Spectra T120 Library

User Guide



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S	October 2023	Updated environmental specifications.

Notes:

- To make sure you have the most current version of this guide check the Spectra Logic Technical Support portal at support.spectralogic.com/documentation/user-guides/.
- To make sure you have the release notes for the most current version of the BlueScale software, check the Spectra Logic Technical Support portal at support.spectralogic.com/documentation/release-notes/.
- You must sign into the portal before viewing Release Notes. The release notes contain updates to the *User Guide* since the last time it was revised.

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About This Guide

This guide describes how to configure, use, maintain, and troubleshoot the Spectra® T120 library. It also provides specifications for the library.

Intended Audience

This guide is intended for data center administrators and operators who maintain and operate backup systems. The information in this guide assumes a familiarity with SCSI, SAS, and Fibre Channel command protocols, as well as with network connectivity protocols such as Fibre Channel and Ethernet. It also assumes a knowledge of technical tasks such as configuring operating systems and installing drivers.

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Related Information

This section contains information about this document and other documents related to the T120.

BlueScale User Interface Screens

The BlueScale® interface changes as new features are added or other modifications are made between software revisions. Therefore, the screens on your library may differ from those shown in this document.

Additional Publications

For additional information about the Spectra T120 and its drives, refer to the publications listed in this section.

Spectra T120 Library

This guide and the following documents related to the Spectra T120 Library are available as PDF files on the Spectra Logic website at: support.spectralogic.com/documentations/user-guides.

- The *Spectra T120 Library Quick Reference Guide* provides a quick reference for the user interface and instructions for performing day-to-day library operations such as powering on and off, and preparing, importing, and exporting media.
- The *Spectra Encryption User Guide* provides detailed information about using BlueScale Encryption Standard and Professional Edition. It also provides useful information about encryption best practices and recycling encrypted media.
- The *Spectra Tape Libraries SCSI Developer Guide* provides detailed information about the SCSI and Fibre Channel commands used in the library.
- The *Spectra Tape Libraries XML Command Reference* provides detailed information about using the XML interface with the T120 library.
- The *Spectra Tape Libraries Warnings* document provides all of the warnings found in Spectra tape libraries documentation, in English and 27 other languages.

The following document is available after logging into your Support portal account at: support.spectralogic.com.

- The *Spectra T120 Library Release Notes and Documentation Updates* provides the most up-to-date information about the library, drives, and media.

Spectra SKLM Server

For additional information that can assist you during the installation and configuration of your server, see the following website:
IBM Security Key Lifecycle Manager welcome page.

LTO Ultrium Tape Drives

The following documents provide information that is applicable to all IBM LTO tape drives.

- *IBM Tape Device Drivers Installation and User's Guide*

  Note: This guide also provides information about using the IBM Tape Diagnostic Tool (ITDT) to troubleshoot drive problems.

- *IBM TotalStorage LTO Ultrium Tape Drive: SCSI Reference* (LTO-1 through LTO-4)
- *IBM TotalStorage LTO Ultrium Tape Drive: SCSI Reference* (LTO-5 and later)

For drive-specific information, search for the product name (for example, LTO 5) on the documentation page on the IBM website. You can also search the IBM Support Portal at: ibm.com/mysupport/s/?language=en_US.

Typographical Conventions

This document uses the following conventions to highlight important information:

WARNING Read text marked by the "Warning" icon for information you must know to avoid personal injury.

Caution Read text marked by the "Caution" icon for information you must know to avoid damaging the library, the tape drives, or losing data.

Important Read text marked by the "Important" icon for information that helps you complete a procedure or avoid extra steps.

Note: Read text marked with "Note" for additional information or suggestions about the current topic.

CHAPTER 1

Library Overview

This chapter provides an overview of the features and components of the T120 library.



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LIBRARY FEATURES

This section provides an overview of the library's BlueScale user interface and its features. It also provides a detailed description of the library's front panel, interior, and back panel components.

BlueScale Software

The library's BlueScale software lets you set configuration options, view library and drive information and metrics, manage cartridges, and monitor library operations. You can access the BlueScale software using either of the following methods:

- The BlueScale operator panel interface—via the touch screen on the library's operator panel.
- The BlueScale web interface—via the remote library controller (RLC) using a standard web browser.

The BlueScale software also controls the operation of the robotics and drives. As part of this function, the information about the location and status of each element in the library, as well as the raw media inventory is stored in non-volatile memory.

In addition to its user interface and control functions, the BlueScale software generates and maintains the MLM database, system logs, and other information related to the current system status. It also handles email operations such as sending the configuration backup file and AutoSupport logs to preconfigured recipients.

See Chapter 3 – Introducing the BlueScale User Interface, beginning on page 59, for detailed information about the features and controls provided by the BlueScale user interface.

Important

Many of the features described in this user guide require your library to be running the most current version of the BlueScale software. Spectra Logic recommends that you keep your library's BlueScale software and component firmware up-to-date at all times. If you are using a previously released BlueScale package, upgrading to the current release is strongly recommended. See Updating the BlueScale Software and Library Firmware on page 382 for detailed information.

The BlueScale software includes the following features (listed in alphabetical order).

Auto Configuration Save

The Auto Configuration Save feature automatically generates a weekly backup file and replaces the previous backup file on the memory card in the LCM. The backup file contains the library configuration and the MLM and DLM databases, as well as the encryption configuration and any BlueScale encryption keys. A backup file is also automatically generated and saved whenever a partition is created or modified. See Use Automatic Backup of the Library Configuration on page 123 for more information.

If desired, the library can email the automatically generated backup file each time it is created. Having an external copy of the backup file ensures that you can recover the library configuration, as well as the MLM and DLM databases, in the event of a disaster and is highly recommended.

Auto Drive Clean

Auto Drive Clean provides library-based cleaning of LTO drives without user intervention. Automated drive cleaning results in fewer failed tape read/write operations and is the recommended method for cleaning drives.

The Auto Drive Clean feature uses a dedicated cleaning partition for storing cleaning cartridges. The cleaning partition can be shared by multiple storage partitions and is used by the library to automatically clean drives whenever necessary. See Cleaning Partitions and Auto Drive Clean on page 42.

Automated Installation

This feature simplifies installation to save time. An Automated Installation (AutoInstall) USB device containing the activation keys for your purchased options ships from the factory with the library.

Functional Overview When the USB device is inserted into the library's LCM during the initial power-up, the auto-install process begins, automatically loading the keys for the purchased options onto the library. During the process, the user interface provides feedback to track the progress.

Additional Activation keys You can add additional keys at a later date by manually entering the activation keys. See Enabling BlueScale Software Support, Options, and Upgrades on page 85 for instructions on how to enter keys and for more information on the AutoInstall process.

AutoSupport

AutoSupport configures the library to automatically contact configured users with messages when specific events occur. It can also be used to open or update a support ticket and send it to a specified email recipient or to Spectra Logic Technical Support. See Chapter 10 – Configuring and Using AutoSupport, beginning on page 289 for detailed information.

Diagnostics and Utilities

Diagnostics and utilities are available through the BlueScale interface. Selecting a diagnostic or utility displays additional information, including whether or not it can be run while the library is operating.



Important

In general, the library diagnostics and advanced utilities are only for use under the direction of Spectra Logic Technical Support.

Drive Lifecycle Management

BlueScale Drive Lifecycle Management (DLM) helps you identify drives that are experiencing high error rates or other problems. DLM is automatically enabled when Media Lifecycle Management (MLM) is enabled. See Chapter 9 – Using Drive Lifecycle Management, beginning on page 280 for detailed information.

Encryption Key Management

The Spectra T120 library can encrypt data and manage encryption keys, using BlueScale key management or the Spectra SKLM key management system.

Spectra SKLM encryption runs on a stand alone server and provides centralized encryption key management. BlueScale encryption key management is tightly integrated into the BlueScale environment. Encryption is performed through encryption-enabled drives. See the *Spectra Tape Libraries Encryption User Guide* for detailed information.

EnergyAudit Reporting

The BlueScale EnergyAudit feature lets you display actual power consumption. See View Power Consumption Statistics on page 139 for information.

Global Spare

The Global Spare feature provides a way to remotely replace a failed drive in the library. You simply configure an installed drive as a designated spare for other drives in the library. This drive can then be substituted for a failed drive in any partition that is configured to use the Global Spare drive. When a drive fails, you simply log into the BlueScale web interface from any location, select the Global Spare option for the failed drive, and continue normal operations. You can then physically replace the failed drive at your convenience. See Assign Global Spare Drives on page 162 and Use the Global Spare Drive on page 349 for more information.

Hardware Health Monitoring

BlueScale Hardware Health Monitoring (HHM) tracks maintenance thresholds for key library components and notifies you when a maintenance threshold is reached. You can click on the maintenance icon on the status bar to send the AutoSupport Log (ASL) file to Spectra Logic Technical Support so they can review the log files and determine if any maintenance tasks are needed. See Respond to HHM Notifications on page 318 for more information.

IPv6 Support

The library supports link-local addressing from a web browser. When the library connects to a routed IPv6 network it requests a link-local IPv6 address. You can then use this link-local address to connect to the library without changing the IP address configuration settings in your library. See Configure Network Settings on page 96 for additional information.

Media Lifecycle Management

BlueScale Media Lifecycle Management (MLM) helps you manage your tape media by giving you tools to proactively determine potential media errors well before they happen. See Chapter 6 – Partition Management, beginning on page 147 and Chapter 8 – Configuring and Using Media Lifecycle Management, beginning on page 234 for detailed information about configuring and using the MLM features.

Remote Support

The remote support feature uses a remote web access application, WebEx™, to facilitate remote problem diagnosis. Remote support preserves your organization's site and data security, giving Spectra Logic Technical Support limited access to your library. With WebEx, Technical Support can "drive" the library, taking enough control to gather the data required to speed understanding of the problem. See Remote Support Icon on page 69 for more information.

Shared Library Services (SLS) Partitioning

The library uses Shared Library Services (SLS) virtualization technology to partition the library into a maximum of six virtual libraries. SLS partitioning is an option you can add to the library by purchasing an activation key from Spectra Logic. See Library Partitions on page 40 for detailed information about how partitions function in the library. See Chapter 6 – Partition Management, beginning on page 147 for detailed information about configuring and using partitions.

Soft Power Control

The Soft Power option disables the front panel power button and instead enables a "soft power" button on the General Status screen of the BlueScale user interface. Enabling the Soft Power option prevents unauthorized users from powering the library off using the front panel power switch. See Use the Soft Power Feature on page 131 for more information.

XML Command Interface

The XML command interface provides a set of commands for use in customer-generated programs used for viewing the library's status, inventory, and configuration information, and performing BlueScale package updates and other operations without using the BlueScale user interface. See the *Spectra Tape Libraries XML Command Reference* for detailed information.

Library Components

The following sections show the locations of and briefly describe the library's major front panel, internal, and rear panel components.

Front Panel Components

This section describes the library's front panel components.

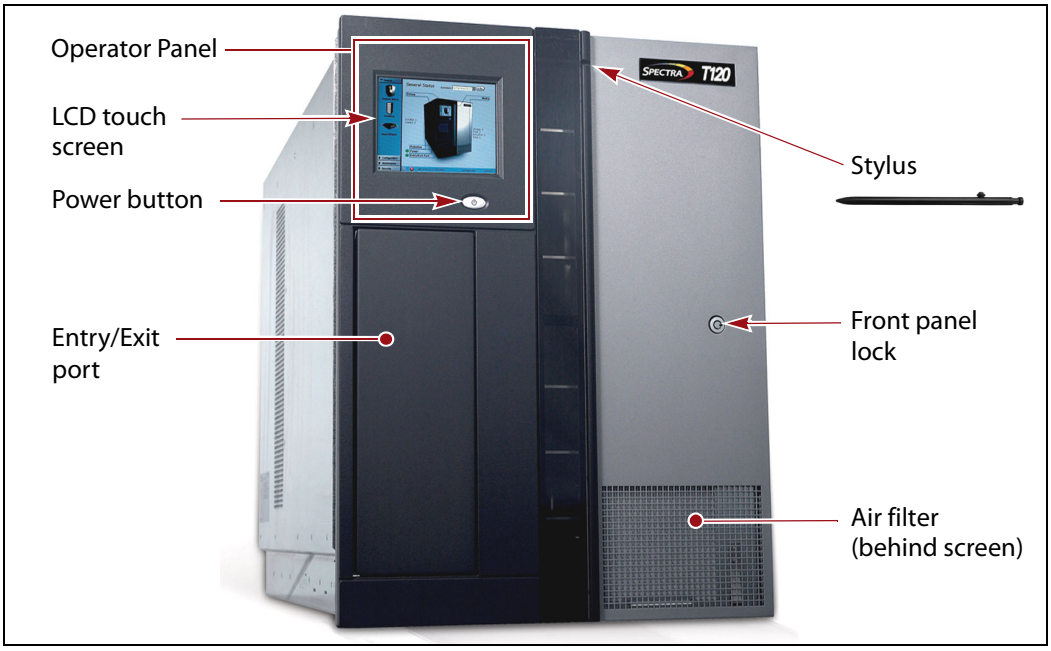


Figure 1 The Spectra T120 front panel components.

Component	Description
Operator Panel	The operator panel includes a color LCD touch screen and the library power button. A stylus for making selections and typing entries on the touch screen can be conveniently stored near the screen.
Entry/Exit Port	The entry/exit port lets you insert or remove tapes into or out of the library. To learn more about the entry/exit port, see Entry/Exit Port on page 31.
Front Panel Lock	The front panel lock prevents unauthorized access to the interior of the library.
Air Filter	The air filter prevents particulate contaminants from being pulled into the library by the air circulation system.

Interior Components

Figure 2 shows the interior components of the library.

Note: The interior components are shown for reference only. They are not accessible during normal operation

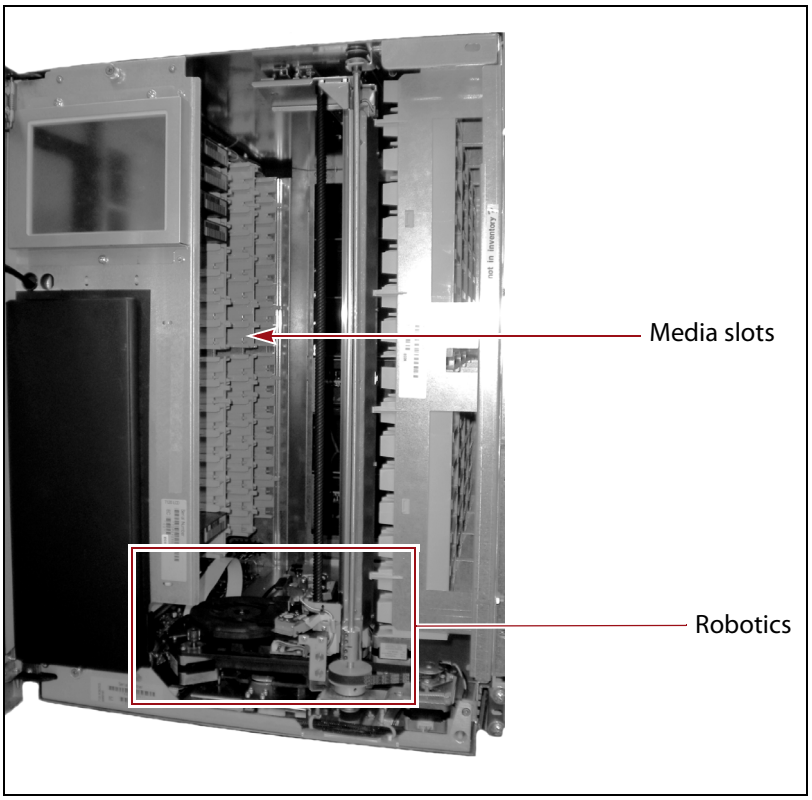


Figure 2 The Spectra T120 interior components, viewed from the front of the library with the door open.

Component	Description
Media Slots	The library contains 120 media slots. Each slot provides storage for one cartridge.
Robotics	The **robotics** assembly retrieves the requested cartridge from the source slot and moves it to its destination. The **cartridge picker** then inserts the cartridge into a drive. When the drive is finished using the cartridge and ejects it, the cartridge picker retrieves the cartridge and the robotics moves to place the cartridge into a slot. The **barcode reader** mounted on the cartridge picker reads the barcode labels on cartridges. The library uses the barcode label information to maintain an inventory of the media currently stored inside the library.

Rear Panel Components

This section describes the library's rear panel components.

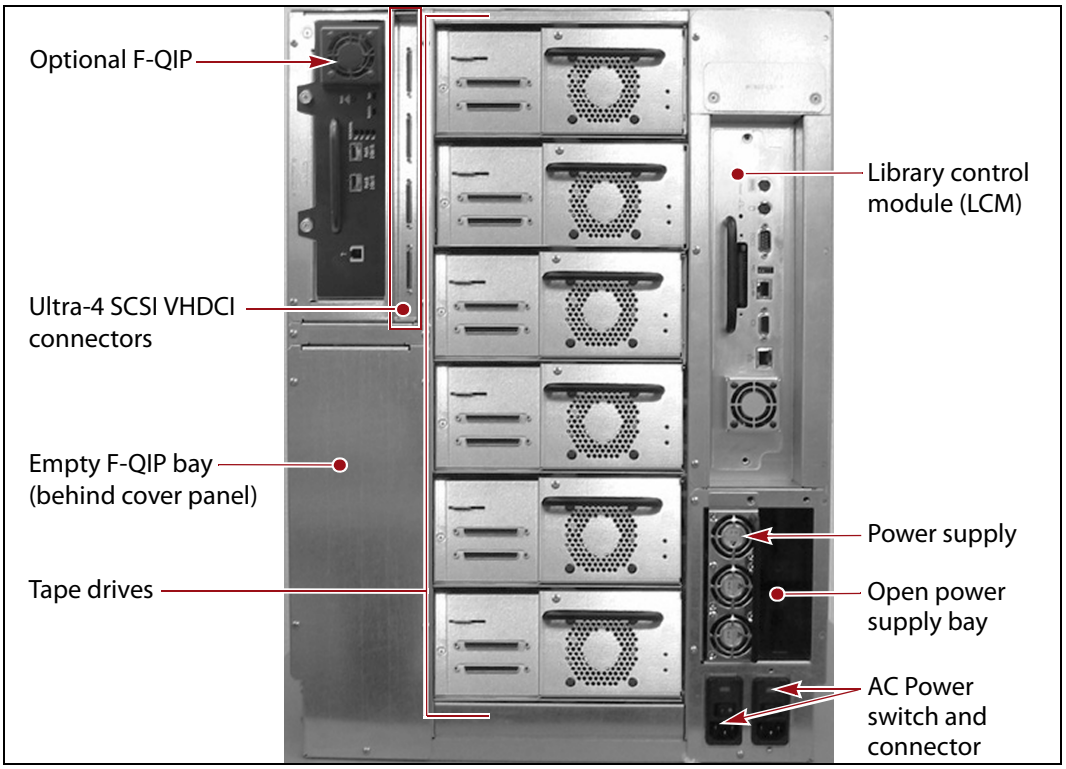
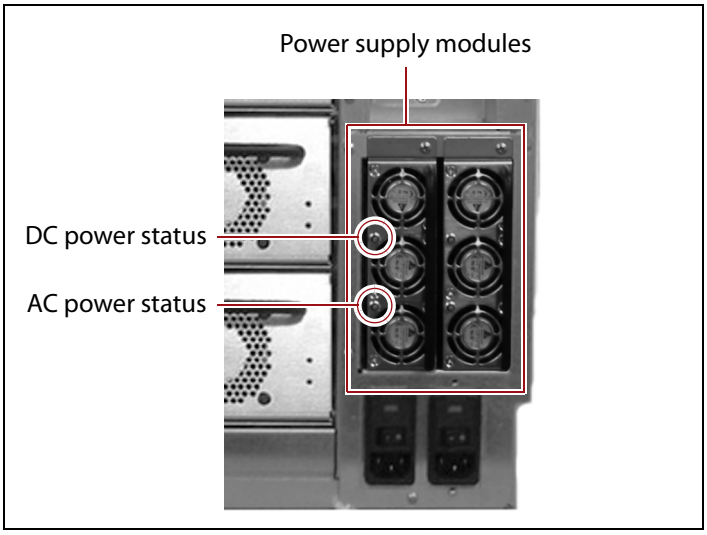


Figure 3 The Spectra T120 rear panel components.

Component	Description
Quad Interface Processor (F-QIP)	An optional F-QIP can be installed in each of the two vertical bays to the left of the drives (see Figure 3). The presence of an F-QIP depends on your library's configuration: ▪ **No F-QIP**: When using direct-attached drives, an F-QIP is not required to provide connectivity for the robotic assembly. Instead, one or more of the drives is assigned to be the exporting drive(s), relaying the commands to the robotic assembly. ▪ **F-QIP**: One F-QIP provides the Fibre Channel interface to the library's robotic assembly and up to four SCSI drives. A second F-QIP must be added to provide connectivity for the fifth and sixth SCSI drives. To learn more, see Controllers on page 34. **Note:** F-QIPs are no longer available for purchase.
Ultra-4 VHDSCI SCSI Connectors	Provide the SCSI bus connectivity between the F-QIP and up to four SCSI drives (see Drive Technology on page 36).
Library Control Module (LCM)	The LCM is a dedicated on-board computer module that runs the BlueScale software that controls all aspects of the library operation. To learn more, see Library Control Module (LCM) on page 32. **Note:** Depending on when your library was manufactured, it has either a Spectra PC module or a Spectra LS module.

Component	Description
Tape Drives	The library accommodates multiple generations of high-performance, high-capacity full-height and half-height LTO drives. Drives are hot-swappable to provide uninterrupted operation. To learn more, see Drive Technology on page 36. **Note:** Any drive bays that do not contain drives have covers installed to maintain proper air circulation throughout the library.
5/12 VDC Power Supply Modules	The 5/12 VDC power supply modules convert AC input to provide the 5 VDC and 12 VDC power used by the robotics, drives, and F-QIPs in the library. They also provide power to the LCD operator panel. The library includes one power supply. An optional second power supply provides redundancy for failover protection in the event that one power supply fails. See Redundant Power Supplies on page 58 for additional information. Each power supply module has two indicator LEDs, one for AC power status and one for DC power status. The color of the LED indicates the status. ▪ **Green**—The power is on and functioning normally. ▪ **Orange**—The power supply has a fault condition. ▪ **Off**—The power is not on or the power supply module is not functioning normally. **Note:** If the second power supply module is not installed, a cover over the opening maintains proper air circulation throughout the library.  **Figure 4** The 5/12 VDC power supply modules.
Power Cord Connector and AC Power Switch	Two power connectors and power switches supply and control the AC power to the library power supply modules. Each switch turns the main AC power on and off for the power supply module above it. If a redundant power supply is used, the AC power connectors for each power supply module should be connected to independent AC branch circuits.

Entry/Exit Port



Figure 5 The T120 E/E port (shown open).

The entry/exit port (E/E port) is used to import cartridges into or export cartridges from the library. Up to eight cartridges are inserted into the E/E magazine, which is then inserted into the E/E port. After you insert the magazine and the door closes, the robotic assembly retrieves each cartridge and moves it to a slot in the library. When the moves are complete, the library updates its inventory to include the newly imported media.

Similarly, when exporting cartridges from the library, the robotic assembly delivers the requested cartridge to the E/E port magazine. You can then remove the entire magazine from the E/E port or you can remove or exchange individual cartridges in the magazine.

A cartridge already in the library is only moved to the E/E port when you request an export operation through the user interface. Data security and backup integrity are enhanced because the media stored in the library can only be accessed using the password-protected BlueScale user interface.

Library Control Module (LCM)

The library uses a dedicated on-board computer module called the Library Control Module (LCM) to run the BlueScale software that controls and manages all aspects of the library operation.

Spectra PC and Spectra LS Depending on when you purchased your library, your library may use either the Spectra LS or the Spectra PC as the LCM. The Spectra LS replaces the previous generation computer module, the Spectra PC. The Spectra LS provides the same functionality as the Spectra PC and includes features that allow for new functionality in the future. The Spectra LS also contains a hard drive that is used for storing the logs used for troubleshooting the library.

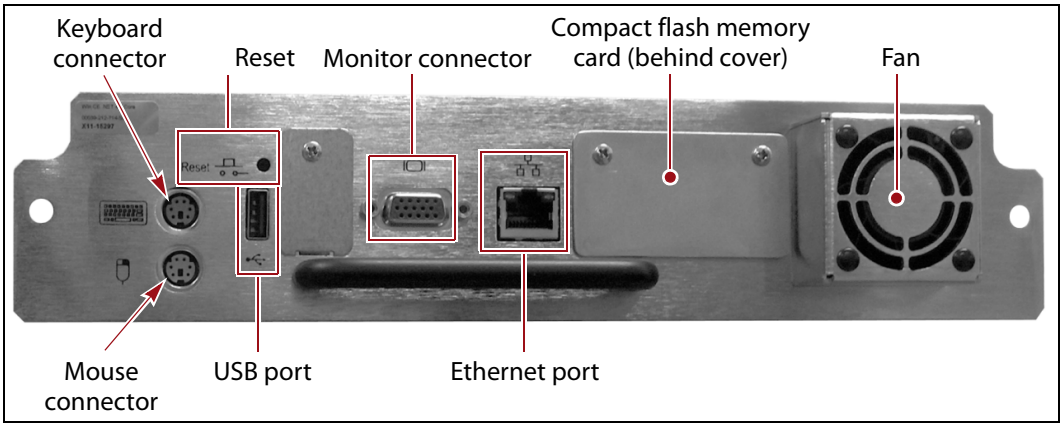


Figure 6 The connectors and components on the **Spectra PC**.

