP, runs on top of Ethernet to provide high-level networking services to applications.

event
A condition that matches a numbered, predefined set of circumstances.

event log
A list of all predefined events logged by library and software management tools.

expansion module
An optional module of the library. It provides additional storage, tape drive capacity, power, and optional I/E stations. The module lacks an operator panel touch screen and LCB.

FC (Fibre Channel)
A high-speed data transfer architecture. Using optical fiber to connect devices, Fibre Channel communications are serial communications that occur at full duplex and achieve data transfer rates of 200 MBps.

FC-AL (Fibre Channel Arbitrated Loop)
A form of Fibre Channel network in which up to 126 nodes are connected in a loop topology. See arbitrated loop.

FC-AL device
A device that employs Fibre Channel Arbitrated Loop and consists of one or more NL_Ports.

fiber
A thin filament of glass. An optical waveguide consisting of a core and a cladding that carries information in the form of light. *Fiber* is also a general term used to cover all physical media types supported by Fibre Channel, such as optical fiber, twisted pair, and coaxial cable.

fiducial
In a library storage context, *fiducial* refers to the reliable identification of media, including both location and media type information. For example, in a library, a fiducial label is a barcoded label that provides the library with location and media type information for three designated containers: magazines in I/E stations, storage slots, and tape drive sleds.

FIPS (Federal Information Processing Standards)
A set of encryption algorithm and other standards that encompass various aspects of information technology standards used by non-military government agencies, government contractors, and agencies working with the government.

firewall
A set of security tools designed to separate an internal network from the public Internet to keep unauthorized users out of a restricted network. Firewalls are the primary line of security defense for businesses.

FL_Port (fabric loop port)
An F_Port that is capable of supporting an attached Fibre Channel Arbitrated Loop. An FL_Port on a loop will have the AL_PA hex '00' giving the fabric the highest priority access to the loop. N_Ports or NL_Ports can attach to it in an arbitrated loop topology and are capable of communicating with FC-AL protocol.

FMR (field microcode replacement) tape
See FUP.

F_Port (fabric port)
A port on a fabric switch to which N_Ports may be directly connected. The F_Port is not capable of communicating with FC-AL protocol.

FRU (field replaceable unit)
The smallest hardware component that can be replaced at a customer installation by a certified field service representative.

FUP (firmware upgrade) tape
A tape that can be used as an alternative to upgrading firmware with SCSI or host.

Gb E or **GigE (Gigabit Ethernet)**
A transport protocol used for transmitting data across traditional LANs. GigE is an enhanced version of the Ethernet protocol that has been used for many years as the underlying transport technology in IP networks.

GUI (graphical user interface)
A computer environment that provides a visual view of a system by incorporating windows, icons, menus, and a pointing device. Also referred to as a Windows, Icons, Mouse, and Pointers (WIMP) interface.

HDD (high density drive)
A drive that contains increased storage capacity of bits and/or tracks per square inch.

home position
Accessor axes positioned at 0 vertical and 0 horizontal, which serve as the point of reference for the position of other library components. Home position is used as a basis for calibration.

host
In general, a *host* is a computer or program that contains data and provides services to other computers or devices. In Fibre Channel terms, a host is a computer that initiates contact with storage devices.

hot swappable
The ability to replace a defective component while the system continues to function normally.

HTTP (Hypertext Transfer Protocol)
The communication rules by which a Web browser (client) and a server delivering Web pages exchange information.

I/E (import/export, generally replacing insert/eject)
The movement of data or hardware in and out of processing and storage systems.

I/E slot
Import/export slot. A bin that contains a single piece of media in the I/E station.

I/E station
Import/export station. A door on the front of the library that contains tape magazines, into which cartridges to be imported are placed manually or cartridges to be exported are placed by the picker.

interoperability
The capability of two or more hardware devices or two or more software routines to work together.