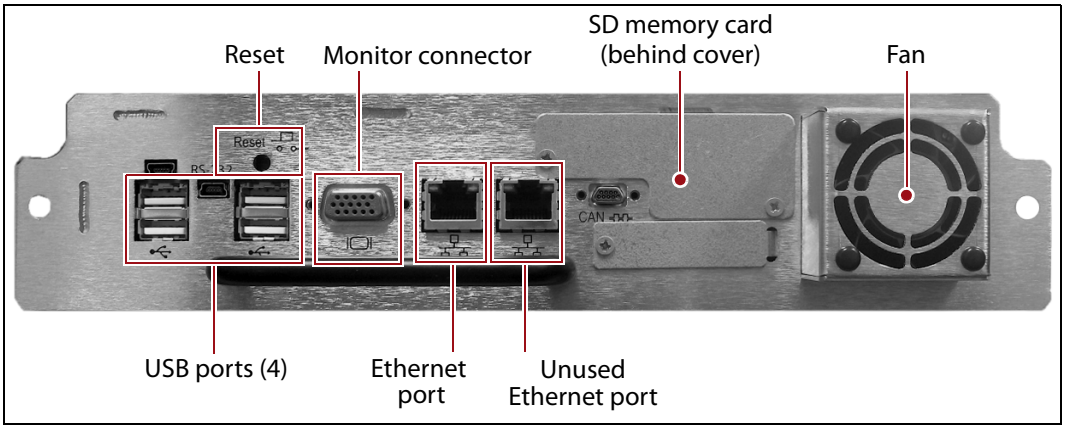


Figure 7 The connectors and components on the **Spectra LS**.

The following table describes the components shown in Figure 6 and Figure 7 on page 32.

Component	Description
PS/2 Keyboard and Mouse Connectors (Spectra PC only)	For convenience, you can connect a PS/2 mouse and keyboard to the appropriate connectors on the LCM and use them when interacting with the BlueScale user interface. This connection provides access to all of the options available from the library's front panel touch screen.
USB Ports (1 on the Spectra PC, 4 on the Spectra LS)	The USB ports on the LCM can be used to connect a USB device for transferring BlueScale encryption keys, saving configurations, and uploading BlueScale packages. You can also connect a USB keyboard and mouse to the USB ports on the LCM and use them when interacting with the BlueScale user interface. This connection provides access to all of the options available from the library's front panel touch screen.
Monitor Connector	For your convenience, you can connect a monitor to the LCM and use it to view the BlueScale user interface instead of using the library's front panel.
Ethernet Port	The Ethernet port on the LCM connects the library to an Ethernet network and is used to access the library through the BlueScale web interface using the Remote Library Controller (RLC). The BlueScale web interface provides access to all of the options available from the library's operator panel except those that require physical interaction with the library (for example, importing or exporting media). **Notes:** ▪ If you are using a BlueScale version prior to BlueScale12.3.0, either Ethernet port on the Spectra LS can be used. However, only one Ethernet port at a time can be used. If cables are connected to both ports, the module automatically checks for active connections and uses the first connection that it detects. ▪ Beginning with BlueScale 12.3.0, only the bottom-most (when the control module is installed) Ethernet port on a Spectra LS may be used to connect the library to an Ethernet network. ▪ The Spectra PC has a 10/100BaseT connection. ▪ The Spectra LS has a 10/100/1000BaseT connection.
Memory Card (behind cover)	The memory card in the module stores the library's configuration information, which includes activation keys, system settings, and partition settings. It also stores the MLM and DLM databases and information related to the current system status. In the event that the LCM is replaced, moving the memory card from the module that was replaced into the new module transfers the stored configuration information to the new module, reducing the likelihood of having to reconfigure the library following a replacement. **Notes:** ▪ The Spectra PC uses a Compact Flash (CF) memory card. The Spectra LS uses a Secure Digital (SD) memory card. ▪ One extra memory card is shipped with new libraries for error recovery.
RS-232 and CAN Connectors	These connectors are only used for troubleshooting by service personnel.

Controllers

Either a direct-attached tape drive (Fibre Channel or SAS) or a quad interface processor (F-QIP) is required to provide the control path for the library's robotics. When configuring a storage partition, the device you select to provide the robotic control path is referred to as the "exporting controller" for the partition.

The controller is the bridge between an external Fibre Channel or SAS connection from the host and the internal interface used by the library. It provides the control path for the media changer commands sent from the host to the library. The controller relays the commands to the LCM, which processes the commands and uses them to control the robotics in the library.

A minimum of one controller is required to connect the library's robotics to the Fibre Channel network. To learn more about the role the controller plays in the library, see Robotics Connectivity on page 48.

Notes:

- An F-QIP can provide the robotic control path for up to six partitions. A tape drive can only provide the control path for one partition.
- If you are using LTO-5 and later generation drives, you can select multiple drives as controllers and export the same changer interface over the drives to provide redundancy, as long as your storage management software can support this. These multiple paths cannot be used at the same time. Assigning multiple drive exporters to one partition reduces the total number of partitions that can be configured in the library.
- F-QIPs can provide encryption capability using BlueScale encryption. See the *Spectra Encryption User Guide* for more information.
- In addition to providing connectivity for the robotics, the F-QIP can provide Fibre Channel connectivity for SCSI drives.
- The F-QIP and the E-QIP are no longer available for purchase.
- If your library uses E-QIPs, refer to the documentation that accompanied your library for information about using this module.

F-QIPs may be mounted in the vertical controller bays located along the left side of the back of the library (see Figure 3 on page 29).

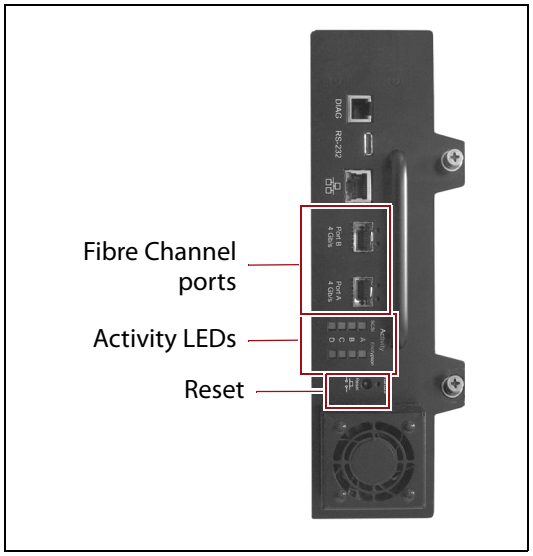


Figure 8 The Fibre Channel QIP (F-QIP).

The following table describes the controllers supported by the library.

Controller	Description
F-QIP	The F-QIP has two integrated dual-channel ports (Port A and Port B), which can be used to provide connections to two separate Fibre Channel arbitrated loops or fabrics. They can also be used to provide redundant control paths to the robotics from a single Fibre Channel arbitrated loop or fabric. In addition to the robotics connectivity, the two ports each provide any-to-any connectivity for up to four drives in the library. An additional feature of the F-QIP is the ability to encrypt data before it is written to tape. This capability is useful if the SCSI drives installed in the library cannot perform encryption themselves. Encryption key management is provided through the library's BlueScale user interface (see the *Spectra Encryption User Guide*). One set of activity LEDs indicates SCSI bus activity (data transfer to or from the attached drives). The other set of activity LEDs indicates whether the data passing to the attached drives is being encrypted or decrypted by the F-QIP. **Notes:** ▪ The Ethernet port on the F-QIP is not used. ▪ The encryption performed by the F-QIP is not compatible with the drive-based encryption available with LTO-4 and later generation drives. Data encrypted by the F-QIP cannot be decrypted by an encryption-enabled LTO-4 or later drive and vice versa.
Tape drive	The commands to control the motion of the robotics within the partition are sent from the host to the exporting drive's logical unit number 1 (LUN 1). The motion control commands are then routed to the robotics using the exporting drive's Automation/Drive Interface (ADI).

Drive Technology

The library supports IBM LTO-3 and later generation Ultrium drives. The drives are mounted in drive sleds, and are hot-swappable to provide uninterrupted operation.

Note: SCSI drives require an F-QIP to be installed to provide Fibre Channel host connectivity. Each F-QIP can provide connectivity for up to four drives.

The library accommodates either six full-height tape drives or ten half-height drives or a mixture of full-height and half-height drives.

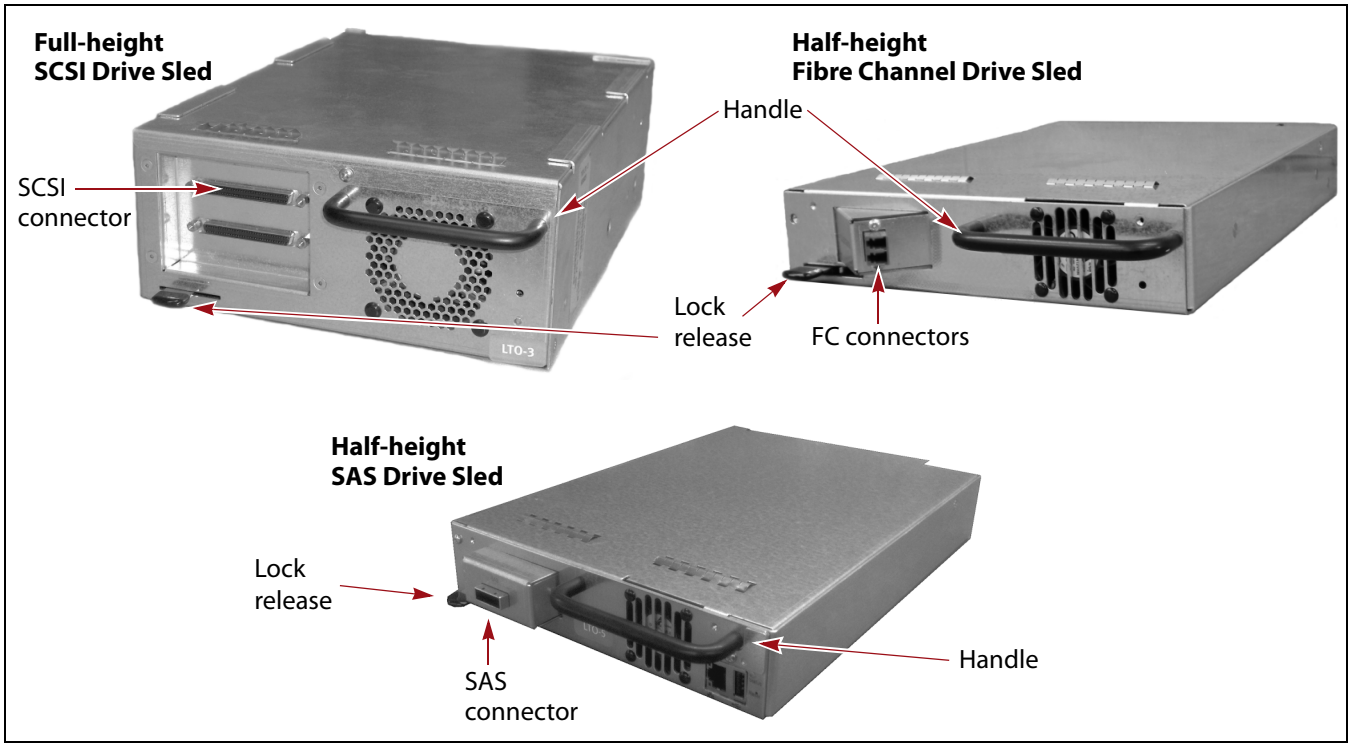


Figure 9 The SCSI, Fibre Channel, and SAS drive sleds.

The following table describes the drive components shown in Figure 9. See Drive Connectors for a description of the connectors.

Component	Description
Drive Sled	The drive sled provides the electrical and logical connections to the library, as well as the connections to the host Fibre Channel arbitrated loop or fabric. The drive sled firmware assigns an identifier to the drive based on its location in the library (see Drive Identifiers on page 45). This identifier is used by the library to identify the drives in the BlueScale and XML interfaces. See Drive Connectivity on page 53 for additional information about the Fibre Channel connectivity provided by the drive sled.

Component	Description
Status LED	▪ **Flashing green** — The drive sled is functioning normally. ▪ **Flashing red/orange** — The drive sled experienced an error. ▪ **Alternating flashing green and red/orange (LTO-5 and later generation drives)** — The drive is ready for replacement (see Replace a Drive on page 434). ▪ **Flashing red (LTO-4 and earlier generation drives)** — The drive is ready for replacement.
Drive Power LED (LTO-5 and later generation drives)	Indicates whether the drive is powered on.
Lock Release	The drive sled automatically locks into place when it is installed in the library to keep it from being accidentally pulled out of the library. The lock release disengages the lock.

Drive Connectors Depending on the type of drive, the drive sled includes the following connectors:

Connector Type	Description
SCSI	Each SCSI drive sled has two LVD SCSI connectors. One connector is cabled either directly to the host SCSI HBA or to one of the Ultra-4 SCSI connectors associated with the F-QIP (see Figure 3 on page 29). For F-QIP-attached drives, the remaining connector always has an LVD SCSI terminator installed. ▪ Full-height SCSI drives have two female 68-pin Micro-D Ultra-3 LVD SCSI connectors. ▪ Half-height SCSI drives have two female 68-pin VHDCI Ultra-4 LVD SCSI connectors. **Important:** Spectra Logic does not support daisy-chaining LTO-4 SCSI drives. LTO-3 SCSI drives can be daisy-chained, but must be limited to two drives on a single SCSI bus. Daisy-chaining other devices on the same SCSI bus as a drive is not supported.
SAS	Each SAS drive sled has a single, unshielded, single-port SFF-8088 serial connector that provides the Serial Attached SCSI (SAS) connectivity for the drive.
Fibre Channel	Both full-height LTO-4 and half-height LTO-5 Fibre Channel tape drives have two multi-mode SFP LC fibre optic connectors to provide connection to a Fibre Channel network. LTO-6 and later generation Fibre Channel half-height drives have a single Fibre Channel port.

For more information about the drives in the library, see:

- Creating a Storage Partition Using Direct-Attached Fibre Channel or SAS Drives on page 157
- Creating a Storage Partition Using Direct-Attached SCSI Drives on page 177
- Creating a Storage Partition using F-QIP-Attached SCSI Drives on page 182
- LTO Tape Drive Specifications on page 471 for information about the transfer rates and storage capacities of LTO drives.
- Component Interface Connectors on page 469 for cabling requirements for connecting the drives to a Fibre Channel arbitrated loop or fabric, for connecting direct-attached SCSI drives to a host SCSI HBA, or for connecting SAS drives to a SAS HBA.

Discontinued Components

The following components are no longer available for purchase and are not described in this user guide. If your library includes these components, refer to the documentation that accompanied your library when you received it for information about using these components when you configure partitions.

- QIPs (both F-QIPs and E-QIPs) are no longer available for purchase. If your library includes SCSI drives, you can continue to use them as long as you have an F-QIP to provide network connectivity for the drives.
- LTO-2 and LTO-3 drives are also no longer available for purchase.

Library Expansion and Upgrades

The Spectra T120 library is designed to expand to meet a data center's changing storage requirements. See Appendix B – Media and Upgrades, beginning on page 456 for additional information.

CHAPTER 2

Architecture Overview

The T120 is designed to provide flexibility and ease of use. To take full advantage of the library's versatility, read this overview of the library's software and hardware architecture.

Topic	
Library Partitions	page 40
Storage Partitions	page 41
Cleaning Partitions and Auto Drive Clean	page 42
Component Identifiers	page 44
F-QIP Identifiers	page 45
Drive Identifiers	page 45
Fibre Channel Connectivity	page 47
Robotics Connectivity	page 48
Drive Connectivity	page 53
High-Availability Configurations	page 57
Drive Connectivity Failover	page 57
Global Spare Drives	page 58
Redundant Power Supplies	page 58

LIBRARY PARTITIONS

Partitions divide the library logically so that it appears as one or more physical libraries — one library per configured partition. Partitioning simplifies storage consolidation through the creation of virtual libraries, each with its own drives and media. Each partition:

- Has exclusive access to the tape drives and media storage assigned to it.
- Can control the robotics to move media within the partition.

The library supports two types of partitions, storage partitions and cleaning partitions.

A T120 library has a maximum of six storage partitions.

One or more cleaning partitions can be configured in a single library. A single cleaning partition can be associated with multiple storage partitions. Cleaning partitions do not count against the partition maximum.

Figure 10 shows a conceptual illustration of a library configured with two storage partitions and one shared cleaning partition.

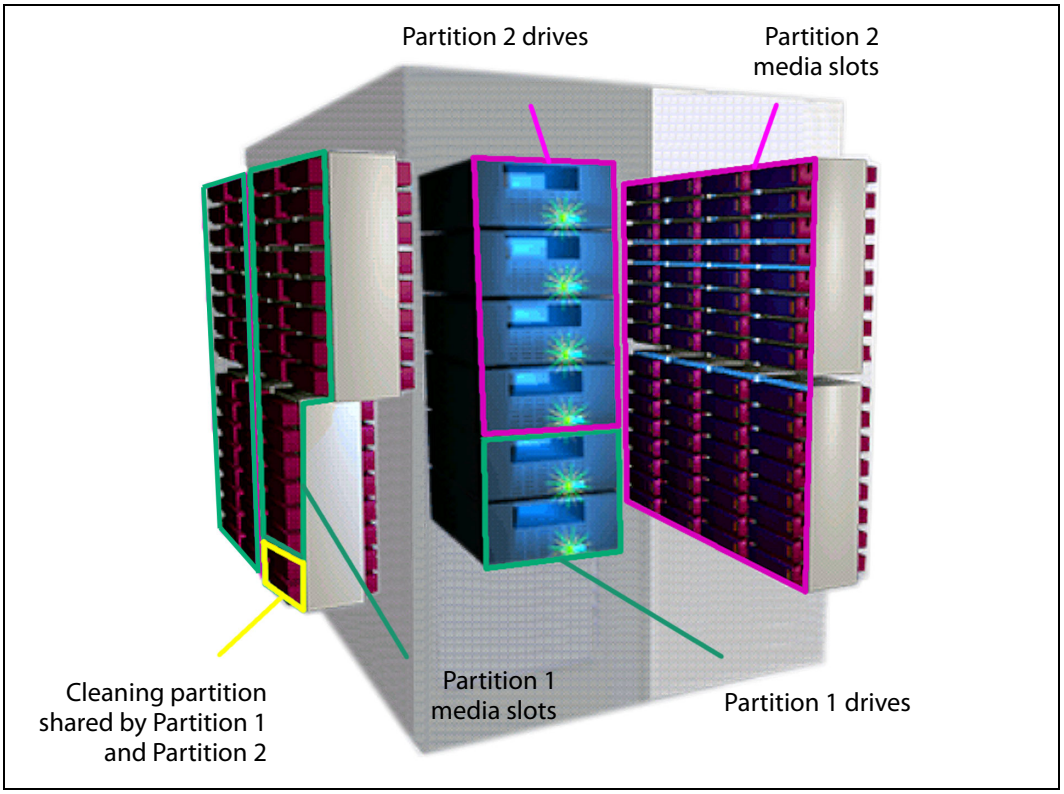


Figure 10 A library with two storage partitions and one shared cleaning partition.

Storage Partitions

Overview The library requires, at a minimum, one storage partition. This is the default configuration. Each storage partition must have at least one drive. Drives can only be assigned to one storage partition at a time; they cannot be shared by multiple partitions.

When additional partitions are needed, the library uses Shared Library Services (SLS) virtualization technology to create the additional partitions. SLS support is an option you can add to the library by purchasing an activation key from Spectra Logic.

In some environments, using multiple storage partitions is crucial to data center efficiency and growth. For example, multiple partitions are extremely useful in the following situations:

Multiple Storage Management Software Packages If groups within your company use different storage management software packages, each software package requires its own dedicated library. Instead of maintaining multiple physical libraries — one per backup package — the data center can use a single Spectra Logic library with multiple partitions, in which each partition appears to the software as a dedicated library.

Multiple Databases If your company uses multiple databases, partitioning the library preserves the backup processes associated with each type of database.

Shared Resources If each department in the company must keep their data segregated, partitioning the library supplies this segregation, as well as the subsequent integrity of the data set. Each partition can only access the drives and cartridge locations assigned to it. Data from other partitions cannot become intermixed with the data stored on the media in the partition's inventory.

Multiple Drive Generations If your data center uses multiple generations of LTO drives, Spectra Logic strongly recommends configuring separate partitions for each generation to ensure read/write compatibility between the drives and cartridges.

Multiple Network Protocols If your company uses multiple network protocols, such as Fibre Channel and SAS, then each protocol must be assigned to its own partition.

Encryption If you want to encrypt some, but not all of your backup data, you can partition the library into an encryption partition and non-encryption partition to segregate the two types of data.

Cleaning Partitions and Auto Drive Clean

Overview The cleaning partition provides permanent storage for cleaning cartridges inside the library when the Auto Drive Clean feature is enabled. This special-purpose partition does not have any drives associated with it. A single cleaning partition can be shared by multiple storage partitions.

Auto Drive Clean uses the cleaning cartridges in the cleaning partition to provide library-based cleaning of LTO drives with minimal user intervention. Automated drive cleaning results in fewer failed tape read/write operations and is the preferred method for cleaning drives.

Drives in a partition with Auto Drive Clean enabled are cleaned no more than once in any 12 hour period. The library posts a message if an Auto Drive Clean does not occur because of the 12 hour restriction. If you want to clean the drive immediately, you can initiate a manual cleaning.

Note: Software-initiated drive cleaning operations cannot use the cleaning cartridges stored in a cleaning partition; the cartridges are not accessible to the storage management software.

Requirements The Auto Drive Clean feature requires a cleaning partition to be associated with the storage partitions that contain the drives you want to clean. Cleaning partitions are created separately and then assigned to one or more storage partitions (see Creating a Cleaning Partition on page 154 and Allocate Slots and Tape Drives on page 164).

The cleaning cartridges must be identified with "CLN" at the beginning of the barcode sequence on their labels. The library prevents you from importing cleaning cartridges that are not properly labeled into a cleaning partition.

Auto Drive Clean Operation The drives that are in a storage partition with an associated cleaning partition are cleaned automatically when cleaning is required. When a drive is unloaded in response to a host request and the data cartridge is moved to its storage location, the library queries the drive to determine if it needs cleaning. If cleaning is required, the library delays notifying the host that the SCSI move command for the unloaded data cartridge is complete while it performs an automatic drive cleaning.

During the delay, the library retrieves a cleaning cartridge from the cleaning partition and inserts it into the drive. When the cleaning is complete, the library returns the cleaning cartridge to the cleaning partition and notifies the host that the SCSI move command for the unloaded data cartridge is complete. The library then posts a system message that the cleaning was successful.

In addition to automatic cleaning, you can use the BlueScale user interface to initiate a manual cleaning operation using a cleaning cartridge stored in the cleaning partition. Only drives in a storage partition that has an associated cleaning partition can be cleaned using this method.

Expired Cleaning Cartridges When an expired cleaning cartridge is loaded into a drive, it is immediately ejected without attempting the cleaning. The library flags the cleaning tape as expired and generates system messages to notify you of the expired cleaning tape and the failed drive cleaning. It marks the cleaning cartridge as expired in its inventory and does not attempt to use it for subsequent cleanings. These cartridges have an "x" next to the slot number when viewed on the Inventory screen.

If the cleaning partition contains another, good cleaning cartridge, a cleaning that failed because the cleaning cartridge is expired is reattempted the next time the host unloads a data cartridge from the drive.

MLM Tracking of Cleaning Cartridges When you enable the BlueScale Media Lifecycle Management (MLM) feature and use MLM-enabled cleaning cartridges, the library stores usage information, including the number of cleans remaining and the cartridge health (good, near expiration or expired), in the MLM database. This information is retained in the MLM database even when a cleaning cartridge is exported from the library.

When a cartridge is nearing the end of its useful life, the library notifies you so that you can replace the cartridge. This early notification helps prevent failed cleanings resulting from using an expired cleaning cartridge.

The library does not store any information about non-MLM cleaning cartridges in the MLM database. However the library does mark an expired cleaning cartridge and does not attempt to use it again as long as it remains in the library. If an expired non-MLM cartridge is exported and then reimported into the library, it is identified as expired the next time it is loaded into a drive.

See Chapter 8 – Configuring and Using Media Lifecycle Management, beginning on page 234 for detailed information about MLM.

COMPONENT IDENTIFIERS

The library's BlueScale user interface and the XML command interface use component identifiers for each drive and F-QIP. These identifiers appear in the BlueScale screens and in system messages.

Note: All component identifiers are numbered consecutively by type, starting at 1.

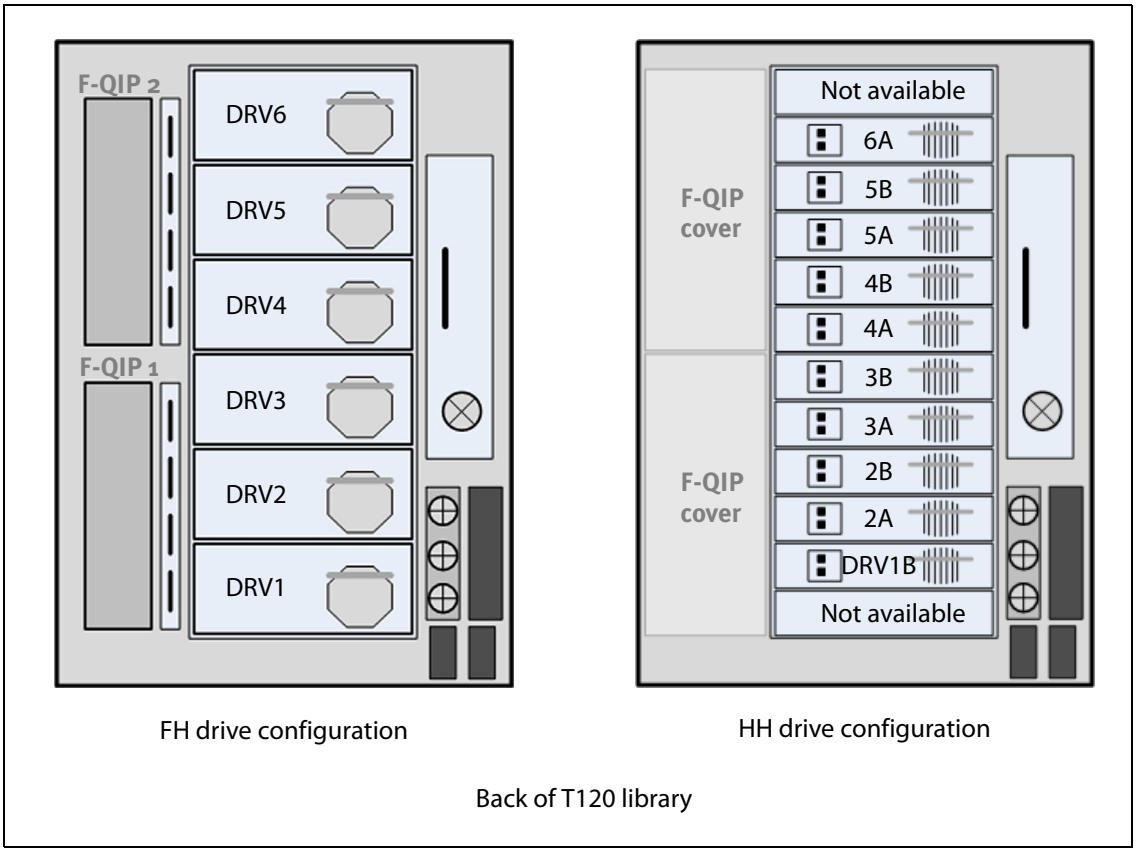


Figure 11 Component locations used in component identifiers.

The library's BlueScale interface identifies drives and F-QIPs based on their locations.

Notes:
- F-QIPs are numbered from the bottom up, with F-QIP1 being the bottom-most.
- Drives are numbered from the bottom up, with DRV1 being the bottom-most. Half-height drives are identified using an additional letter (A or B). For half-height drives, the bottom and top-most drive bays are not used.

F-QIP Identifiers

The F-QIPs can be installed in either bay to the left of the drives. The component identifier for an F-QIP is based on its type and location.

The component identifier for an F-QIP is **F-QIPx**, where:

- **F** is the QIP type (Fibre Channel).
- **QIPx** is the number of the controller bay.

For example, Figure 12 shows the component identifier for **F-QIP1**, which is an F-QIP installed in the bottom bay.

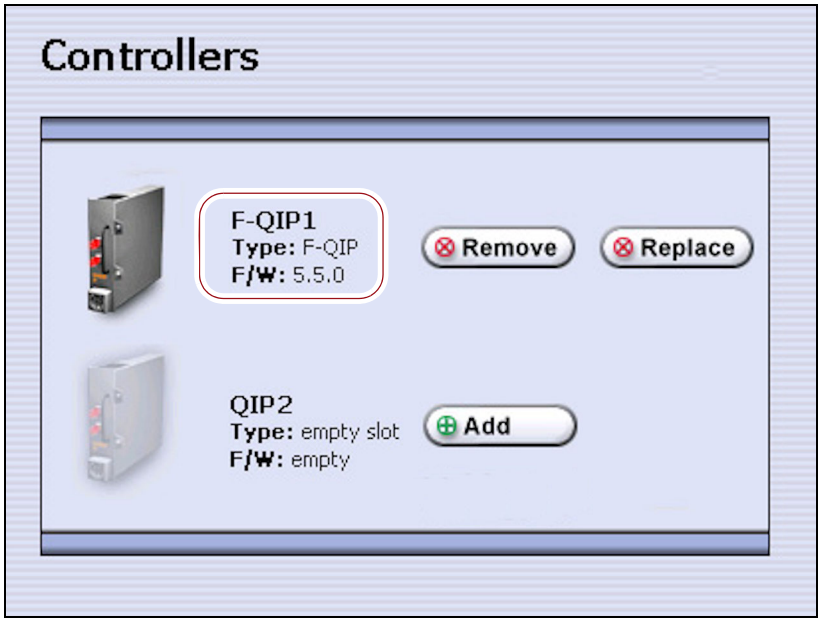


Figure 12 The Controllers screen showing the component identifier for an F-QIP.

Drive Identifiers

The firmware in the drive sled that houses each drive assigns an identifier to the drive based on its location in the library. This identifier is shown in the BlueScale user interface and is used in the XML command interface. The identifier is also used to generate the World Wide Name (WWN) that the library reports for a Fibre Channel drive (see World Wide Names for Fibre Channel Partitions on page 51). Because the identifier is location-based, it remains constant even if the physical drive is replaced by a new drive. The new drive assumes the location-based identifier.

The component identifier for each drive is based on its location and drive type (see Figure 11 on page 44).

The component identifier is shown as **[type]LTO-DRVx**, where:

- **[type]LTO** is the drive type, where:
  - f = Fibre Channel
  - s = SAS
  - (blank) = SCSI
- **DRVx** is the number of the drive bay.

Notes:
- Half-height drives have an additional letter (A or B) to specify the correct drive bay.
- The top (6B) and bottom (1A) half height drive bays are not available.

For example, Figure 13 shows the component identifier for a Fibre Channel LTO drive installed in the fourth half height drive bay from the bottom of the library (**fLTO-DRV3A**). The **Drive Type** descriptor indicates that the drive is an IBM LTO-6 half-height Fibre Channel drive.

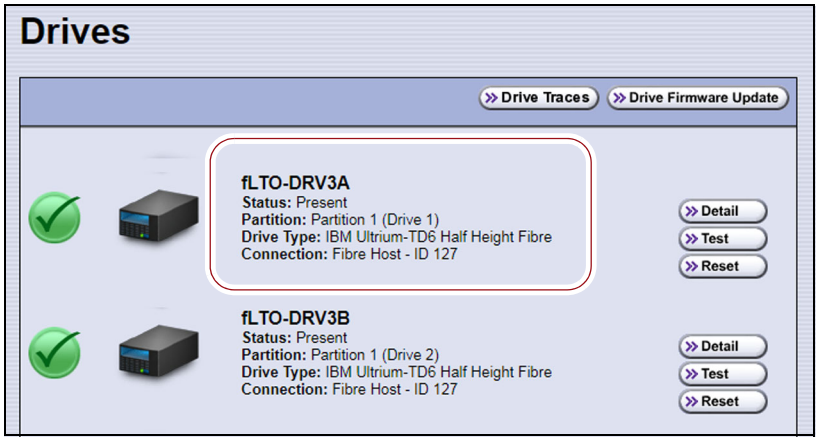


Figure 13 The Drives screen showing the component identifier for a drive.

In addition to the WWN, the drive sled assigns a location-based serial number to the drive.

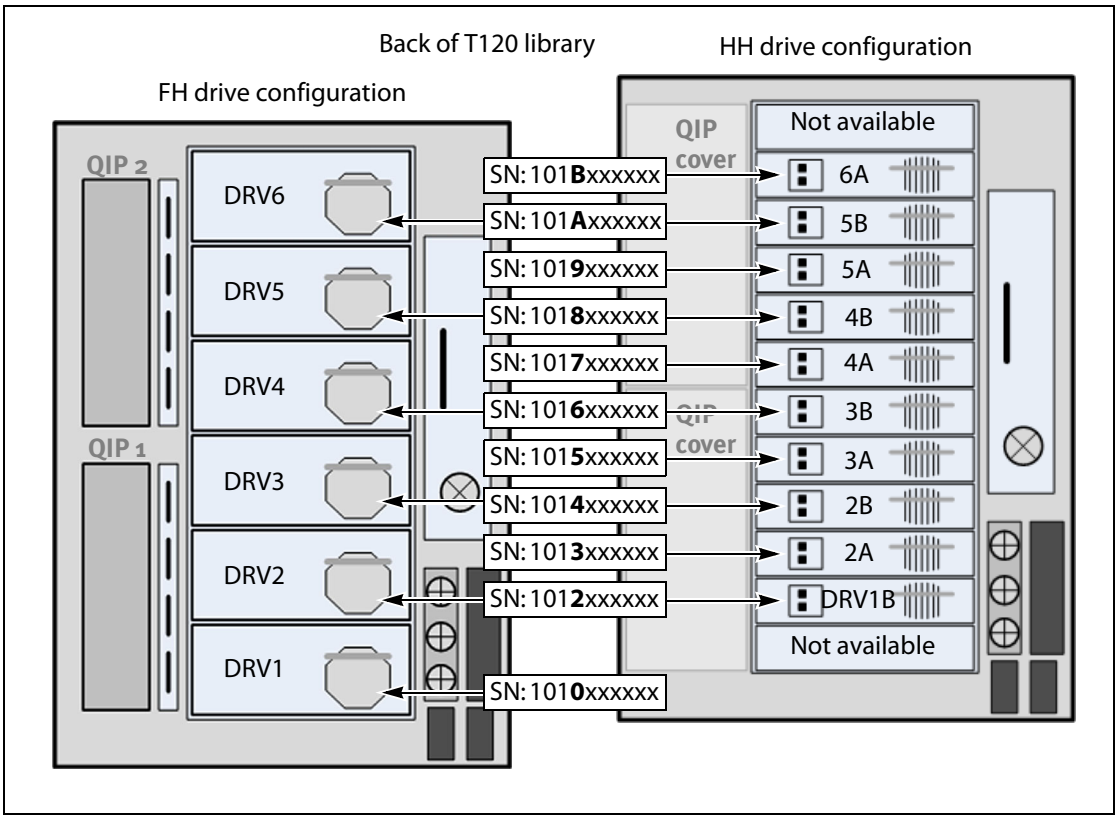


Figure 14 Location-based serial number for full-height and half-height drives.

FIBRE CHANNEL CONNECTIVITY

For most libraries, the library's robotics and drives connect to the host system over a Fibre Channel arbitrated loop or fabric. For other libraries, they are connected over a SCSI bus or SAS fabric. These connections carry two types of information:

- The commands from the storage management software that control the robotics motion and the read/write operations of the drives.
- The data being transferred to and from a drive by the host.

The following sections describe the connectivity for the library's robotics and the drives.

Robotics Connectivity

Either a direct-attached drive or an F-QIP is required to provide the control path for the library's robotics. When configuring a storage partition, the device you select to provide the robotic control path is referred to as the "exporting controller" for the partition. The exporting controller makes the partition accessible to the hosts as a media changer (a library). It receives the media changer commands sent from the host to the library and relays them to the LCM, which in turn processes them into the motion commands used to control the robotics.

- When an F-QIP is not present, a direct-attached Fibre Channel, SAS or SCSI drive provides the robotic control path, as described in Control Path Through a Direct-Attached Drive.
- When an F-QIP is present, it can be used to provide the robotic control path, as described in Control Path Through an F-QIP on page 50.

  Note: An F-QIP cannot be configured for the purpose of providing the robotic control path in a partition with direct-attached drives.

Control Path Through a Direct-Attached Drive

In a direct-attached drive configuration, one or more drives in a storage partition are designated as the exporting drive (also known as the exporting controller). The commands from the host to control the motion of the robotics within the partition are routed to the exporting drive's logical unit number 1 (LUN 1). Commands to control the operation of the exporting drive are sent from the host to LUN 0 of the drive.

Notes:

- If you have multiple storage partitions, you must designate an exporting drive for each partition.
- A drive can only provide the robotic control path for the partition to which it is assigned.
- If you are using LTO-5 and later generation drives, you can select multiple drives as controllers and export the same changer interface over the drives to provide redundancy, as long as your storage management software can support this. These multiple paths cannot be used at the same time.
- Assigning multiple drive exporters to one partition reduces the total number of partitions that can be configured in the library.

Figure 15 is a simple representation of how the drives and robotics in a library with a single direct-attached Fibre Channel partition are connected to a Fibre Channel SAN through a switch or hub. Drive 6A provides the robotic control path for the partition.

Note: A partition that uses a direct-attached SCSI drive as the exporting controller is similar, with each connection to the Fibre Channel hub or switch replaced by a direct connection to a SCSI HBA in a host.

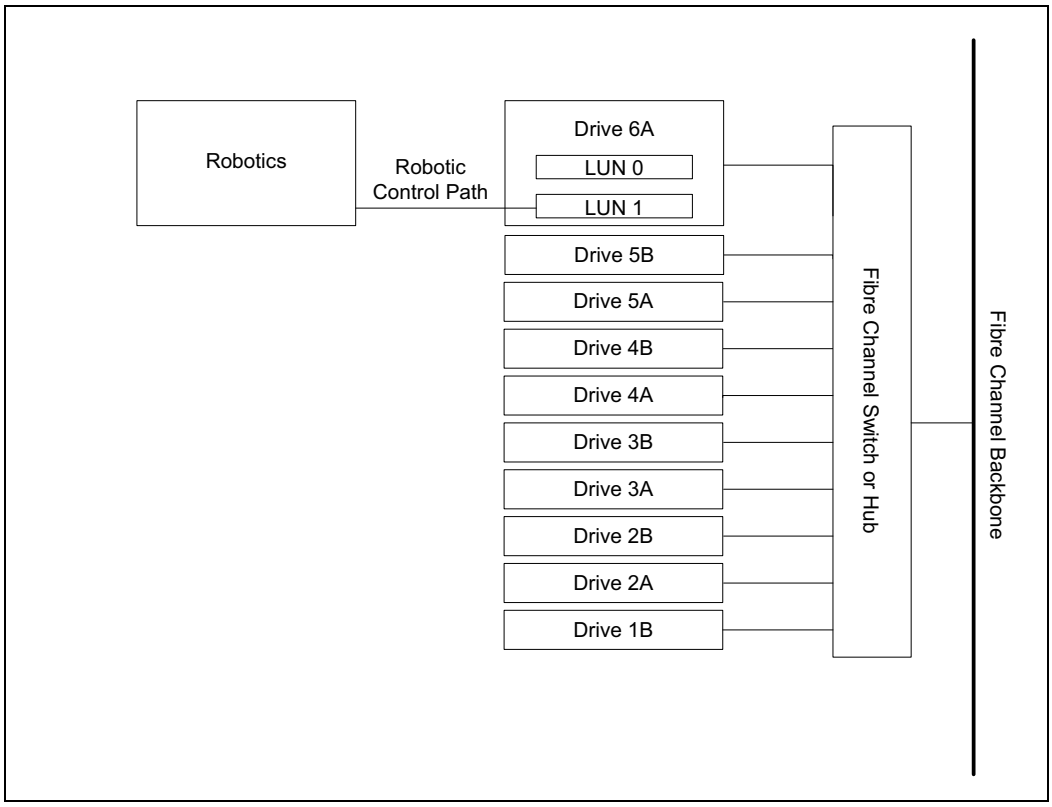


Figure 15 An example of an exporting drive in a partition with direct-attached Fibre Channel drives.

Control Path Through an F-QIP

In an F-QIP-based configuration, an F-QIP is the exporting controller for the partition. This controller provides the bridge between the Fibre Channel interface from the host and the internal interface used by the library to communicate with the robotics.

An F-QIP can support up to six partitions, each with full control of the robotics. For example, if the library contains two partitions, a single F-QIP can provide the robotic control path for both partitions.

Figure 16 shows an example of a partition with SCSI drives and F-QIPs attaching to the Fibre Channel environment. Port A on F-QIP 2 provides the robotic control path over which the motion commands to control the robotics assembly are received from the host.

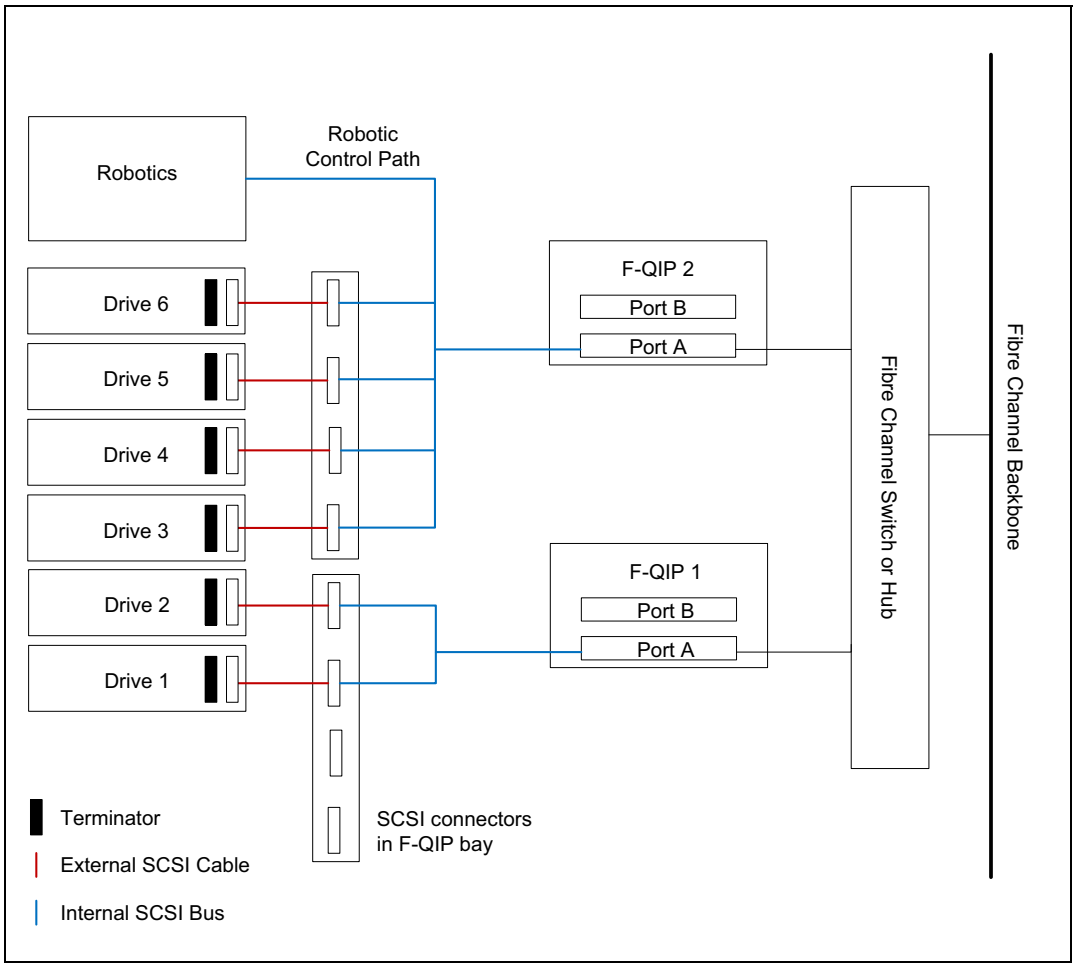


Figure 16 An example of F-QIPs in a partition with SCSI drives.

World Wide Names for Fibre Channel Partitions

The World Wide Name (WWN) displayed for each partition on the Shared Library Services screen is the WWN of the exporting controller (F-QIP or direct-attached drive) that provides the robotic control path for the partition (the exporting controller). The WWN is based on the physical location of the controller in the library and remains constant even if the controller is replaced. The new controller assumes the location-based WWN.

Note: If multiple drives are configured as exporting controllers in a partition there are multiple WWNs for the partition. Click **Summary** to display the Partition Settings screen, which lists all of the WWNs.

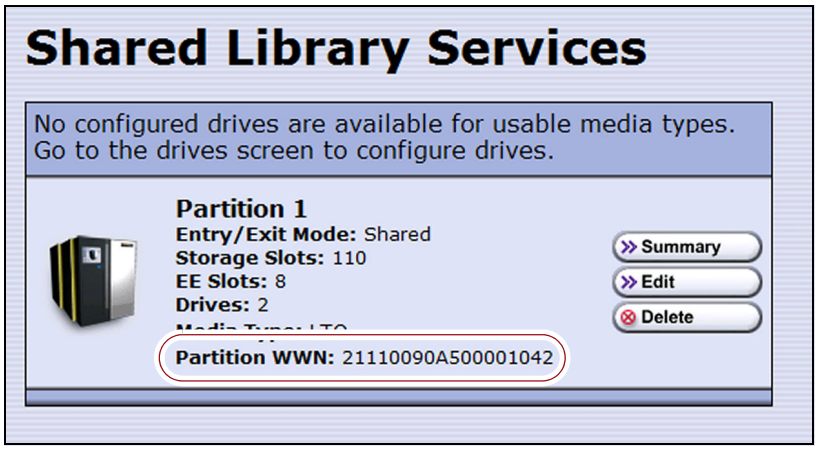


Figure 17 The WWN assigned to the partition.

For Partitions with F-QIPs as the Exporting Controller

- The partition WWN is actually the World Wide Node Name (WWNN) for the exporting controller.
- If multiple partitions use the same Fibre Channel port on the F-QIP, all of the partitions have the same WWNN and the same World Wide Port Name (WWPN). However, the partitions will have different LUNs under those controllers, starting at LUN zero (0).
- If you create two partitions and configure one partition to use Port A and another to use Port B, the WWNN/WWPN of port A will start with 21 and the WWNN/WWPN of port B will start with 22. In this case the ports are independent. However, both of the partitions will show the WWN for Port A only.
- If you export the same partition out both port A and port B on a RIM or QIP, the WWNN will be the same for both ports but the WWPN will be different. This scenario is a type of redundant path to the robotics.
- For more information about WWNs, log on to the portal (see Accessing the Technical Support Portal on page 435), open the Knowledge Base, and in the KBA field, enter `01764` to access the article *Spectra Library World Wide Names (WWNs) for QIPs* (the article discusses F-QIPs; the concepts are the same for a RIM).

For Partitions with a Drive or Drives as the Exporting Controller

- The partition WWN is the same as the WWN for the drive. The commands to control the motion of the robotics within the partition are sent from the host to the exporting drive's logical unit number 1 (LUN 1). Commands to control the operation of the exporting drive are sent from the host to LUN 0 of the drive.
- See World Wide Names for Fibre Channel Drives on page 54 for more information about WWNs for drives.

Fibre Channel Port Configurations

One or both of the external ports on the exporting controller can be used to provide the network connectivity for the robotics.

Single Port Connectivity The simplest configuration uses only one of the interface ports on the exporting controller. This configuration works well when only a single host is connected to the library. When multiple hosts are connected to the same port, they must share this single communication path to the robotics. This type of configuration requires the hosts to use device sharing application software to handle the arbitration for use of the robotics.

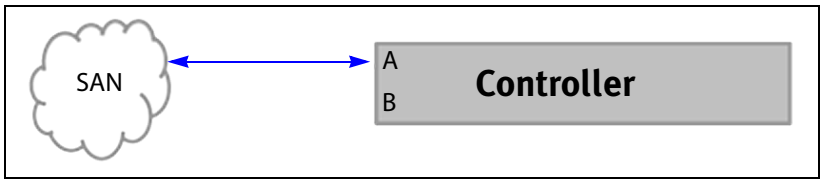


Figure 18 Single port network connectivity to the exporting controller.

Dual-Path Connectivity (F-QIPs only) A slightly more complex configuration uses both interface ports on the exporting controller with each connected to a different library partition. Each port is used as an independent communications path. From a host perspective, each port is viewed as a unique, independent path to a partition. The two ports can be connected to the same or possibly different storage area networks (SANs). The library processes the motion commands and relays them to the partitions in the order that they are received. This is a way to provide limited visibility between the partitions. If you have more than two partitions you can use additional controllers to provide additional isolation between partitions.

Dual-Port Connectivity As an alternative to the configurations that use a single port for each partition, dual-port configurations use both interface ports as a single communications path to the same partition. The ports can be connected to the same or different SANs. The hosts on the network can use either port to communicate with the robotics. A dual-port configuration allows a host to have an alternate, redundant, path to reach the partition. Not all host software can support this type of configuration.

Note: The two ports cannot be used simultaneously..