IP (Internet Protocol)
A protocol that specifies the formats of packets and addresses. Addresses are formulated as four groups of 2 or 3 digit numbers separated by periods, such as 255.255.255.255 (IPV4). The newer IPV6 standard uses 8 groups of 16 bits each. Each group is written as 4 hexadecimal digits, and the groups are separated by colons (:). The address 2001:0db8:0000:0000:0000:ff00:0042:8329 is an example of this representation.

kernel
The heart of the UNIX operating system. The kernel is the part of the operating system that allocates resources and controls processes. The design strategy has been to keep the kernel as small as possible and to put the rest of the UNIX functionality into separately compiled and executed programs.

key server
A server (computer) that receives, stores, and provides encryption/decryption keys for a specified encryption type.

L_Port (loop port)
A port that has the capability to communicate only over FC-AL hubs and through FL_Ports.

LED (light emitting diode)
The mode of data transmission for multimode cables with short wave optical transceivers. Single-mode cables, by comparison, use high powered, long wave lasers.

LME (Library-Managed Encryption)
An encryption method that allows the library to manage the interaction with the encryption-capable tape drive. LME does not require any independent software support and is transparent to the application.

library
A large-scale tape device with robotics that can house multiple tape drives and a significant amount of tape cartridges.

library control module
See control module.

license key
An alphanumeric code that makes a locked feature available. For example, a license key can be applied to the library to enable unlicensed slots.

logical library
See partition.

loop
With this Fibre Channel option, the port operates with attached loop-capable devices. If a point-to-point device is attached, the appliance is not able to communicate with it.

loop ID
A unique 7-bit value from 0 to 126 that represents the 127 valid AL_PAs (physical addresses) on a loop.

LTO (Linear Tape Open)
A family of magnetic tape media that are "open" in the sense of not being owned by a single proprietor. LTO comes in two formats, Accelis and Ultrium. Accelis is the fast access implementation, while Ultrium is the high capacity implementation.

LUN (logical unit number)
A unique identifier used on a SCSI bus to distinguish between devices that share the same bus. A LUN can be an end user, a file, or an application. In storage technology, a single large storage device might be divided into smaller pieces, either to make the vast storage space more manageable or because the storage space is dedicated to different servers, drives, or applications. When the storage space is divided into smaller parts, each part is configured with its own SCSI unique identifier, or LUN.

magazine
A container for removable media storage used in tape libraries.

media
A material that stores data, such as tapes in cartridges or optical disks.

media ID
A barcode number attached to a specific piece of media.

media type
A format/size of media, for example, LTO.

medium
See media.

mixed media
The ability of a library to simultaneously support multiple types of storage media.

N_Port (node port)
A port that has the capability to communicate only through an F-Port. It is a port on a computer, disk drive, and so on, through which the device does its Fibre Channel communication as a direct fabric-attached port for use with the point-to-point or fabric topology. It is identified by a world wide name.

NL_Port (node loop port)
A port that has the capability to communicate over both FC-AL hubs and through F_Ports.

online
A status for a component that indicates it is active and available for use.

OS (operating system)
A control program for a computer that allocates computer resources, schedules tasks, and provides the user with a way to access the resources.

partition
An abstraction of an underlying physical library that may present a different personality, capacity, or both to a host. It is a representation of real physical elements, combined to create a grouping that is different from the physical library. Also a logical portion of the physical library that is viewed by the host as if it is a complete library. Partitions present the appearance of multiple, separate libraries for purposes of file management, access by multiple users, or dedication to one or more host application.

pathname
A list of directories separated by slashes (/) and ending with the name of a directory or nondirectory file. A pathname is used to trace a path through the file structure to locate or identify a file.

picker

The robotic hand that handles cartridges.

point to point

A Fibre Channel topology that consists of a dedicated connection between two devices: a sending device and a receiving device.

rackmount

An industry standard communication and computer equipment rack cabinet.

RAS (reliability, availability, and serviceability)

Three key attributes of computing system quality design. See reliability, availability, and serviceability. An infrastructure to support serviceability in order to identify, diagnose, and fix problems within the system. This approach is designed to address the ability of service personnel and customers to diagnose and resolve problems identified within the system. Additionally, configuration is addressed to support detection of hardware configuration compatibility issues and persistence across FRUs.