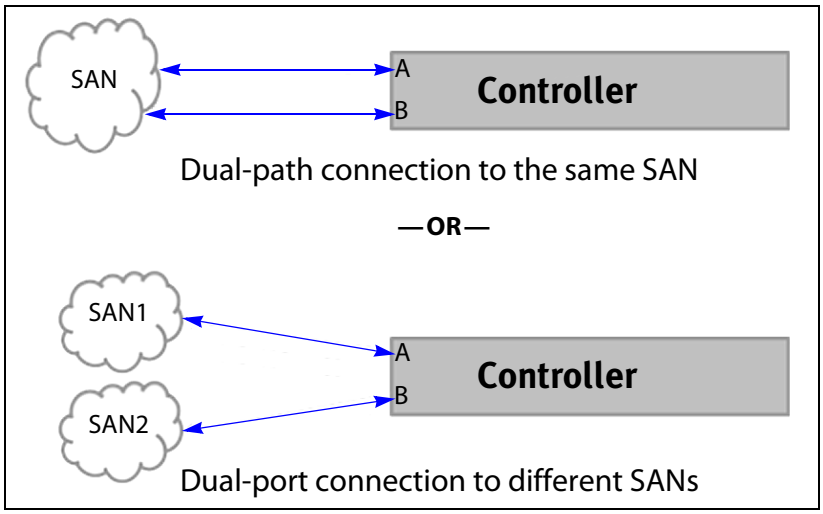


Figure 19 Examples of a dual-path and dual-port configurations.

Drive Connectivity

The drives in the library have either a Fibre Channel interface, a SAS interface, or a SCSI bus interface.

- Fibre Channel drives connect directly to the host using a Fibre Channel arbitrated loop or fabric, as described in Partitions Using Direct-Attached Fibre Channel Drives on page 54.
- Serial Attached SCSI (SAS) drives connect directly to a SAS HBA.
- SCSI drives can be connected using either of the following methods:
  - Using a direct connection to a SCSI HBA, as described in Partitions Using Direct-Attached SCSI Drives on page 55. The terminator for each SCSI bus is installed on one of the drive's external LVD SCSI connectors.

  —OR—

  - Using an F-QIP to provide the Fibre Channel connectivity, as described in Partitions Using F-QIP-Attached SCSI Drives on page 56. The F-QIP acts as a bridge to connect SCSI drives to a Fibre Channel fabric or arbitrated loop. The terminator for each SCSI bus is installed on one of the drive's external LVD SCSI connectors.

Keep in mind that all of the drives on an arbitrated loop or SCSI bus must share the data transfer capacity (bandwidth) of the interface. Having multiple devices on the same loop can negatively impact the performance of all the devices.

Partitions Using Direct-Attached Fibre Channel Drives

When a partition includes Fibre Channel drives, the drives are connected directly to the host using a Fibre Channel arbitrated loop or fabric. Figure 15 on page 49 is a simple representation of how the robotics and direct-attached Fibre Channel drives are connected directly to a Fibre Channel SAN through a switch or hub.

World Wide Names for Fibre Channel Drives As part of providing network connectivity, the drive sled firmware assigns a location-based WWN for the drive it houses. This WWN is displayed on the Drive Details screen and can be used by the host software to address the drive. Because this WWN is location-based, it remains constant even if a drive is replaced by a different one of the same type. The new drive assumes the location-based BlueScale identifier and WWN.

Note: The WWN displayed on the Drive Details screen is actually the WWPN for port A on the drive sled. The WWPN for port B is the same as the one for port A except that the second digit from the left is **2** instead of **1**.

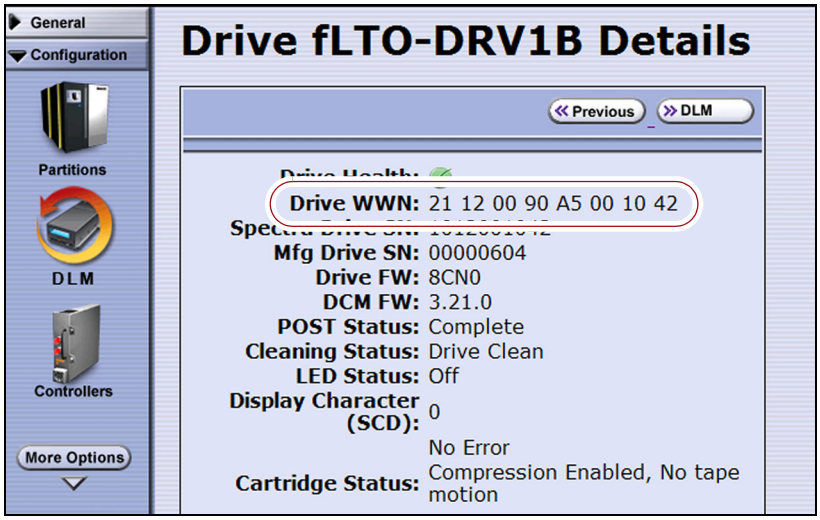


Figure 20 The WWN assigned to a Fibre Channel drive.

Partitions Using Direct-Attached SCSI Drives

When using direct-attached SCSI drives in the library, each drive is connected directly to the SCSI bus. One of the drives in each partition provides the robotic control path to the robotics.

Each SCSI drive has two external SCSI connectors which provide SCSI bus connectivity to a host SCSI HBA, as illustrated in Figure 21. Each drive is on a separate SCSI bus and can only be accessed by the host that is connected to it. Each SCSI bus is terminated by an LVD SCSI terminator on the drive's other SCSI connector. Each drive connection requires a separate SCSI HBA in the host.

Important Spectra Logic does not support daisy-chaining LTO-4 SCSI drives. LTO-3 SCSI drives can be daisy-chained, but must be limited to two drives on a single SCSI bus. Daisy-chaining other devices on the same SCSI bus as a drive is not supported.

Important Although a maximum of 15 devices can be connected to a single wide LVD SCSI bus, attaching more than two devices (including the SCSI HBA) to a single SCSI bus can potentially have a negative impact on the performance of all devices on the bus.

Note: One of the drives in a partition also provides the robotic control path.

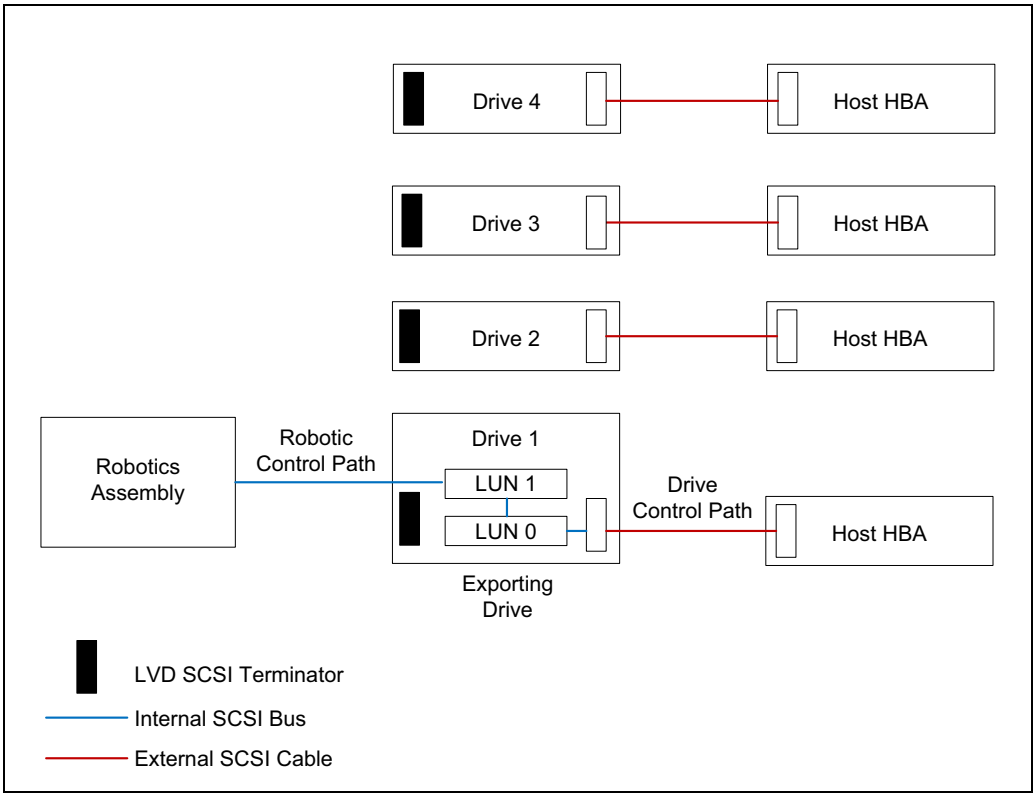


Figure 21 Direct-attached SCSI drive connectivity.

Partitions Using F-QIP-Attached SCSI Drives

When a partition includes SCSI drives, an F-QIP can be used to provide Fibre Channel connectivity to the host. Each F-QIP has two external fiber ports and provides connectivity for up to four SCSI drives. If a partition contains more than four drives, an additional F-QIP is required to provide the connectivity for the remaining drives.

Note: In this type of configuration, one of the F-QIPs used for drive connectivity is also used to provide the robotic control path.

The F-QIP acts as a bridge to connect SCSI drives to a Fibre Channel fabric or arbitrated loop. Figure 16 on page 50 is a representation of how the drives and robotics in a library with a single F-QIP-based partition are connected to a Fibre Channel arbitrated loop or fabric through a switch or hub.

The two ports on the F-QIP provide any-to-any connectivity to the drives connected to the four SCSI connectors associated with it. The drives connected to the F-QIP are potentially accessible to hosts through both ports on the F-QIP or their accessibility can be limited to only those hosts connected to each port.

For example, if the F-QIP port visibility is configured so that the top two SCSI connectors are only accessible through Port A and the bottom two are only accessible through Port B, then the drives connected to the top two connectors can only be accessed by the host connected to Port A and the bottom two drives can only be accessed by the host connected to port B.

In a more complex configuration, the F-QIP can be configured so that all four SCSI connectors are accessible through both ports, making the attached drives accessible to the hosts connected to either port on the F-QIP. Such a configuration is typically used in a shared storage environment.

Important If drives are visible to multiple servers, your storage management software must support this visibility. Otherwise server contention for a single drive can create network and system problems.

HIGH-AVAILABILITY CONFIGURATIONS

In high-availability enterprise environments, keeping the library operating even in the event of a network connection failure or component failure is extremely important. The following sections describe the high-availability features of the library.

Drive Connectivity Failover

The LTO-4 and LTO-5 full-height Fibre Channel drives used with the library are equipped with two Fibre Channel ports. The two Fibre Channel ports cannot be used simultaneously to provide redundant data paths between the hosts and the drive. However, they can be used to provide failover capability in the event that communication to the port currently in use is interrupted. This failover can be accomplished several ways, including:

- Manually disconnect the fiber optic cable from the failed port and connect it to the other port. You may need to reconfigure your host software to recognize the alternate port.
- Connect each port on the drive to a separate Fibre Channel HBA in the host. You can also use a dual-port Fibre Channel HBA. Configure one HBA (or HBA port) as the primary connection and the other HBA (or HBA port) as the failover connection. Install failover software on the host computer to control the transfer of I/O from one HBA to the other in case of a failure. You may also need to configure your storage management software to correctly recognize both ports. Refer to your failover software, HBA, and storage management software documentation for instructions.
- Connect each port on the drive to a separate Fibre Channel HBA in the host. You can also use a dual-port Fibre Channel HBA. Configure one HBA (or HBA port) as the primary connection and the other HBA (or HBA port) as the failover connection. Install failover software on the host computer to control the transfer of I/O from one HBA to the other in case of a failure. You may also need to configure your storage management software to correctly recognize both ports. Refer to your failover software, HBA, and storage management software documentation for instructions.

  Note: Tape drives sold by Spectra Logic do not support MPIO.

Global Spare Drives

The BlueScale Global Spare feature provides a way to remotely substitute an available Fibre Channel LTO-4 or later generation drive in the library for a failed drive of the same type. The feature lets you configure an installed drive as a designated spare for other drives in the library. This drive can then be substituted for a failed drive in any partition that is configured to use the Global Spare drive. When a drive fails, you simply log into the BlueScale web interface from any location, select the Global Spare option for the failed drive, and continue normal operations. You can then physically replace the failed drive at your convenience. See Assign Global Spare Drives on page 162 and Using a Global Spare Drive on page 348 for more information.

Redundant Power Supplies

The library requires one 5/12 VDC power supply to be installed. Installing an optional, additional power supply provides redundancy and failover protection in the event that a single power supply fails.

The library has both a primary and a secondary AC power input. When using a redundant AC power configuration, each input is connected to a separate branch circuit. This allows for failover in the event of a power failure in one of the circuits.

CHAPTER 3

Introducing the BlueScale User Interface

The BlueScale user interface is used for configuring, monitoring, and maintaining the T120. The user interface displays on a color touch screen on the front of the library. It can also be displayed remotely through a standard web browser using the Remote Library Controller (RLC) or on a monitor connected directly to the LCM.

Note: The XML command interface can also be used to perform many of the functions provided by the BlueScale user interface. See the *Spectra Tape Libraries XML Command Reference* for detailed information about using the XML command interface.

This chapter describes the BlueScale user interface and how it is used.

Topic	
Overview of the BlueScale User Interface	page 60
Access Options	page 60
User Interface Features	page 62
Library Management	page 70
Using the BlueScale User Interface	page 71
Log Into the User Interface	page 71
Log Off or Switch Users	page 76
Enter Information on Screens	page 77

OVERVIEW OF THE BLUESCALE USER INTERFACE

The BlueScale user interface lets you set configuration options, view library and drive information and metrics, manage media, monitor library operations, and perform maintenance operations.

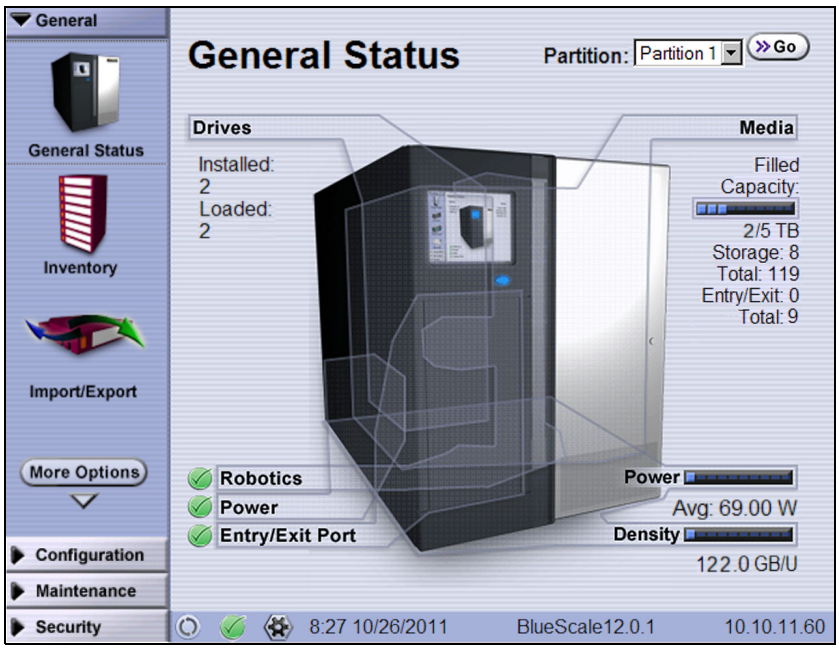


Figure 22 The BlueScale user interface General Status screen.

Access Options

The BlueScale user interface is accessed using either the touch screen on the library operator panel or through the BlueScale web interface.

Operator Panel Touch Screen Interface

The touch screen on the library's operator panel is the library's local BlueScale user interface. You select options and enter information by touching the appropriate location on the screen with a stylus or your finger. The touch screen interface includes a soft keyboard that you can use to enter alphanumeric characters into text fields. This soft keyboard can be accessed from the keyboard icon that displays whenever text input is required.

In addition to using the touch screen, you can access the local user interface using a monitor, keyboard, and mouse connected directly to the LCM (see Figure 6 and Figure 7 on page 32). This method of accessing the local BlueScale user interface provides the same functionality that is available from the touch screen.

Important Do not use the **Enter** key on your keyboard when making selections in the BlueScale user interface. It can cause inconsistent behavior in the BlueScale interface.

BlueScale Web Interface

The BlueScale web interface lets you use a standard web browser to access the library through the Remote Library Controller (RLC). Enter the library's IPv4 or IPv6 address into a browser running on a computer that can access the Ethernet network to which the library's LCM is connected.

Important

- When accessing the library remotely through a web browser, do not use the **Enter** key on your keyboard when making selections in the BlueScale user interface. Various web browsers handle the **Enter** key differently, causing inconsistent behavior in the BlueScale interface.
- Always use your mouse to make selections and click the buttons in BlueScale screens instead of using your keyboard.
- Do not use the browser's back button to return to a previously viewed BlueScale screen. Always use the BlueScale toolbar and buttons on the screen to navigate the BlueScale web interface.
- Using a keyboard command (for example, **F5**) to refresh the browser when connected to the BlueScale web interface causes unpredictable results.

The BlueScale web interface provides access to the same features and functions that are available through the touch screen, excluding functions that involve physical interaction with the library (for example, using the E/E port to import or export a cartridge).

When using the web interface, keep the following requirements in mind:

Number of Sessions The BlueScale web interface supports up to eight simultaneous connections to the library. If you attempt to establish more than eight simultaneous web interface connections, the existing connection with the longest idle time is terminated.

Supported Browsers Remote access to the library through the web interface is only supported using the following web browsers:

- Microsoft® Internet Explorer®
- Mozilla® Firefox®
- Google® Chrome™
- Apple® Safari®

Additional browsers were not fully tested with the BlueScale web interface. Using an unsupported browser may result in the BlueScale web interface not displaying or operating as expected.

User Interface Features

The following sections describe the common features that appear in all screens in the user interface.

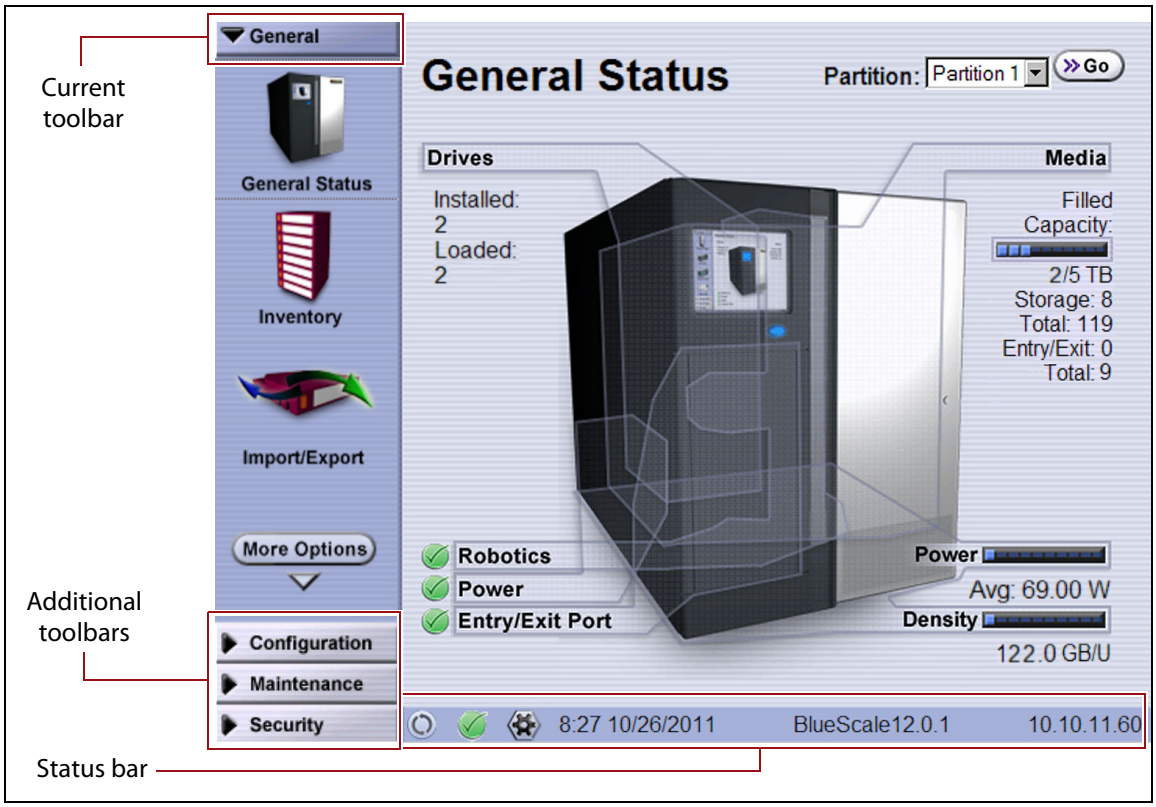


Figure 23 The BlueScale user interface features.

Toolbars

The toolbar panel appears along the left edge of each screen (see Figure 23) and lets you navigate through the available toolbars to select options. Clicking on a toolbar expands it to display the available options. The screen for the previously selected option remains displayed until you select another option, either from the same toolbar or another one.

Option Overview

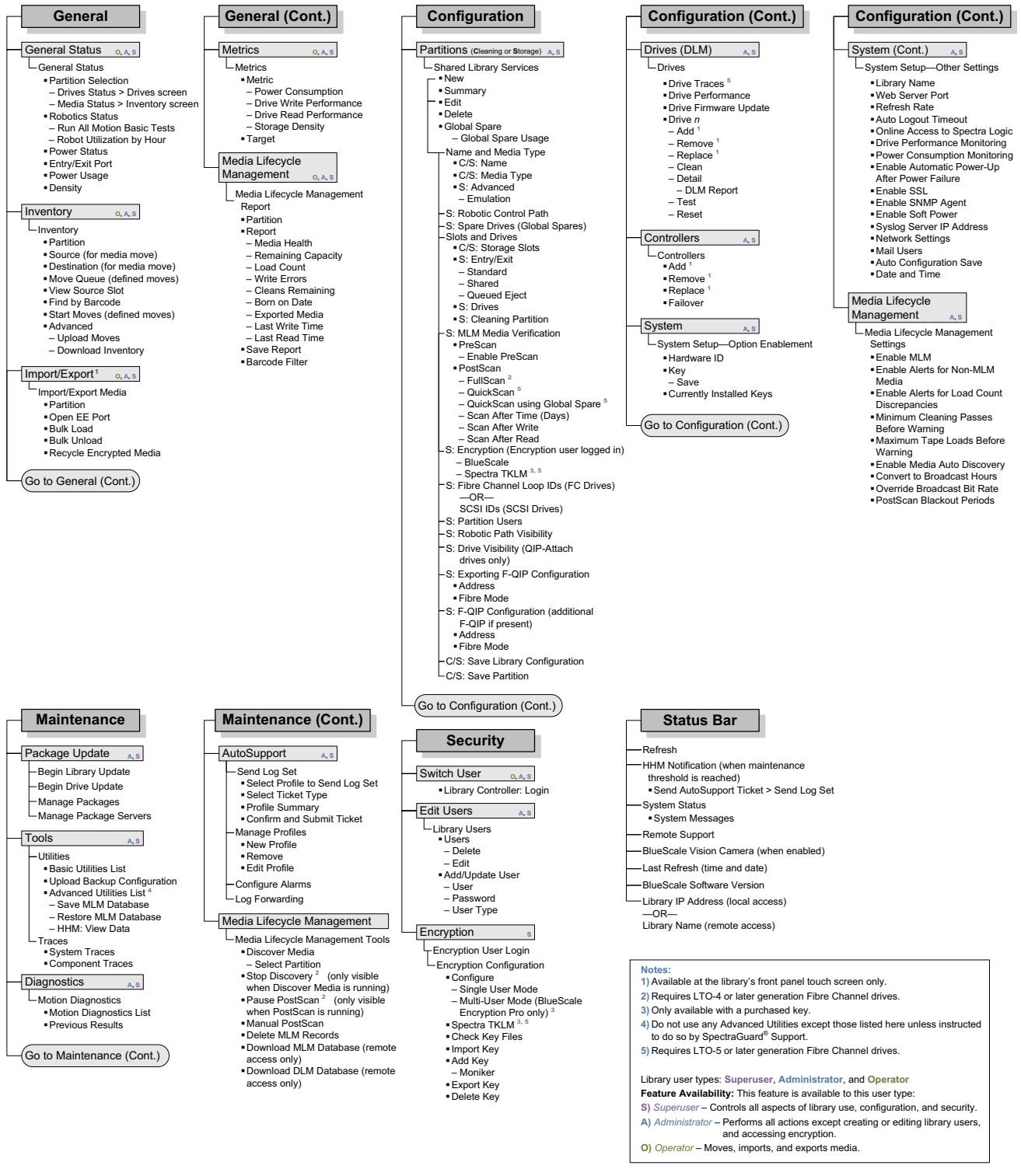
The following table provides an overview of the options available under each toolbar. Figure 24 on page 66 shows the sequence of the screens under each option.

Toolbar	Available Options
General	The General toolbar (shown in Figure 23 on page 62) provides access to the most frequently used library screens and controls: ▪ **General Status** — Displays the current status for all of the major library components for the selected library partition. Moving the cursor over the name of the component highlights the component in the system graphic. ▪ Click **Drives** to display the Drives screen for more detailed information about the status of the drives (see View Drive Status Information on page 142). The Drives screen can also be accessed from the Configuration toolbar (see Configuration on page 64). ▪ Click **Robotics** to display the Robotics Status screen, which provides access to the Tools and Usage tabs. Select the Tools tab to access the **Run All Motion Basic Tests** diagnostic (see Testing the Robotics on page 331). Select the Usage tab to access the Robot Utilization feature (see View Robot Utilization Information on page 141). ▪ Click **Media** to display the Inventory screen, which is also accessed from the **Inventory** option on the General toolbar. ▪ Click **Filled Capacity** to display the Media Lifecycle Management Report screen, which is also accessed from the Media Lifecycle Management option on the General Status screen. ▪ **Inventory** — Displays the Inventory screen, which shows the library's media inventory information. Use the controls on the Inventory screen to locate individual cartridges and move cartridges from one location in the library to another. See Chapter 7 – Media Management, beginning on page 201, to learn about using the options available from this screen. ▪ **Import/Export** — Displays the Import/Export screen, which provides controls for importing, exporting, and exchanging cartridges. See Import and Export Overview on page 202 to learn about using the options available from this screen. **Note:** The **Import/Export** option is not available when accessing the library remotely using the BlueScale web interface. ▪ **Metrics** — Displays screens that show the metrics for drive performance, power consumption, and storage density for the media types in the library. See Use Performance Metrics on page 137 for information about viewing the metrics available for the library. ▪ **Media Lifecycle Management** — Displays the Media Lifecycle Management Report screen, which provides controls for generating media lifecycle reports. See Using MLM Reporting on page 266 to learn about using the options available from this screen.

Toolbar	Available Options
Configuration	The Configuration toolbar provides access to controls for configuring all aspects of the library's operation: ▪ **Partitions** — Displays the Shared Library Services screen, which provides information about the currently selected partition and lets you define new partitions or modify existing partitions. See Chapter 6 – Partition Management, beginning on page 147, to learn about configuring and using both storage and cleaning partitions in your library. ▪ **Drives** or **DLM** — Displays the Drives screen, which lists all of the drives installed in the library. Depending on the library configuration, the screen offers options for performing different types of operations on each drive. If Drive Lifecycle Management (DLM) is enabled, the **Drives** icon in the Configuration toolbar changes to **DLM**. The Drives screen changes to include a DLM status icon next to each drive. This icon provides at-a-glance information about the general health of the drive. See View Drive Status Information on page 142 and Chapter 9 – Using Drive Lifecycle Management, beginning on page 280, to learn about using the options available from the Drives screen. **Note:** DLM is automatically enabled when you enable Media Lifecycle Management (MLM). ▪ **Controllers** — Displays the Controllers screen, which provides information about the F-QIPs installed in the library. The Controllers screen may not have any entries if the library is using direct-attached drives to provide the robotic control path for partitions. ▪ **System** — Displays the System Setup screen, which provides controls for enabling purchased library options and configuring the library's system-wide operating parameters. See Chapter 4 – Configuring the Library, beginning on page 79, to learn about the options available from the System Setup screen. ▪ **Media Lifecycle Management** — Displays the Media Lifecycle Management Setting screen, which provides controls for enabling MLM and configuring global settings for MLM. See Chapter 8 – Configuring and Using Media Lifecycle Management, beginning on page 234, to learn about using the options available from the Media Lifecycle Management Setting screen.

Toolbar	Available Options
Maintenance	The Maintenance toolbar provides access to maintenance and troubleshooting options for the library and drives. ▪ **Package Update** — Displays the Package Update screen, which shows the version of the BlueScale software the library is using and provides controls for updating the BlueScale software and the firmware for individual library components, managing update packages, and configuring and managing package servers. See Configure a Package Server on page 118 and Updating the BlueScale Software and Library Firmware on page 382, to learn about using the options available from the Package Update screen. ▪ **Tools** — Displays the Maintenance Tools screen. From this screen you can access the Utilities and System Traces screens which provide tools used during maintenance and troubleshooting procedures. See Chapter 11 – Library Troubleshooting, beginning on page 306, and Chapter 13 – Maintaining the Library, beginning on page 378, to learn about using the options available from the Utilities and System Traces screens. ▪ **Diagnostics** — Displays the Diagnostics screen, which provides access to diagnostics used for testing the library during troubleshooting procedures. These tests are performed under guidance from Spectra Logic Technical Support. ▪ **AutoSupport** — Displays the AutoSupport screen, which provides controls for creating and maintaining AutoSupport profiles, opening and updating support tickets, and configuring AutoSupport features. See Chapter 10 – Configuring and Using AutoSupport, beginning on page 289, for detailed information about configuring and using AutoSupport. ▪ **Media Lifecycle Management** — Displays the Media Lifecycle Management Tools screen, which provides access to controls for using MLM features. See Chapter 8 – Configuring and Using Media Lifecycle Management, beginning on page 234, to learn about using the options available from the Media Lifecycle Management Tools screen.
Security	The Security toolbar provides access to options for managing users and for configuring and using the encryption feature for your library. ▪ **Switch User** — Displays the main BlueScale Login screen, which logs the current user out of the library and lets a different user log in. See Log Off or Switch Users on page 76 for information about using this option. ▪ **Edit Users** — Displays the Edit Users screen, which provides tools for adding, editing, and deleting users. See Configuring Library Users on page 80, to learn about using the options available on the Edit Users screen. ▪ **Encryption** — Displays the Encryption Login screen. You must log into the encryption feature before you can enable and configure the encryption options. See the *Spectra Encryption User Guide* for information about configuring and using encryption with the library. **Note:** BlueScale Encryption Standard Edition capability is included with the library. You can purchase an activation key for either BlueScale Encryption Professional Edition or the Spectra SKLM Encryption key management system to access additional encryption capabilities.

Map of Options Available from the Toolbar



Note: The BlueScale user interface changes as features are added or modified between BlueScale revisions. The toolbar options shown here may differ from those available for your library.

Figure 24 Map of the options available from the BlueScale Toolbar.

Status Bar

The status bar is located along the bottom edge of most screens. The information and icons displayed on the status bar depend on the status of the system and whether you are using the operator panel or the BlueScale web interface.

Note: See Additional Status Bar Icons on page 68 for additional icons that can also appear on the status bar.

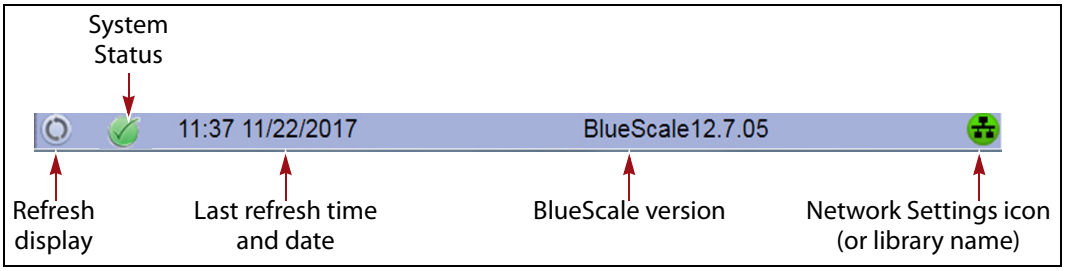


Figure 25 The BlueScale status bar.

Refresh Display Button Refreshes (updates) the information currently displayed on the user interface. If you set a long interval for the refresh rate or disabled the automatic screen refresh by setting the refresh rate to zero (see Refresh Rate on page 91), you can refresh the screen manually by clicking the refresh display button.

Important

Do not use keyboard commands (for example, **F5**) to refresh the browser when connected to the BlueScale web interface. These keyboard commands can cause unpredictable results.

System Status Icon Indicates the status of library components. The BlueScale user interface uses the following icons to indicate the status of library components. Click the status icon to view system messages (see Check and Respond to Messages on page 134 for information about these messages).

Note: These status icons also display next to the major system components shown on the General Status screen (see Figure 23 on page 62).

Icon	Description	Meaning
	A check mark (✓) in a green circle	All system components are functioning correctly.
	An ***i*** in a blue circle	An informational message about a system component is available. Check messages to determine the component.
	An exclamation point (**!**) in a yellow triangle	A system component requires attention. Check messages to determine the component.
	An **X** in a red circle	A system component experienced an error condition. Check messages to determine the component.

Last Refresh Time and Date Shows when the displayed information was last updated. The library refreshes different screens at different rates, depending on the type of data displayed. The screen refresh rate can be set for a specific interval or disabled (see Refresh Rate on page 91). The displayed information can be refreshed manually by clicking the refresh display button.

BlueScale Version Shows the BlueScale version currently being used by the library.

Network Settings Icon or Library Name Shows the Network Settings icon or name for the library. If you are managing the library from the touch screen operator panel, the Network Settings icon displays on the status bar. Click the icon to go to the Network Settings screen. If you are using the BlueScale web interface, the library's name is shown instead of the Network Settings icon.

Note: If you are using the BlueScale web interface and you did not set the library name, the right-hand side of the status bar is blank.

If you need to view or set the library's IP address or name, see Configure Network Settings on page 96 and Library Name on page 90, respectively.

Additional Status Bar Icons

The status bar can also include the following additional icons.

Auto Download Icon If one or more package servers are configured to automatically download firmware packages (see Configure a Package Server on page 118) and a new package was downloaded, the Auto Download icon (a wrench in a yellow circle) displays to indicate that an update package is ready for installation. Click the icon to navigate to the Package Update screen. See Updating the BlueScale Software and Library Firmware on page 382 and Updating Drive Firmware on page 409 for information on installing the update.

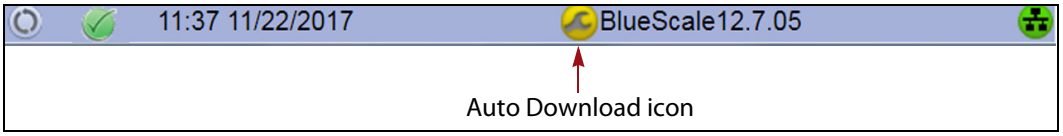


Figure 26 The Auto Download icon in the BlueScale status bar.

Remote Support Icon Provides you with online access to the support section of the Spectra Logic website where you can search the Knowledge Base, access the Product Documentation, and download BlueScale update packages and drivers. If you need additional assistance, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).

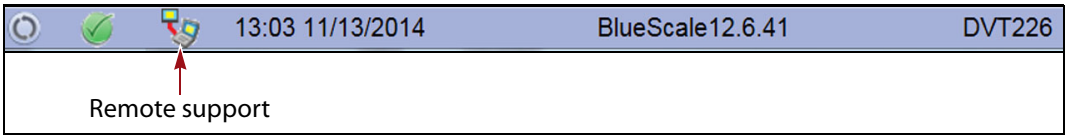


Figure 27 The Remote Support icon in the BlueScale status bar.

The remote support icon is also used to activate secure remote access capabilities using Cisco WebEx technology. This remote access helps Spectra Logic Technical Support provide faster resolution of support calls. This capability is only enabled on an as-needed basis during a support call.

Notes:
- The remote support icon is only visible when you are accessing the library through the BlueScale web interface.
- When Spectra Logic Technical Support needs to launch a WebEx session to access your library, they send you a link via email.

HHM Icon When the library or one of its components reaches its maintenance threshold, the Hardware Health Monitor (HHM) notification icon appears on the status bar. As with the system message icon, the color of the icon indicates the urgency of the notification.

You can click the icon to view information about the notification and send a Hardware Health Monitor ticket to a contact person within your organization or to Spectra Logic Technical Support. They can then review the logs and determine if any maintenance tasks are needed (see Using BlueScale Hardware Health Monitoring on page 318).

Note: The HHM icon only displays if an HHM threshold is reached. After any required tasks are complete, the threshold can be reset. The HHM icon disappears until the next threshold is reached.

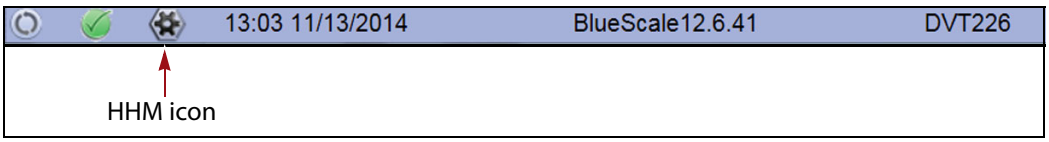


Figure 28 The HHM icon in the BlueScale status bar.

Progress Bar

When the library is busy processing a command, a horizontal progress bar displays above the status bar. Do not use the touch screen (or the BlueScale web interface) until the progress bar disappears.

Library Management

The library management features in the BlueScale user interface provide maximum configurability and ease of use for the T120. To take full advantage of the library's versatility, read the following overview of the library's management features.

Automatic Email Alerts

Simple Mail Transfer Protocol (SMTP) allows users to receive library status information via email. When the library generates messages through the library control module, the library automatically sends email notifications to users who are configured to receive them. Information included in the notification consists of the message number, severity, details, remedy, and the time it was generated. Message types are Information, Error, Warning, and Fatal (see System Messages on page 133). You can select the types of messages each library user receives (see Configure Mail Users on page 99).

AutoSupport

AutoSupport guides you through the process of sending email regarding library problems — along with library logs and configuration information — directly to internal support personnel or Spectra Logic Technical Support. See Chapter 10 – Configuring and Using AutoSupport, beginning on page 289 for detailed information.

User Security

Library users are assigned to one of three groups, each with its own set of pre-defined library privileges (also known as permissions). These privileges determine the type of operations a user can perform on the library and are the primary means for configuring library security. See Configuring Library Users on page 80 for detailed information about users.

Note: An additional, separate password must be entered to access the encryption features. See the *Spectra Tape Libraries Encryption User Guide* for information about the encryption user.

USING THE BLUESCALE USER INTERFACE

The library's BlueScale user interface lets you set configuration options, view library and drive information and metrics, manage media, and monitor library operations.

Note: Unless otherwise specified, references to the user interface screens apply to both the touch screen on the library operator panel and the screens presented through the BlueScale web interface.

Log Into the User Interface

Before you can manage or configure the library, you must log into the BlueScale user interface.

After the library completes its power-on sequence, the Library Initialization screen displays. This screen lists the required initialization steps and current status of the library's major components (Robotics and LCM). Text boxes provide descriptions about the currently active tasks.

Notes:

- If your library has a static IP address, you can access the library using the BlueScale web interface (RLC) as soon as the Library Initialization screen displays
- If the library cannot complete the initialization process, it generates system messages and enters maintenance mode. Contact Spectra Logic Technical Support for assistance.

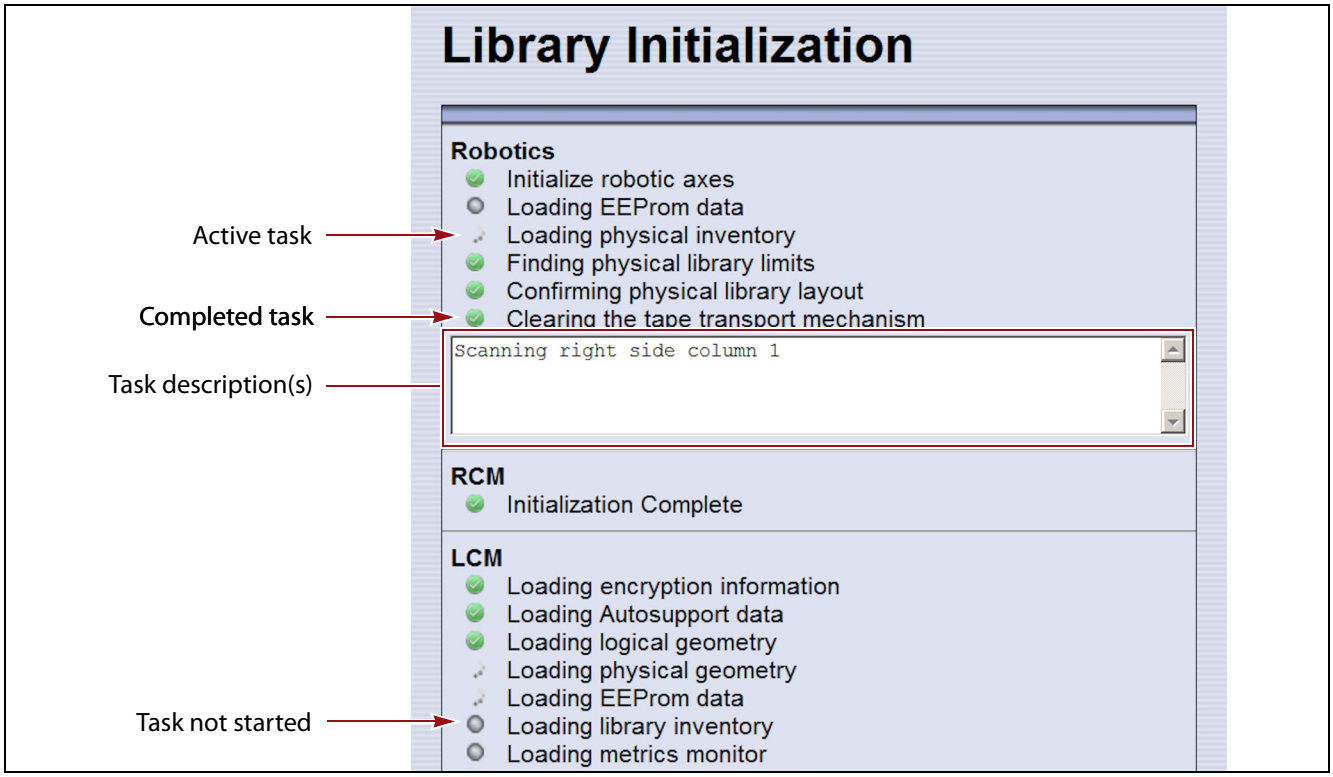


Figure 29 The Library Initialization screen.

After the library completes its initialization sequence, the Library Controller: Login screen displays on the library operator panel. This Login screen also displays when you access the library remotely using the BlueScale web interface (RLC), as well as when you switch users or when the library automatically logs out the current user if auto-logout is enabled.

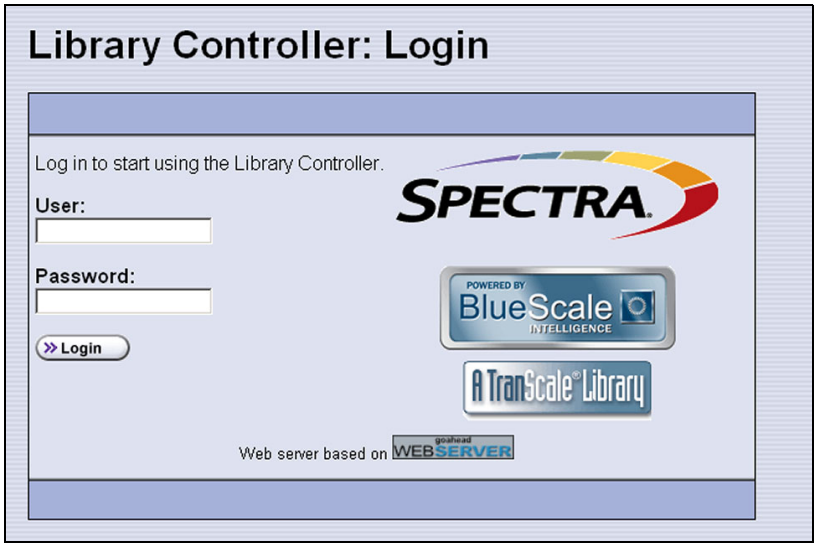


Figure 30 Log into the library using the Library Controller: Login screen.

If there is no interaction with the operator panel within 30 seconds after the Login screen displays, the Login screen is replaced by the pre-login General Status screen. This General Status screen provides at-a-glance status for the library and its components without requiring you to log into the library. You can view the status of the entire library or a specific partition.

Note: The pre-login General Status screen does not display when you access the library remotely through the BlueScale web interface.

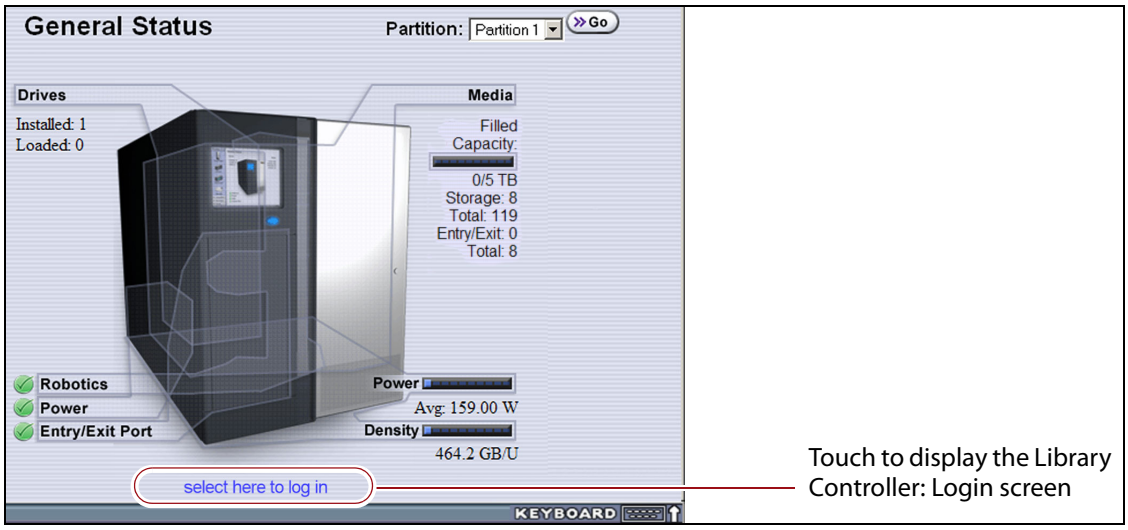


Figure 31 Log in from the pre-login General Status screen.

Use the following steps to log into the library:

1. Connect to the library. The method depends on how you are accessing the library.

   Using the front panel touch screen or a direct connection to the LCM

   - If the Login screen is displayed, skip to Step 2 on page 74.
   - If the pre-login General Status screen is displayed, touch or click **select here to login** at the bottom of the screen to display the Login screen and then skip to Step 2 on page 74.

   Note: If the soft keyboard is open and covering the bottom of the screen, touch the keyboard icon to close the soft keyboard or use the scroll bar on the right side of the screen to scroll down to the bottom of the screen.

   Connecting to the library remotely using the BlueScale web interface

   Enter the IP address of the T120 in the address bar of a web browser on a computer on an active network that has access to the library. The steps you use depend on whether SSL is enabled or not.

If SSL is...	Use the following steps...
Not enabled (the default)	**1.** Enter the IPv4 or IPv6 address configured for the library in the format: **`http://[library IP address]`** (see Configure Network Settings on page 96). **2.** The BlueScale Login screen displays (see Figure 30 on page 72). Proceed to Step 2 on page 74.
Enabled	**1.** Enter the IPv4 or IPv6 address configured for the library in the format **`https://[library IP address]`** (see Configure Network Settings on page 96). See Enable SSL on page 93 for information about enabling SSL. **Important:** When using SSL, you must prefix the IP address with https:// instead of just entering the IP address. **2.** If you receive a warning about the website's security certificate, choose to ignore or resolve the warning. **Notes:** ▪ The security warning only appears if you did not resolve the security certificate warning, either by storing a valid security certificate on the library (see Install a Security Certificate and Authentication Key on page 105) or by creating a security exception for the library on the browser (method depends on the browser you are using). ▪ If you do not resolve the warning, you receive the warning about the security certificate each time you access the BlueScale web interface. **3.** The BlueScale Login screen displays (see Figure 30 on page 72). Proceed to Step 2 on page 74.

2. Select the **User** text box. A cursor appears in the box.

   Note: When using the touch screen on the library operator panel, touch the keyboard icon on the Login screen to activate the soft keyboard on the library's touch screen. Use the stylus or your finger to select fields and to type information using the soft keyboard.

   Selecting the keyboard icon again closes the soft keyboard.

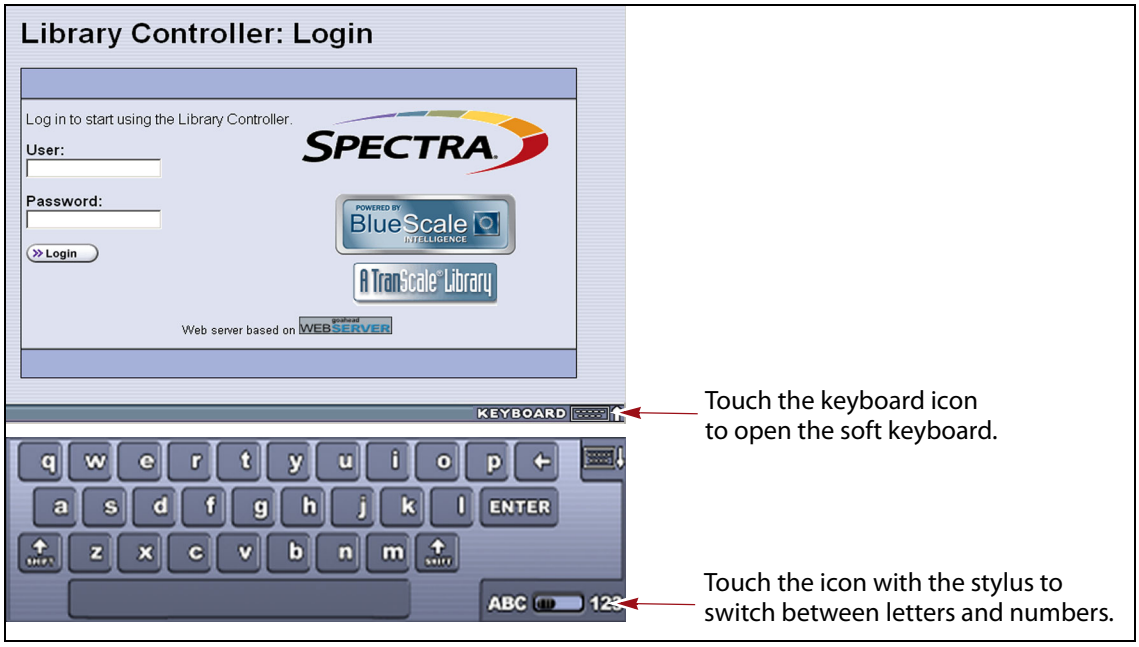


Figure 32 Log into the library using the Library Controller: Login screen.