RAS ticket

A ticket that alerts service personnel and customers of an issue with the library. RAS tickets identify which library components are most likely causing the issue. When possible, a RAS ticket provides instructions for resolving the issue.

reliability

A RAS attribute that is designed to prevent failure of a storage solution. See RAS.

SAM (SCSI Architecture Model)

An ANSI standard that defines the generic requirements and overall framework in which other SCSI standards are defined. New generations of this standard are identified by a numeric suffix; for example, the second generation standard is SAM2.

SAN (storage area network)

A dedicated network that connects storage devices and servers in a pool, providing consolidated storage and storage management. Storage interconnects between many initiators and target devices. The SAN allows for sharing resources (target devices) among multiple servers (initiators).

SCSI (Small Computer System Interface)

A set of standards for a high-speed, parallel interface that connects processing devices to peripheral devices, such as storage subsystems. The acronym is pronounced "scuzzy."

SCSI ID (Small Computer Systems Interface Address)

An address on a SCSI BUS. Typically there are 16 addresses on a single channel SCSI BUS.

server

A powerful, centralized computer (or program) designed to provide information to clients (smaller computers or programs) upon request.

serviceability

A RAS attribute that refers to a component that is designed to accurately diagnose and report failures, as well as minimize downtime in a storage solution. See RAS.

setup wizard

A tool for initially configuring the library. It appears the first time the user starts the library. However, it can be used to modify configurable items anytime after the initial configuration.

sled

See UDS.

SMI-S (Storage Management Initiative Specification)

An industry standard SMI-S application programming interface (API) developed by SNIA that facilitates the management of multi-vendor devices in a storage area networks (SANs) environment.

snapshot
A rapid, point-in-time image of a volume created initially on the same disk as the original by duplicating metadata rather than copying the full data set. Snapshots are often used to protect against data corruption (viruses, etc.) or to create test or pre-production environments. Snapshots are also often used as a first step for creating non-disruptive point-in-time backups, and for copying data sets to a second disk to create a full duplicate copy of the volume. Snapshots are created on disk, and in the same format as the original data. Snapshots are also referred to as *point-in-time copies* and as *shadow copies*.

SNMP (Simple Network Management Protocol)
The protocol governing network management and the monitoring of network devices and their functions. Similar in function to SAM, except SNMP governs LAN, whereas SAM governs SAN.

SSL (Secure Sockets Layer)
A protocol that provides encrypted communications on the Internet. SSL is layered beneath application protocols such as HTTP, SMTP, Telnet, FTP, Gopher, and NNTP and is layered above the connection protocol TCP/IP.

storage device
An appliance containing data that can be accessed, added to, changed, or deleted by the user. The storage media types include tapes and optical disks. A storage device can be a single disk drive, or can constitute thousands of tapes in a large tape library.

storage slot
The physical home where a data cartridge resides.

subsystem status
A feature that provides predictive alerts, warning of any loss of connectivity or device failure using local or remote alerts. Subsystem status allows administrators to correct faults before they affect backup or other data transfer operations.

tape drive
A device that spins disks and tapes while it reads and writes data in storage.

TCP/IP (Transmission Control Protocol/Internet Protocol)
The communications protocol used by the Internet. It runs on top of Ethernet to provide high-level networking services to applications.

topology
The logical and/or physical arrangement of stations on a network.

trap
An SNMP alert that is sent when predefined conditions are met. For example, an error trap tests for an error condition and provides a recovery routine.

UDS (universal drive sled)
The hardware that houses Fibre Channel and SCSI tape drives in a module.

user ID
An alphanumeric value that the password database associates with a login name. Also, UID.

WORM (write once, read many)
A common type of data storage medium, in which data can be read and reread, but not altered, after it has been recorded.

WWNN (world wide node name)
A unique number assigned by a recognized naming authority. The world wide name is integral to Fibre Channel operations.

WWPN (world wide port name)
The WWPN is a 64-bit, hard-coded address for each port on an FC-connected device. It is used to identify available SAN devices at end points.

X-axis, X-position
The horizontal position of the library's robotic arm.

Y-axis, Y-position
The vertical position of the library's robotic arm.