3. Type your user name (**su** is the default user name for a superuser).

   See Configuring Library Users on page 80 for information about the three types of user groups and the options and controls accessible to each user group.

4. Type your password in the **Password** text box. If you log in as one of the default users, there is no password (unless you configured one).

   Note: By default, passwords are not required to log into the library. If you want to password-protect access to the library, set passwords for each user as described in Configuring Library Users on page 80.

5. Click **Login**. The library's General Status screen displays.

   Note: If you just powered-on or reset the library, there may be a delay after you click **Login** while the library completes its initialization. When the initialization is complete, the General Status screen displays.

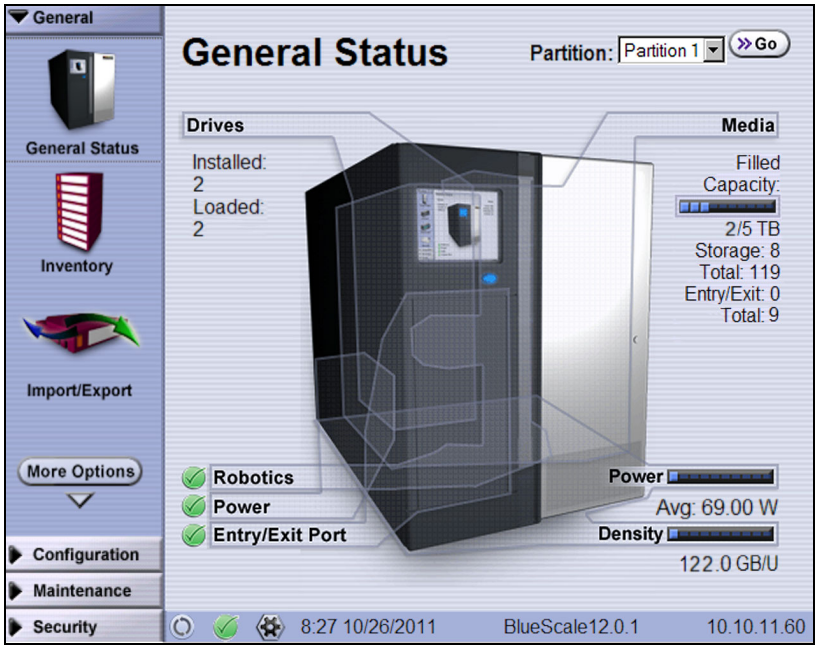


Figure 33 The BlueScale General Status screen.

6. If you want to enable encryption or configure encryption settings, select **Security** ⋯⁘ **Encryption** to log into the encryption feature (see the *Spectra Encryption User Guide* for detailed instructions).

Log Off or Switch Users

1. If a screen other than the Login screen is displayed, select the **Security** toolbar to display the Security options.

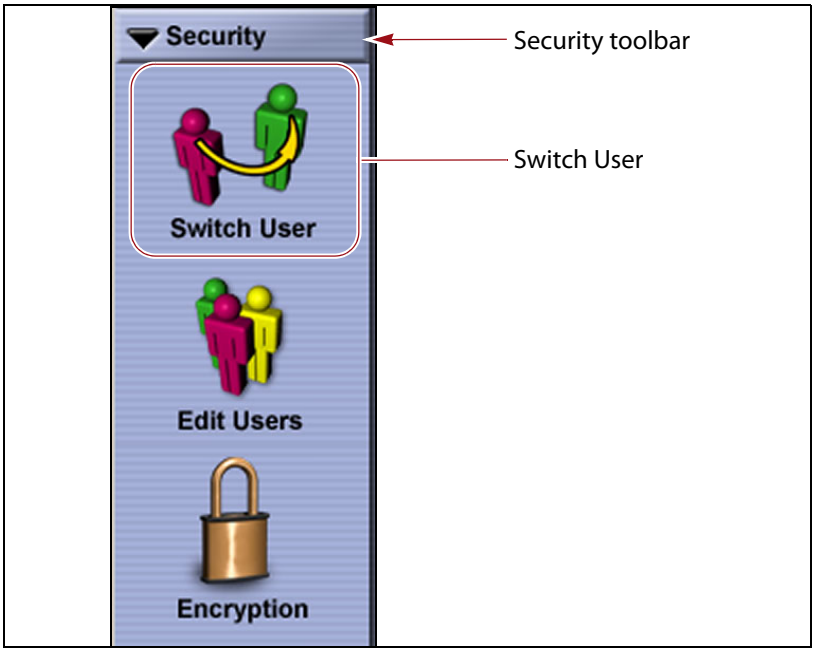


Figure 34 The Security toolbar.

2. Select **Switch User** to log out the currently logged in user and redisplay the Login screen.
3. If desired, log in again using the same or a different user name and password.

Enter Information on Screens

Entering information on a user interface screen requires using one of the following methods.

BlueScale Web Interface

The BlueScale web interface lets you use your computer keyboard to enter information into the user interface and a mouse to navigate through the user interface screens (see BlueScale Web Interface on page 61). Using the web interface is the most convenient way to enter large amounts of information when you are configuring the library.

Important

When accessing the library remotely through a web browser, do not use the **Enter** key on your keyboard when making selections in the BlueScale user interface. Various web browsers handle the **Enter** key differently, causing inconsistent behavior in the BlueScale interface.

Always use your mouse to make selections and click the buttons in BlueScale screens instead of using your keyboard.

Note: Functions that require physical interaction with the library (for example, importing or exporting cartridges) are not available when using the BlueScale web interface.

Soft Keyboard



When using the touch screen on the operator panel, select the keyboard icon in the lower right corner of any screen to activate the on-screen keyboard. When the keyboard is extended, an icon in the lower right corner lets you select between alphabetic or numeric characters. Use a stylus or your finger to select fields and enter alphanumeric information using the keyboard. Touching the keyboard icon again closes the keyboard.

Note: The soft keyboard can also be used to access several troubleshooting features provided through the BlueScale software (see Troubleshooting BlueScale User Interface issues on page 308).

External Keyboard and Mouse

If you cannot use the BlueScale web interface, using an external keyboard and mouse connected to the library is useful when you need to enter large amounts of information. The user interface options available when you use an external keyboard and mouse are the same as when you use the library's touch screen operator panel.

Important

Not all characters on a USA-type keyboard are supported in the BlueScale user interface. If a character does not appear on the soft keyboard, then its use is not supported.

When accessing the library using an external keyboard connected to the library, do not use the **Enter** key on your keyboard when making selections in the BlueScale user interface. Doing so may cause inconsistent behavior in the BlueScale interface.

- If your library uses the Spectra PC module, you can connect a USA-type PS/2 keyboard and mouse to the respective connectors on the LCM (see Figure 6 on page 32).
- If your library uses the Spectra LS module, you can connect a USA-type USB keyboard and USB mouse to the LCM (see Figure 7 on page 32).

  Note: If using a non-USA type keyboard, you need to find the equivalent for some characters like the back slash or forward slash.
- When using a keyboard and mouse connected directly to the library, it may also be useful to connect a monitor to the monitor port on the LCM. The monitor displays the same information as the touch screen.

Feedback Required Screens

When the BlueScale software needs you to make a selection or perform an action it displays a Feedback Required screen. If you do not respond to the Feedback Required screen within 10 minutes, the request times out and the action fails.

CHAPTER 4

Configuring the Library

This chapter describes the procedures for configuring the library's system settings, including the users, the network connections, and optional features.

Topic	
Configuring Library Users	page 80
Add a New User	page 81
Modify an Existing User	page 82
Delete an Existing User	page 82
Accessing the System Setup Screen	page 83
Enabling BlueScale Software Support, Options, and Upgrades	page 85
Enter Activation Keys	page 87
Add Options	page 88
Configuring the Global System Settings	page 90
Configure the System Settings	page 90
Configure Network Settings	page 96
Configure Mail Users	page 99
Enable Email for the Auto Configuration Save File	page 101
Set the Date and Time	page 103
Configuring Optional Library Settings	page 104
Install a Security Certificate and Authentication Key	page 105
Enable and Configure SNMP	page 108
Configure Emulation	page 111
Configure Barcode Reporting	page 113
Configure a Package Server	page 118
Backing Up the Library Configuration	page 122
Use Automatic Backup of the Library Configuration	page 123
Use Manual Backup of the Library Configuration	page 124

CONFIGURING LIBRARY USERS

Overview Each library user is assigned to one of three user groups, each with its own set of pre-defined library privileges (also known as permissions).

User Privilege Requirements Only a user with superuser privileges can add, modify, or delete users.

Understanding User Groups and Security

Before you begin, read this section to understand the three types of user groups and what types of privileges each has.

Note: You must enter an additional password to access the encryption features. See the *Spectra Tape Libraries Encryption User Guide* for information about the encryption user.

The following table describes the three user groups and the privileges of each. By default, passwords are not required for any of the three default users.

User Group Type	Description	Default User Name
Superuser	Controls all aspects of the library's configuration and operation, including defining other library users and assigning them to a user-privilege group. **Notes:** ▪ The library requires a minimum of one superuser. You cannot delete the last member of the Superuser group. ▪ Only a user with superuser privileges can add, modify, or delete users. ▪ Only a user with superuser privileges can access and configure encryption features. ▪ Only a user with superuser privileges can use the Soft Power feature. ▪ Only a user with superuser privileges can enable or disable the Enable Automatic Power-Up After Power Failure feature.	**su**
Administrator	Configures and uses the library. With the exception of creating or modifying library users, accessing the encryption features, enabling Automatic Power-Up After Power Failure, and using the Soft Power feature, users in the Administrator group have the same privileges as users in the Superuser group.	**administrator**
Operator	Performs day-to-day operations. Users assigned to the Operator group can move media, and import and export media using the EE port, but cannot access the more sensitive library operations such as configuration, diagnostics, and security.	**operator**

Add a New User

Use the following steps to add a new library user and assign that user to a user group:

1. Log into the library as a user with superuser privileges (see Log Into the User Interface on page 71).
2. From the toolbar menu, select **Security ⋯⁘ Edit Users**. The Library Users screen displays.

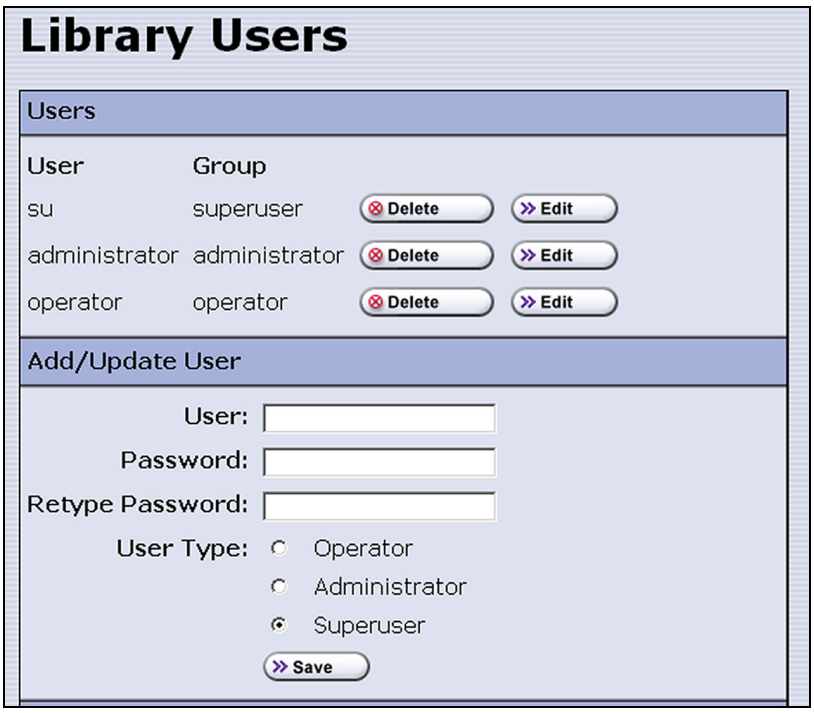


Figure 35 The Library Users screen.

3. Complete the information in the Add/Update User panel.

   Note: User names and passwords can contain any combination of the numbers 0-9, lower and upper case alphabetic characters (a-z and A-Z), and the at symbol (@), dash (-), underscore (_), period (.), forward slash (/), and space characters. There is no limit to the length but Spectra Logic recommends lengths of less than 2048 characters.

For this field...	Enter...
User	The username for the user.
Password **Retype Password**	A password for the user and then retype the password to confirm. **Notes:** ▪ For security, the text in the **Password** and **Retype Password** fields is shown as asterisks (*). ▪ Though highly recommended, passwords are not required for any of the three user types.

For this field...	Enter...
User Type	Select the group to which the user belongs. **Note:** See Configuring Library Users on page 80 for descriptions of the user groups and privileges associated with each.

4. Click **Save**. The new user name and group assignment is added to the list of users.
5. Repeat Step 3 on page 81 and Step 4 for each additional library user.

Modify an Existing User

Important If you change the passwords for the default users, make sure that you keep a record of the new passwords. The passwords cannot be reset if you forget them.

Use the following steps to change settings for an existing user.

1. Log into the library as a user with superuser privileges.
2. From the toolbar menu, select **Security ⋯⁘ Edit Users**. The Library Users screen displays (see Figure 35 on page 81), showing a list of library user names.
3. Find the user's name, then click **Edit** next to the name.
4. Change the user's name, password, group, or any combination of these as required.
5. Click **Save** to save your changes.

Delete an Existing User

Use the following steps to delete an existing user.

Important If you delete the default users, make sure that you keep a record of at least one superuser name and password.

Note: The library requires there to be a minimum of one user assigned to the superuser group. You cannot delete the last member of the superuser group.

1. Log into the library as a user with superuser privileges.
2. From the toolbar menu, select **Security ⋯⁘ Edit Users**. The Library Users screen displays (see Figure 35 on page 81), showing a list of library user names.
3. Locate the name of the user to delete, then click **Delete** next to that user's name.

   When the screen refreshes, the user list no longer includes the user name you just deleted.

ACCESSING THE SYSTEM SETUP SCREEN

Overview All of the settings for the library's general configuration options are accessed through the System Setup screen. The screen is divided into two panes. You may need to use the scroll bar to see the entire screen.

- **Option Enablement pane** — Used for entering the activation keys for any purchased options, including BlueScale Software Support, licensed capacity, and Shared Library Services (SLS). This panel also lists all of the currently licensed options.

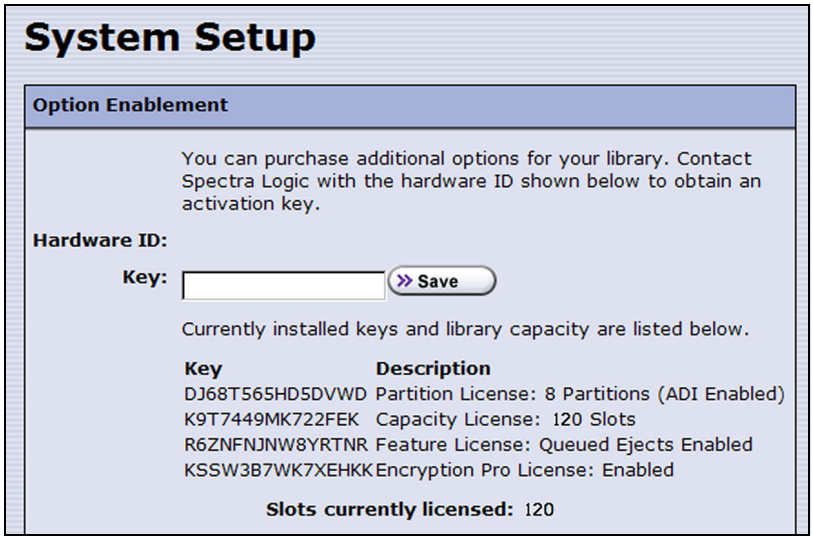


Figure 36 The System Setup Option Enablement pane.

- **Other Settings pane**—Used for configuring the operational parameters for the library.

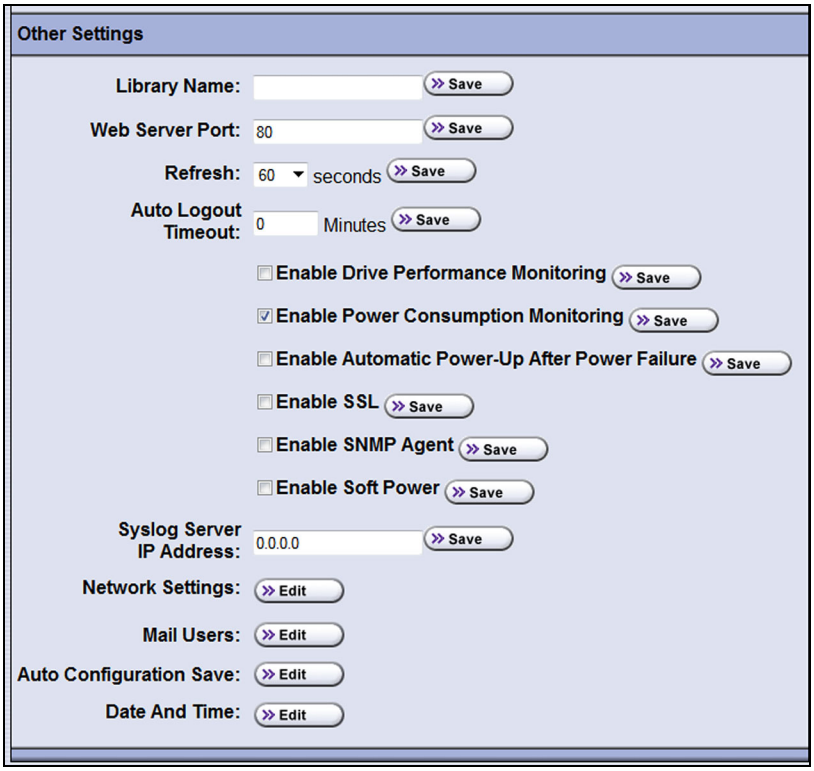


Figure 37 The System Setup Other Settings pane.

User Privilege Requirements Only a user with superuser or administrator privileges can access the System Setup screens to enable new options or change system configuration settings. See Configuring Library Users on page 80 for information about the three types of user groups and what types of privileges each has.

Access the System Setup Screen Use the following steps to access the System Setup screen when you want to enable a new option or change a configuration setting.

1. Log into the library as a user with superuser or administrator privileges (see Log Into the User Interface on page 71).
2. From the toolbar menu, select **Configuration ···⁘ System**. The System Setup screen displays (Figure 36 and Figure 37 on page 84 show the two panes of the screen).

ENABLING BLUESCALE SOFTWARE SUPPORT, OPTIONS, AND UPGRADES

Overview Activation keys are required to enable the BlueScale Software Support license and any library options and upgrades you purchase. These activation keys are tied to the library serial number (the hardware ID). The library ships with paper copies of the activation keys for the initial BlueScale Software Support license, the initial licensed slot capacity, and any additional options you purchased with the library. You must enter the activation key for the BlueScale Software Support license and each option into the library to make the option available for use.

Requirements for updating the library BlueScale software A valid BlueScale Software Support key is required in order to update the library's BlueScale software and component firmware. When you renew or extend your service contract, you receive an activation key that must be entered into the System Configuration screen to enable continued BlueScale updates.



Important

Your initial library purchase includes a BlueScale Software Support key that is valid for the duration of the warranty period, or for the duration of any uplifted or extended service contract you purchased with the library, whichever is longer.

When you renew or extend your service contract, you must generate a new BlueScale Software Support key and enter the new key into the library to allow continued access to BlueScale upgrades (see Obtain the Option Activation Key on page 89). If you have questions about your service agreement, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).

Standard and upgraded options for the library The default library configuration includes a basic set of options that lets you start using the library immediately. These options do not require activation keys to enable them. When you purchase upgraded options or additional Capacity on Demand (CoD), you receive an activation key that must be entered into the System Configuration screen to enable the options. See Library Support and Upgrades on page 458 for information about the available upgrade options.

Option	The default library configuration includes...	Upgrade if you need...
Partitions	Support for using a single storage partition.	Additional storage partitions. Purchase a Shared Library Services (SLS) activation key. See Library Partitions on page 40 for information about how SLS provides partitioning in the library.
Encryption	BlueScale Encryption Standard Edition.	More advanced encryption management capabilities. Purchase either BlueScale Encryption Professional Edition or the Spectra SKLM encryption key management system. See the *Spectra Tape Libraries Encryption User Guide* for information.
CoD Capacity	The licenced number of slots you purchased with the library.	Additional capacity. Purchase a CoD activation key for the additional slots you need. See Library Support and Upgrades on page 458 for more information. **Notes:** ▪ The licensed slots must be enabled by entering the activation key into the System Configuration screen (see Enter Activation Keys on page 87.) ▪ You must create or modify a partition to make use of the added capacity. See Chapter 6 – Partition Management, beginning on page 147 for instructions. ▪ If the CoD capacity you purchase exceeds the number of slots that are present in the library, the extra licensed slots cannot be used.

Enter Activation Keys

Notes:

- Paper copies of the activation keys for the initial BlueScale Software Support license and the options you purchased with the library are included with the library when shipped.
- An Automated Installation (AutoInstall) USB device containing the activation keys for your purchased options ships from the factory with the library. The USB device is inserted into the library's LCM during the initial power-up. The auto-install process begins, automatically loading the keys for the purchased options onto the library. During the process, the user interface provides feedback to track the progress.
- You can compare the paper copies of the activation keys with information in the Option Enablement pane of the System Setup screen and enter any missing keys as described in this section.
- If you purchase options after the initial library installation, you are provided an activation key for each option as described in Add Options on page 88.
- If you receive activation keys by email, it is helpful to use the BlueScale web interface (RLC) to access the System Setup screen. You can then cut and paste keys from the email containing the keys into the System Setup screen instead of typing them.

Use the following steps to enter a new BlueScale Software Support key or the activation key for a new option into the library.

1. Have on hand the activation key for the BlueScale Software Support license or other option (see Obtain the Option Activation Key on page 89).
2. Access the System Setup screen (see Accessing the System Setup Screen on page 83).

The Option Enablement pane at the top of the screen lists the currently licensed options.

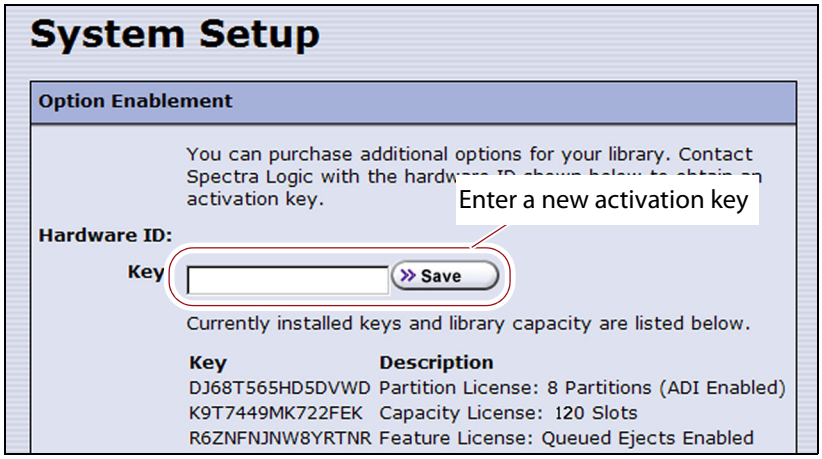


Figure 38 Enter the keys in the System Setup screen.

3. Enter the activation key for the option you want to enable in the **Key** field.

   Note: The activation keys are not case-sensitive.

4. Click **Save**.

   The System Setup screen refreshes and displays the new activation key and its description in the list of keys. The option is available for immediate use.

   Note: Keep a record of all activation keys listed on the Option Enablement pane of the System Setup screen. You need to re-enter them if the library is reset to factory defaults.

Add Options

This section describes how to determine the Hardware ID and obtain activation keys for new options *after* the initial installation. See Renewing the BlueScale Software Support Key on page 380 if you need to renew or extend your service contract, which includes the BlueScale Software Support key.

Important The BlueScale Software Support key and all option activation keys are tied to the library serial number. If you have multiple libraries, you need separate activation keys for each library.

Determine the Library Serial Number

The library serial number (Hardware ID) is required for renewing or extending your service contract, which includes the BlueScale Software Support key, and for purchasing additional Capacity on Demand (CoD) or other upgrade options.

Use the following steps to determine your library's serial number.

1. Access the System Setup screen (see Accessing the System Setup Screen on page 83).
2. Make a note of the library's serial number (Hardware ID), which is needed to generate the activation keys.

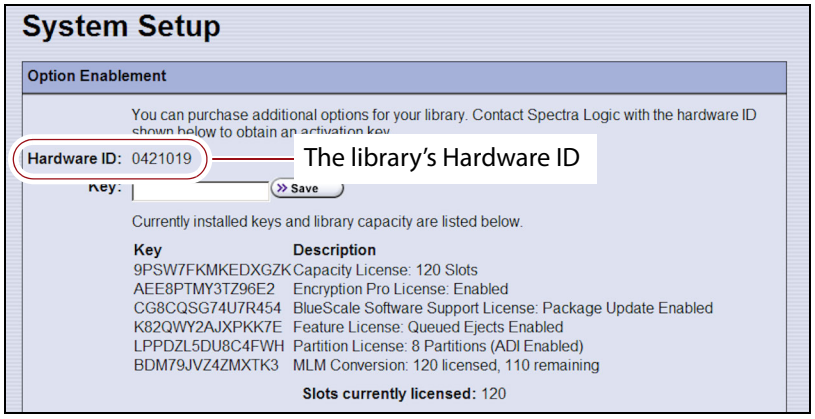


Figure 39 Locate the library's serial number (Hardware ID).

Obtain the Option Activation Key

1. Contact your Spectra Logic sales representative to order the desired options (see Contacting Spectra Logic on page 7).
2. When your order is processed, the Spectra Logic Customer Care team contacts you with instructions for generating the activation key for each option.
3. Enter each activation key into the Option Enablement pane of the System Setup screen (see Enter Activation Keys on page 87).

CONFIGURING THE GLOBAL SYSTEM SETTINGS

This section describes how to modify the library's general configuration settings. To change the current value for any of these settings, access the System Setup screen (see Accessing the System Setup Screen on page 83), then scroll down to the Other Settings pane. The following sections describe using this screen to configure the library.

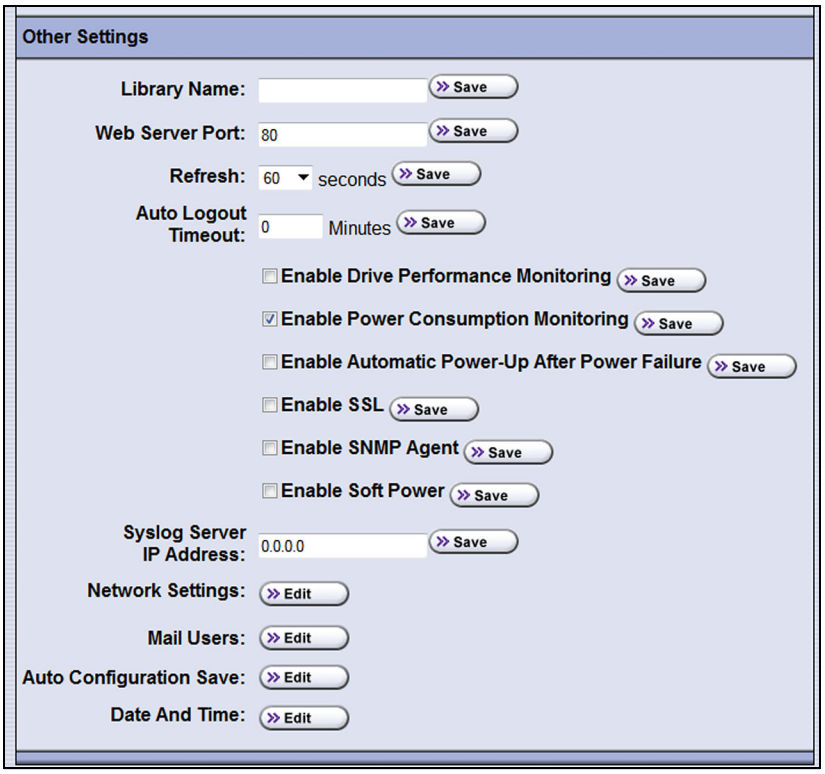


Figure 40 The Other Settings pane of the System Setup screen.

Configure the System Settings

The following table lists the system settings that are configured through the Other Settings pane of the System Setup screen, describes how to change each setting, and provides the default value for each setting, if applicable.

Setting	Description	Default
Library Name	Set the name used to identify the library in messages it sends to mail recipients. **1.** Type a name for the library. Use a name that helps identify the library to a remote user. **2.** Click **Save**.	blank (no name set)

Setting	Description	Default
Web Server Port	Set the port number for the dedicated Ethernet port used to access the library's embedded web server. **1.** Enter a port number from 0 to 65,535. The default port number is 80, which is appropriate for most installations and is strongly recommended. If you use a port number other than 80, the port number must be explicitly entered into the web browser when accessing the library remotely. **Important:** Do not set the web server port to 443. Using this port number causes the front panel display to become unstable. **2.** Click **Save**. **3.** Reset the library to enable the new web port number setting (see Resetting the Library on page 328).	80
Refresh Rate	Set how frequently the information on the BlueScale user interface screens is refreshed. **1.** Use the **Refresh** drop-down list to select a scheduled interval time. **2.** Click **Save**. **Notes:** ▪ You can manually refresh the displayed information at any time by clicking the refresh display button located at the left end of the status bar (see Status Bar on page 67). ▪ If you want to disable automatic refreshing of the display, set the refresh rate to off. ▪ If you configure a setting other than the default refresh rate or disable automatic refreshing, you must configure the refresh rate every time you log into the library.	60 seconds
Auto Logout Timeout	Set how long the current connection to the BlueScale user interface is idle before the current user is logged out. **1.** Enter the number of minutes for the timeout. **2.** Click **Save**. **Note:** Setting the timeout value to zero disables auto logout.	0 (zero) minutes (Disabled)
Enable Drive Performance Monitoring	Enable or disable the option to monitor the performance of the drives in the library (see View Drive Performance Statistics on page 137). **Important:** Make sure that the drives do not contain media before you enable or disable Drive Performance Monitoring. If you enable or disable this option when a drive contains a cartridge, the drive is reported as empty and backups may fail. **1.** Select the **Enable Drive Performance Monitoring** check box to enable the option (or clear the check box to disable it). **2.** Click **Save**.	Cleared (Disabled)

Setting	Description	Default
Web Server Port	Set the port number for the dedicated Ethernet port used to access the library's embedded web server. **1.** Enter a port number from 0 to 65,535. The default port number is 80, which is appropriate for most installations and is strongly recommended. If you use a port number other than 80, the port number must be explicitly entered into the web browser when accessing the library remotely. **Important:** Do not set the web server port to 443. Using this port number causes the front panel display to become unstable. **2.** Click **Save**. **3.** Reset the library to enable the new web port number setting (see Resetting the Library on page 328).	80
Refresh Rate	Set how frequently the information on the BlueScale user interface screens is refreshed. **1.** Use the **Refresh** drop-down list to select a scheduled interval time. **2.** Click **Save**. **Notes:** ▪ You can manually refresh the displayed information at any time by clicking the refresh display button located at the left end of the status bar (see Status Bar on page 67). ▪ If you want to disable automatic refreshing of the display, set the refresh rate to off. ▪ If you configure a setting other than the default refresh rate or disable automatic refreshing, you must configure the refresh rate every time you log into the library.	60 seconds
Auto Logout Timeout	Set how long the current connection to the BlueScale user interface is idle before the current user is logged out. **1.** Enter the number of minutes for the timeout. **2.** Click **Save**. **Note:** Setting the timeout value to zero disables auto logout.	0 (zero) minutes (Disabled)
Enable Drive Performance Monitoring	Enable or disable the option to monitor the performance of the drives in the library (see View Drive Performance Statistics on page 137). **Important:** Make sure that the drives do not contain media before you enable or disable Drive Performance Monitoring. If you enable or disable this option when a drive contains a cartridge, the drive is reported as empty and backups may fail. **1.** Select the **Enable Drive Performance Monitoring** check box to enable the option (or clear the check box to disable it). **2.** Click **Save**.	Cleared (Disabled)

Setting	Description	Default
Enable Power Consumption Monitoring	Enable or disable the option to monitor the amount of power your library is using through the Power Consumption Monitor (EnergyAudit) feature (see View Power Consumption Statistics on page 139). **1.** Select the **Enable Power Consumption Monitoring** check box to enable the option (or clear the check box to disable it). **2.** Click **Save**. **Note:** When you disable and then re-enable power consumption monitoring, the library does not begin capturing data again until you power cycle the library.	Selected (Enabled)
Enable Automatic Power-Up After Power Failure	Enable or disable the option to automatically power on the library after a power failure (see Use the Automatic Power-Up After Power Failure Feature on page 130). **1.** Select the **Enable Automatic Power-Up After Power Failure** check box to enable the option (or clear the check box to disable it). **2.** Click **Save**. **Note:** The **Enable Automatic Power-Up After Power Failure** feature can only be enabled or disabled by a superuser.	Cleared (Disabled)
Enable SSL	Enable or disable Secure Socket Layer (SSL) access to the BlueScale web interface. **Important:** Enabling SSL configures the BlueScale web interface to use a secure Internet connection. You must prefix the IP address with **https://** instead of just entering the IP address when accessing the BlueScale web interface. **Note:** Beginning with BlueScale 12.7.06.01, the library uses TLS 1.2. **1.** Select the **Enable SSL** check box to enable the option (or clear the check box to disable it). **2.** Click **Save**. **3.** Click **OK** in response to the notification about resetting the web server. **4.** Wait for the web server to reset (approximately 2 to 3 minutes), and then log back into the library. **5.** If desired, Install a Security Certificate and Authentication Key as described on page page 105.	Cleared (Disabled)

Setting	Description	Default
Enable SNMP Agent **SNMP Settings**	Enable or disable the SNMP agent and configure SNMP settings. **1.** Select the **Enable SNMP** check box to enable the option (or clear the check box to disable it). **2.** Click **Save**. **3.** If you enabled SNMP, click **SNMP Settings** to configure the SNMP options. See Enable and Configure SNMP on page 108 for detailed information and instructions. **4.** Click **Save** to save the SNMP settings and return to the System Setup screen. **Notes:** ▪ The option to edit the **SNMP Settings** is only present after you select **Enable SNMP Agent** and click **Save**. ▪ Spectra Logic libraries use SNMPv2c.	Cleared (Disabled)
Enable Soft Power	Enable or disable the Soft Power feature. See Use the Soft Power Feature on page 131 for information about the Soft Power feature and instructions for using it. **1.** Select the **Enable Soft Power** check box to enable the option (or clear the check box to disable it). **2.** Click **Save**. **Note:** The Soft Power feature can only be enabled or disabled by a superuser.	Cleared (Disabled)
Syslog Server IP Address	Enter the IP address of an external Syslog server used to collect the system messages posted by the library. See Use Syslog on page 135 for information about what the Syslog messages contain. **1.** Enter a valid IPv4 or IPv6 address for the Syslog server. Do not include http: or https:. To disable a server do one of the following: ▪ For BlueScale12.7.03 or earlier, set the IP address to 0.0.0.0. ▪ For BlueScale12.7.07 or later, clear the IP address. **2.** Click **Save**. The library immediately begins forwarding all system messages to the server at the specified IP address.	Cleared (Disabled)

Setting	Description	Default
Network Settings	Set the IP addressing for the LCM Ethernet port. You can also configure up to two DNS IP addresses for use with the NTP service. See Configure Network Settings on page 96 for detailed information and instructions. **Note:** Depending on how you are accessing the library, the status bar shows: ▪ The Network Settings icon when you access the library using the touch screen or a direct connection to the LCM. ▪ The library's name, if set, when you are accessing the library using the BlueScale web interface through a web browser connection.	Dynamic
Mail User	Configure recipients for emails containing system messages, traces, and diagnostic results generated by the library. See Configure Mail Users on page 99 for detailed information and instructions.	*autosupport@ spectralogic.com*
Auto Configuration Save	Enable or disable sending the Auto Configuration Save file to a previously configured mail recipient. See Enable Email for the Auto Configuration Save File on page 101 for detailed information about this option and instructions for configuring it. **Note:** The Auto Configuration Save file is always generated, regardless of the setting for this option. See Use Automatic Backup of the Library Configuration on page 123 for information about the Auto Configuration Save file.	Cleared (Disabled)
Date And Time	See Set the Date and Time on page 103 for detailed information and instructions for setting the date and time.	Current date and time for the Mountain time zone (US and Canada)

Configure Network Settings

Overview Spectra Logic highly recommends that you configure your library for network access. Without network access, you are unable to perform any of the following operations:

- Access the BlueScale web interface for remote management of the library using a standard web browser.
- Open support incidents from the library front panel or send AutoSupport Logs (ASLs) on demand to Spectra Logic Technical Support for troubleshooting.
- Automatically email system messages or reports to configured mail users.
- Automatically send a notification to a specified recipient when certain critical events occur.
- Download the latest BlueScale package from Spectra Logic's Support portal directly to the library.

Using Dynamic Addressing By default, the IPv4 address for the Ethernet port on the LCM is set automatically using the Dynamic Host Configuration Protocol (DHCP) and the IPv6 address is set through dynamic address assignment.

Notes:
- If you select Dynamic addressing, the LCM must be connected to an Ethernet network that has a DHCP server to obtain an IP address.
- Do not select Dynamic addressing if your network does not have a DHCP server.

Using Static IP Addressing If your network does not use DHCP, or if you want the library to use a fixed IP address, you can configure a static (fixed) IP address as described in this section. Using a static IP address ensures that the IP address for the library remains consistent and is highly recommended.

Configuration Process Use the following steps to configure the library for network access.

1. Access the System Setup screen (see Accessing the System Setup Screen on page 83).

2. Click **Edit** next to Network Settings. The Network Settings screen displays.

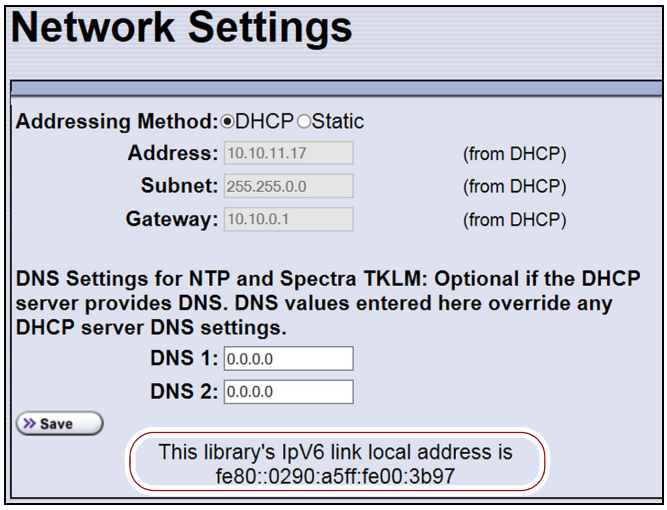


Figure 41 The BlueScale12.7.03 and earlier Network Settings screen.

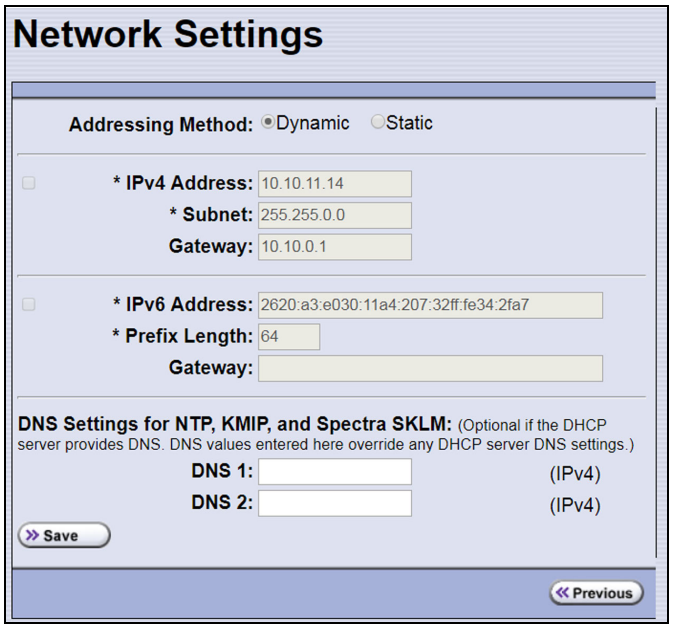


Figure 42 The BlueScale12.7.07 and later Network Settings screen.

3. Decide which type of addressing you want the library to use.
   - **Dynamic** — The library is issued an IPv4 address by the DHCP server and an IPv6 address through address assignment. Both are displayed on the Network Settings screen.
   - **Static** (highly recommended) — The library uses fixed IP addresses. If you select static addressing, enter the following information:

     Note: When entering IP addresses, do not include http: or https:

For BlueScale12.7.03 or earlier:

For this field...	Enter...
Address	A valid IPv4 address.
Subnet	The subnet mask. The subnet mask must be a valid IPv4 address.
Gateway	A valid network gateway IPv4 address. Enter 0.0.0.0 for the Gateway if your network does not use a gateway.

For BlueScale12.7.07 or later:

For this field...	Enter...
If the IPv4 check box is selected: (if the IPv4 check box is not selected, the IPv4 address defaults to 127.0.0.1 and is effectively disabled)	
Address	A valid IPv4 address.
Subnet	The subnet mask. The subnet mask must be a valid IPv4 address.
Gateway	A valid network gateway IPv4 address. Leave the field blank if the network does not use a gateway.
If the IPv6 check box is selected:	
Address	A valid IPv6 address. The library compresses the IPv6 address when saved.
Prefix	Enter an integer between 1 and 128 to indicate the portion of the IPv6 address that indicates a group of IP addresses on the same network.
Gateway	A valid network gateway IPv6 address. Leave the field blank if the network does not use a gateway.

4. Optionally, enter the IPv4 address for a Domain Name Server.

   If you plan to use NTP to automatically set the library's date and time, you must enter a valid IPv4 address for at least one DNS server used by the NTP service (see Set the Date and Time on page 103).

   Notes:
   - Although the BlueScale software only accepts an IPv4 address for DNS devices, the library accepts both IPv4 and IPv6 addresses from the DNS devices.
   - To delete an already saved DNS setting, clear the field.

5. Click **Save** to save the IP addressing.

   Note: If you are connected to the library through the BlueScale web interface and you change the addressing, the library's IP address changes as soon as you click **Save**. As a result, you lose the connection to the library.

Configure Mail Users

Overview The library can send email messages with system messages, traces, and diagnostic results to selected recipients. These recipients can be configured to receive messages automatically as they are generated by the library, or on demand when traces are run, reports are generated, or the library's configuration data is backed up. Recipients can also be configured to receive AutoSupport messages.

Notes:
- The library must be connected to a network with Internet access before you configure mail recipients.
- You must configure the SMTP server used by the *autosupport@spectralogic.com* mail user if you want to open an AutoSupport ticket directly from the library (see Chapter 10 – Configuring and Using AutoSupport, beginning on page 289). This mail user is also used to send the ASL and HHM files that the library generates to Spectra Logic Technical Support when troubleshooting a problem.

Add or Modify Mail Users Use the following steps to add or modify mail recipients.

1. Access the System Setup screen (see Accessing the System Setup Screen on page 83).
2. Click **Edit** next to **Mail Users**. The Mail Recipients screen displays.

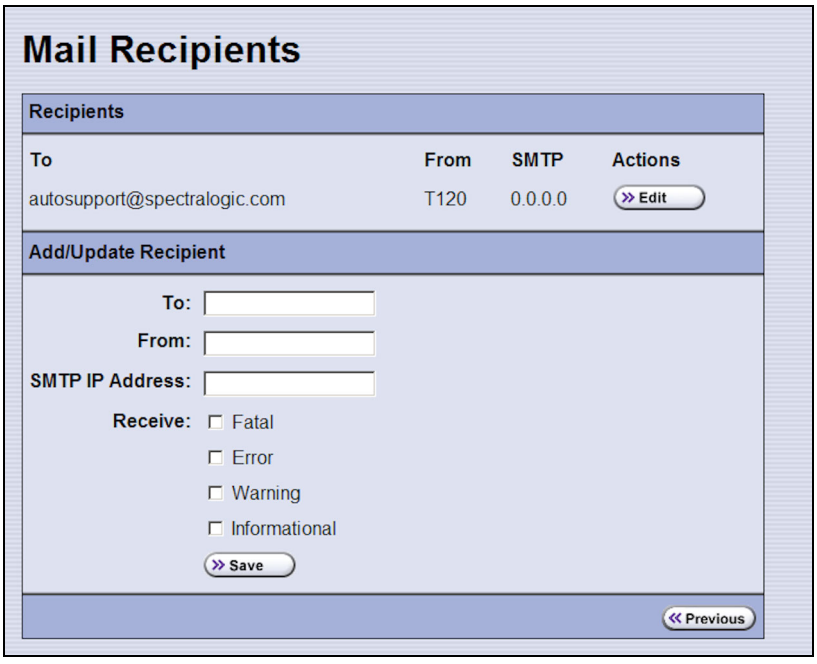


Figure 43 The Mail Recipients screen.

3. To modify an existing recipient, click **Edit** next to the desired recipient in the Recipients pane.

   The Add/Update Recipient pane refreshes to show the current information for the selected recipient.

4. Enter the information for a new recipient or update the information for an existing recipient in the Add/Update Recipient pane.

For this field...	Do the following...
To	Enter the email address of the recipient. Be sure to use the full address using the standard email format, including the @ symbol. **Important:** The email address cannot contain spaces or other non-alphanumeric characters (for example, an ampersand, &). To include multiple addresses, leave a space between each address.
From	Enter an alphanumeric string to uniquely identify the library (for example, the name or location of the library). **Important:** The string cannot contain spaces or most non-alphanumeric characters (for example, the & or the @ symbols).
SMTP IP Address	Enter the IPv4 or IPv6 address of your SMTP server in the **SMTP IP Address** field. Do not include http: or https:.
Receive	Select the type(s) of messages that the user receives by selecting one or more of the message types listed. ▪ **Fatal** — An error occurred that prevents the library from continuing operation. Immediate attention is required. ▪ **Error** — An error occurred that impacts the operation of the library. Determine the cause of the error and remedy it as soon as possible. ▪ **Warning** — The library detected conditions that may impact operation. Determine the cause of the problem and remedy it as soon as possible. ▪ **Informational** — Activities that generate system messages have occurred. **Notes:** ▪ Selecting a message type automatically sends all messages of that type to the recipient as they are generated by the library. ▪ If no message type is selected, the library does not automatically send messages to the recipient. However, messages can still be sent to the recipient on an individual basis when traces or diagnostics are run. ▪ Do not select message types for the *autosupport@spectralogic.com* mail recipient. This mail recipient is only used to receive AutoSupport ticket requests or ASL and HHM files that are generated by the library.

5. Click **Save**. The screen refreshes to show the new or updated mail recipient in the Recipients portion of the Mail Recipient screen (Figure 43 on page 99).
6. If desired, select **Send Test** next to the newly added mail recipient to send a test email.
7. Repeat Step 2 on page 99 through Step 5 on this page to configure or modify additional email recipients.
8. Click **Previous** to return to the System Setup screen.

Enable Email for the Auto Configuration Save File

Overview Having a current backup of the library's metadata (the library partition configuration, the MLM and DLM databases, and any BlueScale encryption keys) is an essential component of any disaster recovery plan. For more information about protecting the library metadata, see Back Up and Protect the Spectra Library Metadata on page 448.

In the event that you need to restore the library configuration, you can use either the automatically saved configuration backup file from the LCM or the emailed copy (see Restore From an Auto Configuration Save File on page 335).

Auto Configuration Save Process The library generates an Auto Configuration Save backup file once a week and every time you create or modify a partition. This backup file contains the current library configuration, the MLM and DLM databases, and any BlueScale encryption keys stored in the library.

Notes:
- The time for generating the weekly Auto Configuration Save backup file is based on the first time the file was generated.
- The library does not generate an Auto Configuration Save backup file when you make configuration changes other than creating or modifying a partition.

Auto Configuration Save Email Process Configuring the library to automatically send the Auto Configuration Save backup file as an email attachment to a previously configured email recipient is highly recommended. The library sends the email whenever it generates the Auto Configuration Save backup file. The email includes instructions for using the attached file to restore the library.

Important To use this automatic email option, you must first configure the user to whom you want the backup file sent as a mail recipient (see Configure Mail Users on page 99).

Configure Automatic Email Option Use the following steps to configure the automatic email option for the Auto Configuration Save backup file.

1. Access the System Setup screen (see Accessing the System Setup Screen on page 83).

2. Click **Edit** next to **Auto Configuration Save** in the Other Settings pane. The Automatic Configuration Save Setup screen displays.

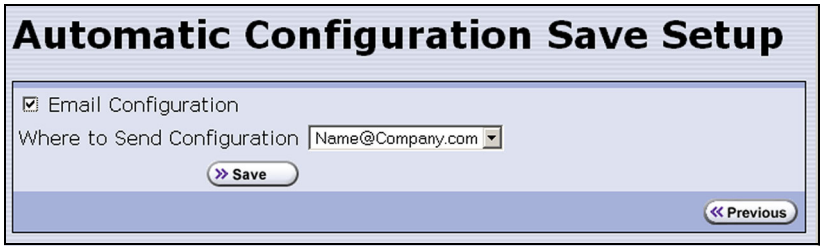


Figure 44 The Automatic Configuration Save Setup screen.

3. Select the **Email Configuration** check box, and then use the drop-down list to select the desired recipient from the list of previously configured mail recipients.

   Note: Do not use the default *autosupport@spectralogic.com* email recipient. Spectra Logic does not save emailed configuration files.

Set the Date and Time

1. Access the System Setup screen (see Accessing the System Setup Screen on page 83).
2. Click **Edit** next to **Date And Time** in the Other Settings pane. The Date and Time screen displays showing the method currently selected for setting the date and time.
3. Select the method you want to use for setting the date and time.

   Note: Changing the method of setting the library time and date from **Automatic Time and Date Settings (NTP)** to **Manual Time and Date Settings** or the other way around requires an LCM reboot to enable the new setting.

If you select...	Then...
Automatic Time and Date Settings (NTP)	If not already displayed, the Date and Time screen refreshes to show options for configuring a Network Time Protocol (NTP) server.

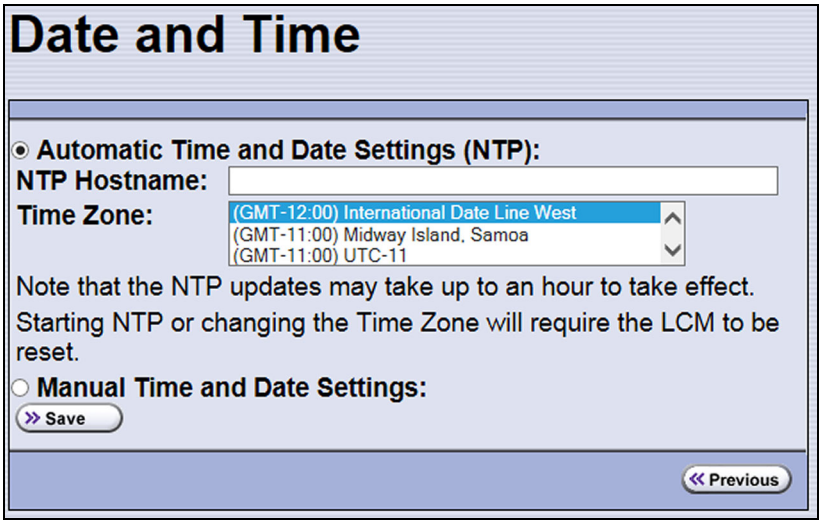
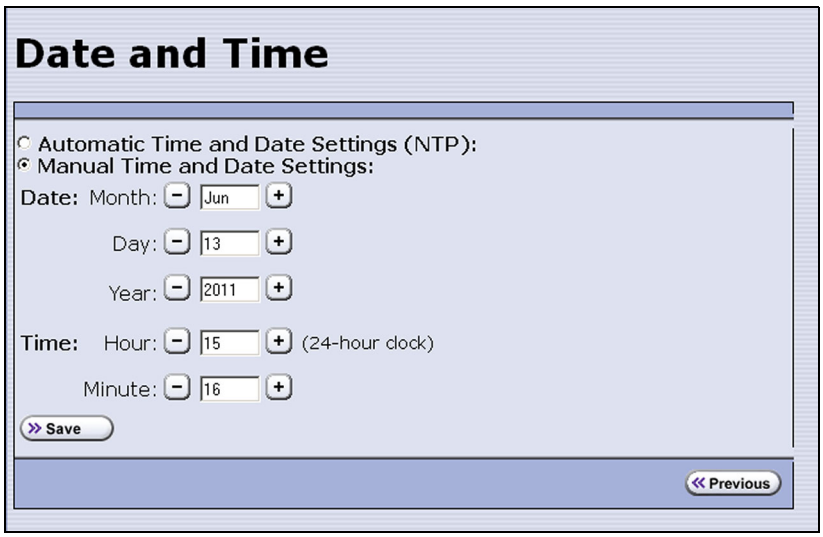


Figure 45 Configure the settings for using NTP.

1. Enter the **NTP Hostname** for the NTP server you want to use. Do not include !@#$^&*()> and < in the NTP hostname (for information about NTP, see http://support.ntp.org/bin/view/Main/WebHome).
2. Select the **Time Zone** you want to use (typically the one corresponding to the location of the library).
3. Click **Save**. As soon as you click **Save**, the library reboots to start using the new settings.

Notes:

- Because the NTP server is addressed using a hostname instead of an IP address, you must configure at least one DNS server before you can use NTP (see Configure Network Settings on page 96).
- After you configure NTP, it can take up to an hour for the time to synchronize with the NTP server.

If you select...	Then...
Manual Time and Date Settings (Default)	If not already displayed, the Date and Time screen refreshes to show options for manually setting the date and time.  **Figure 46** Configure the settings for manually setting the date and time **1.** Use the Date and Time **+** and **–** buttons to select the month, day (date), year, hour, and minute values. **Note:** The values in the Date & Time counters do not wrap. For example, to change the month from December to January, click and hold the **–** button to decrement the month. **2.** Click **Save**. Click **Previous** to return to the System Setup screen.

CONFIGURING OPTIONAL LIBRARY SETTINGS

This section describes optional configuration settings that you may select to set for your library and operating environment.

Install a Security Certificate and Authentication Key

If you enabled SSL (see Enable SSL on page 93), use the following steps to obtain and install a security certificate and private key.

Note: Beginning with BlueScale 12.7.06.01, the library uses TLS 1.2.

1. Obtain a security certificate and private key using one of the following methods:

Important The ssl.crt and ssl.key files can only contain ONE certification or key. The BlueScale software does not support multiple keys (chaining keys) in the key or certificate files. If there are multiple keys in the files, they are all considered invalid.

Important When generating a self signed certificate using openssl, use the -x509 command line option. Loading a file without this option may cause the LCM to hang.

Important When generating a self signed certificate or a certificate signing request using openssl, use the -nodes command line option to prevent the key from being encrypted.

- **Create a Self-Signed Certificate**

  For example, to create a self-signed certificate and authentication key using **openssl**, use the following command.

  ```
  openssl req -x509 -nodes -days 365
  -newkey rsa:2048 -keyout ssl.key -out ssl.crt
  ```

  The `openssl req` command is a certificate request and certificate generating utility. The following parameters are used in the example:

  - `-x509` - This option outputs a self signed certificate instead of a certificate request.
  - `-nodes` - This option specifies that the private key not be encrypted.
  - `-days` *`n`* - When the `-x509` option is also used, this option specifies the number of days (*`n`*) that the certificate is valid.
  - `-newkey rsa:`*`nbits`* - Generates an RSA key *`nbits`* in size. The Library supports RSA keys in bits of 512, 768, 1024 and 2048.
  - `-keyout` *`filename`* - This option specifies the private key file name.
  - `-out` *`filename`* - This option specifies the certificate file name.

  After entering the command, you are prompted to provide the following information. Sample responses are shown.

  - Country Name (2 letter code) [AU]: **US**
  - State or Province Name (full name) [Some-State]: **Colorado**
  - Locality Name (eg, city) []: **Boulder**
  - Organization Name (eg, company) [Internet Widgits Pty Ltd]: **Spectra Logic**

- Organizational Unit Name (eg, section) []: **DVT Test**
- Common Name (e.g. server FQDN or YOUR name) []: **T120@company.com**
- Email Address []: **support@company.com**

- **Request a Certificate Using a Certificate Signing Request**

  Request a security certificate and the authentication key from your signing authority and process the key for use in with the BlueScale software.

  a. Request a certificate from www.verisign.com, www.instantssl.com, www.letsencrypt.org or another SSL certificate vendor to obtain the certificate. For example, to generate a certificate signing request using **openssl**, use the following command:

  ```
  openssl req -newkey rsa:2048 -nodes
  -subj "/C=US/ST=Colorado/L=Boulder/O=Spectra/
  CN=DVT-T120" -out ssl.csr -keyout ssl.key
  ```

  The `openssl req` command is a certificate request and certificate generating utility. The following parameters are used in the example:

  - `-newkey rsa:`*nbits* - Generates a new certificate signing request and a new RSA private key *nbits* in size. The Library supports RSA keys in bits of 512, 768, 1024 and 2048.
  - `-nodes` - This option specifies that the private key not be encrypted.
  - `-subj "`*arg*`"` - This option provides the answers to many of the prompts shown in the example above.
  - `-keyout` *filename* - This option specifies the private key file name.
  - `-out` *filename* - This option specifies the certificate signing request file name.

  b. Send the certificate signing request to the signing authority. A certificate named ssl.crt and a key named ssl.key will be returned.

2. The BlueScale web server must use an RSA private key and cannot use a key with a passphrase. If the private key does not include `BEGIN RSA PRIVATE KEY` in the header or uses a passphrase, rename the key to `original_ssl.key` and issue the following command.

```
openssl rsa -in original_ssl.key -out ssl.key
```

If the key has a passphrase, issuing this command prompts you for the passphrase.

3. Save the security certificate file (`ssl.crt`) and the private key (`ssl.key`) in the root folder of a USB device.

   Note: The security certificate file must be named `ssl.crt` and the private key must be named `ssl.key`.

4. Connect the USB device to a port on the LCM (see Figure 6 and Figure 7 on page 32) and wait for the device to mount.
5. Log into the library as a user with superuser or administrative privileges (see Log Into the User Interface on page 71).
6. From the toolbar menu, select **Maintenance** ···⁘ **Tools**. The Maintenance Tools screen displays.
7. Select **Utilities**. The Utilities screen displays.
8. Click **Show Advanced**. The Advanced Utilities Confirmation screen displays.
9. Click **Next**. The Utilities screen refreshes to show a list of the advanced utilities.
10. Scroll through the list of advanced utilities and select the **Load SSL Certificate and Key from USB** utility.

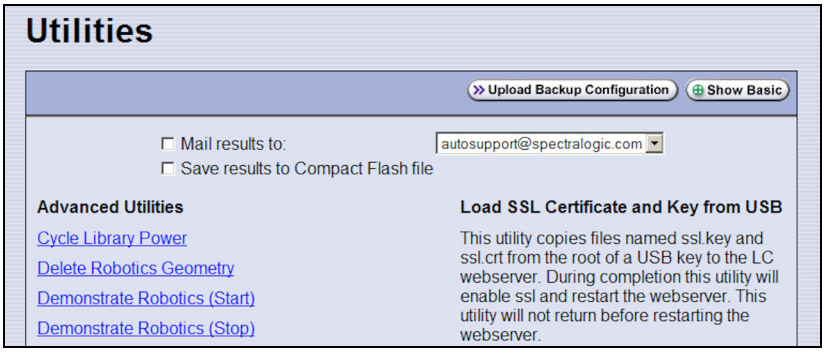


Figure 47 Use the **Load SSL Certificate and Key from USB** utility to load the security certificate onto the library.

11. Click **Run Utility** to copy the security certificate and private key to the T120 web server.

    Notes:
    - The SSL keys are not stored as part of the library configuration. If you replace the SD card, you will have to reload these keys.
    - To change or update the SSL keys, you must first manually delete the old keys from the LCM. Contact Spectra Logic Technical Support for assistance (see Contacting Spectra Logic on page 7).

Enable and Configure SNMP

Overview Simple Network Management Protocol (SNMP) is a protocol for monitoring the health and welfare of your library by using integrated alerts. When SNMP is enabled, the Other Settings pane in the System Setup screen includes options for enabling the SNMP agent and configuring SNMP settings.

Note: Spectra Logic libraries use SNMPv2c.

Network-Based Library Management If you are using a network-based library monitor/management application other than the library's BlueScale user interface, you may need to identify the library's SNMP settings to the application. These settings include the read, write, and broadcast community strings.

Configure SNMP Use the following steps to enable and configure SNMP.

1. Access the System Setup screen (see Accessing the System Setup Screen on page 83) and scroll down to the Other Settings pane.
2. Select **Enable SNMP Agent** to enable SNMP in the library and click **Save**. The System Setup screen refreshes to include an option for editing the SNMP settings.

   The agent returns information contained in the library's Management Information Base (MIB) to the workstation used to manage the network. The MIB defines what information is available from the library over the network. The MIB file is available for download from the **Downloads** ⋯ **Tools** page of the support portal.

3. Click **Edit** next to **SNMP Settings**. The SNMP Settings screen displays.

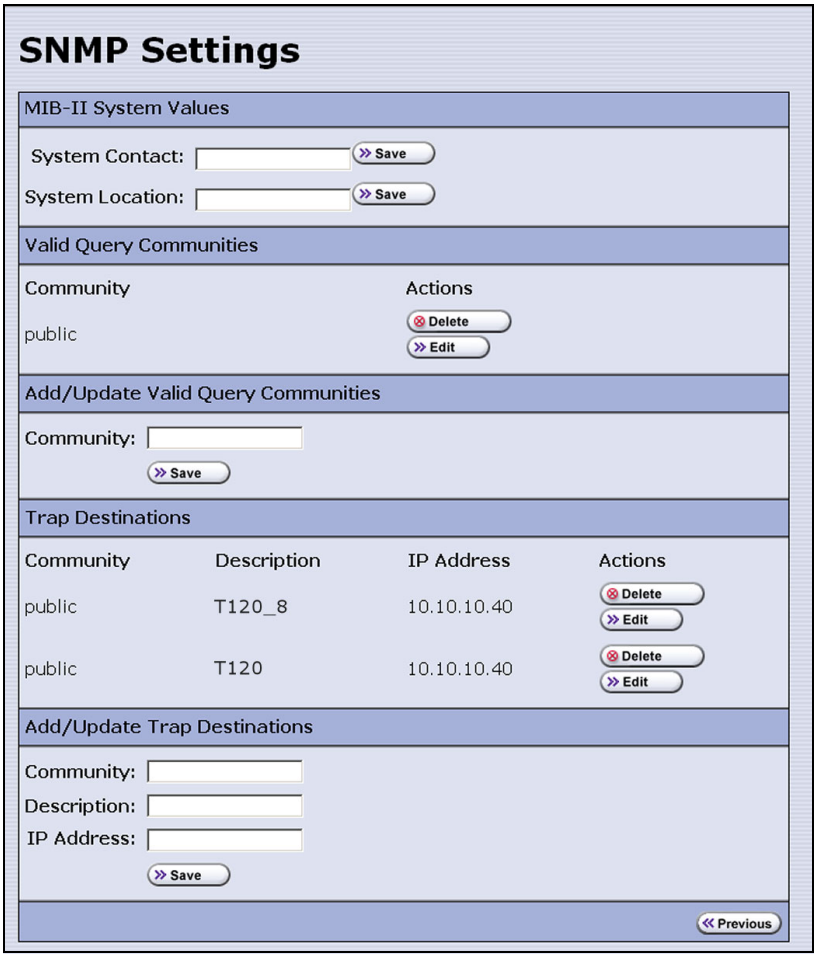


Figure 48 The SNMP Settings screen.

4. Enter the following information on the SNMP Settings screen..

Field	Description
System Contact	Maps to the value for system.4 (sysContact) object in the MIB. Enter the informations and click **Save**.
System Location	Maps to the value for system.6 (sysLocation) object in the MIB. Enter the informations and click **Save**.
Valid Query Communities	Lists all SNMP communities to which the library currently belongs. The library only responds to SNMP queries from members of these communities. The default valid query community is **public.** ▪ Click **Edit** next to the setting you need to modify. The current settings display in the corresponding Add/Update section of the screen. Click **Save** in the corresponding Add/Update section of the screen after you make your changes. **Important:** Community strings are case sensitive. If the library is configured to include the community called "OurCommunity," it answers to queries from OurCommunity but not from a community called "ourcommunity." ▪ Click **Delete** to remove a setting.

Field	Description
Trap Destinations	Lists all the currently configured trap destinations (IPv4 or IPv6 addresses) to which the library sends SNMP traps. There are no default trap destinations configured. **Note:** Only one community at a time may contain IPv6 addresses. ▪ Click **Edit** next to the setting you need to modify. The current settings display in the corresponding Add/Update section of the screen. Click **Save** in the corresponding Add/Update section of the screen after you make your changes. ▪ Click **Delete** to remove a setting.

5. Click **Previous** to return to the System Configuration screen.

Configure Emulation

Overview The library identifies itself as "SPECTRA PYTHON" in response to a SCSI Inquiry command. If your storage management software or operating system does not specifically support one of the Spectra Logic libraries that identifies itself as "SPECTRA PYTHON," you can configure one or more partitions to emulate another type of library. Because most storage management software is certified for one or more of these libraries, using the emulation mode may allow these applications to support the library.

Caution Using emulation is not the preferred method of operation and should only be used when recommended by Spectra Logic Technical Support.

Important StorNext® versions 4.1.2 and later provide native support for Spectra tape libraries. However, if you are using an earlier version of StorNext, you must configure one or more storage partitions to emulate a Sun StorageTek L700 library. Support for using the STK L700 emulation mode with StorNext software requires BlueScale11.0 or later.

Configuring a partition to emulate the STK L700 library results in the following changes to the SCSI data it reports:

- The **INQUIRY** command returns STK L700 as the product identification.
- The **READ ELEMENT STATUS** command reports the element addresses (the element addresses for the robotics, drives, and slots) using the format defined for the Sun StorageTek L700 library.

Notes:
- Configuring emulation changes how the library identifies itself to the operating system or storage management software.
- The following instructions describe an advanced partition configuration option that is used only in the context of creating or editing a partition. The screens for configuring emulation are only accessible after you complete the initial configuration steps for the partition (see Define the Initial Storage Partition Settings on page 157).

User Privilege Requirements Only a user with superuser or administrator privileges can configure emulation. See Configuring Library Users on page 80 for information about the three types of user groups and what types of privileges each has.

Configure Emulation Use the following steps to configure a partition to emulate another type of library.

1. Log in as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Configuration ⋯⁘ Partitions**. The Shared Library Services screen displays.

3. Click **Edit** to modify an existing partition or **New** to create a new partition. The Name and Media Type screen displays.
4. Click **Advanced**. The Advanced Partition Settings screen displays.

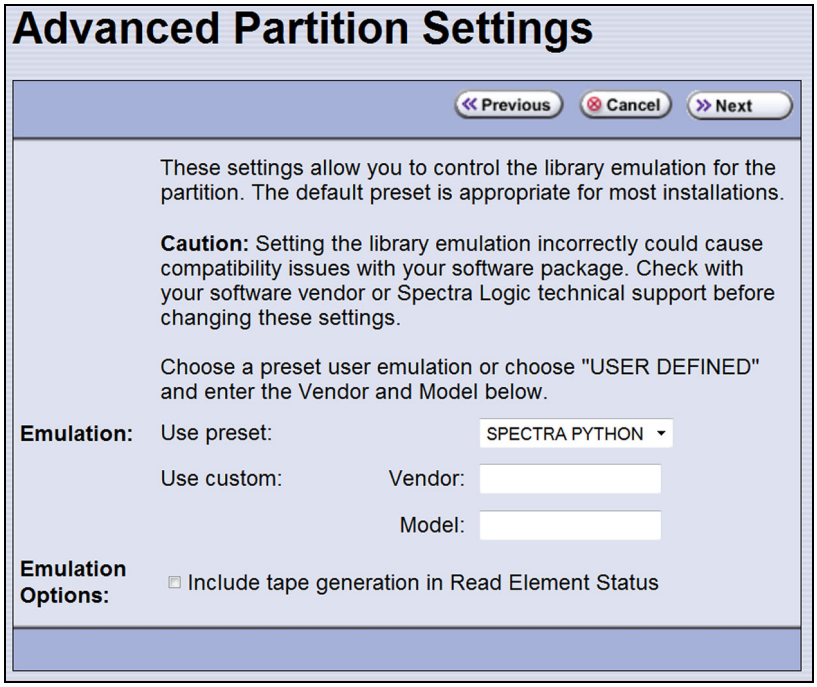


Figure 49 Specifying the emulation type.

5. Select the type of library you want the T120 to emulate. You can either:
   - Select a preconfigured emulation from the **Use preset** drop-down list.

   —OR—

   - Create a custom emulation, enter the **Vendor** and **Model** for the library to be emulated. These fields are used in the string that the library returns in response to a SCSI Inquiry command.

   Note: The default setting is SPECTRA PYTHON.
6. If you want the SCSI Read Element Status command response to include Media Domain, Media Type, Drive Domain, and Drive Type, select **Include tape generation in Read Element Status**. See the *Spectra Tape Libraries SCSI Developer's Guide* for more information.
7. Click **Next**. The Robotic Control Path screen displays listing the exporting controllers currently installed in the library.

   The Robotic Control Path screen is the beginning of a series of configuration screens. The sequence of steps and screens matches those described in Creating a Storage Partition Using Direct-Attached Fibre Channel or SAS Drives on page 157.

Configure Barcode Reporting

Overview The Spectra Logic tape libraries support barcode data strings consisting of a start character; from 1 to 16 characters, including alphanumeric characters and an optional checksum character; and the stop character. Quiet zones precede and follow the start and stop characters.

By default, the library:

- Expects barcode labels with checksums (that is, it treats the right-most character as a checksum character).
- Does not use the checksum character to validate the barcode.
- Reports up to 16 characters but does not report the checksum character.

Notes:
- With the exception of the checksum, the barcode labels typically show the human-readable character that each barcode character represents. The checksum character is not considered human-readable.
- If you change the barcode options for a partition, the library will report a tape mismatch error when tape cartridges previously discovered by MLM are loaded into a drive.

Modifying Barcode Reporting If your environment has any of the following:

- Labels without a checksum character
- A requirement to validate the barcode using the checksum
- Storage management software with specific barcode requirements

then you may need to modify the default settings used by the library.

Important

- Proceed with caution when changing the library's default barcode reporting settings. Any changes that you make affect every partition in the library. Before making changes, make sure that the changes do not adversely affect others using the library.
- If you modify the barcode reporting settings, you should do so before using any cartridges in the library. If you change the barcode reporting settings after the cartridges were used by the storage management software, the software may no longer recognize those cartridges. In general, it is best to leave the library set to its defaults and make any reporting modifications on the software side if that is an option.
- If you change the barcode options, the library will report a tape mismatch error when tape cartridges previously discovered by MLM are loaded into a drive.
- Never mix cartridges with checksummed and non-checksummed labels in the library.

Barcode Reporting Mismatch Errors Unexpected behavior can occur if the library's barcode reporting configuration does not match the type of barcode labels that are being used **and** what the storage management software expects. The most common problems that occur are:

- The library is configured to expect a checksum character in barcodes, but the barcode labels do not have a checksum character. In this case, the barcode reported by the library is "missing" the right-most character. This is because the library treats the last character in the barcode as a checksum character, which it does not report, when the character is actually part of the barcode.
- The library is configured to use barcode labels that do not include a checksum, but the barcode labels include a checksum character. In this case, the library treats the checksum character as part of the barcode and therefore reports a seemingly random "garbage" character as the last character of the barcode.
- The library is configured to use barcodes that include a checksum and perform checksum verification, but the barcode labels do not have a checksum character. In this case, the library reports a verification error on every barcode label because the character it is using to perform the checksum verification is not a checksum character.

User Privilege Requirements Only a user with superuser or administrator privileges can modify barcode reporting. See Configuring Library Users on page 80 for information about the three types of user groups and what types of privileges each has.

Changing the Library's Barcode Reporting Configuration

Note: If you are unsure whether your labels include a checksum character, see Determining the Barcode Label Type on page 116.

If necessary, use the following steps to change the library's barcode reporting configuration to disable the use of checksum characters, enable or disable the verification of the checksum character, or modify what portion of the actual barcode is reported to the host.

Important After the utility completes, the LCM reboots. After the library completes its initialization, it rescans the barcode labels of all media in the library. This rescan takes approximately 18 seconds per cartridge.

1. Log into the library as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Maintenance** ⋯ **Tools**. The Maintenance Tools screen displays.
3. Select **Utilities**. The Utilities screen displays.

4. Click **Show Advanced**. The Advanced Utilities Confirmation screen displays.
5. Click **Next**. The Utilities screen refreshes to show a list of the advanced utilities.
6. Select the **Modify Barcode Reporting** utility. The screen refreshes to show information about the utility. Figure 50 shows the default settings.



Figure 50 Use the Modify Barcode Reporting utility to change how the library handles barcode labels.

7. Change the barcode reporting as required for your environment.

Use this parameter	If...
Non-check-summed barcodes	Your labels do not include a checksum.
Check-summed barcodes	Your labels include a checksum **and** you want the barcode verified against the checksum when it is read. Verification is not generally required, but adds extra confirmation that the barcode label was read correctly by the barcode reader.
Ignore check-sum barcodes	Your labels include a checksum character but you do not want the barcode verified against the checksum when it is read. This is the default setting.
Report left-hand characters	You want the library to report only the left-most *x* characters in the barcode, where x is any number from 1 to 16. For example, if the barcode is 1234567L2 and you configure the library to report only the five left-most characters, the library reports the barcode as 12345. **Important:** Be careful when specifying the number of left-most characters to report. You may end up with duplicate barcodes reported. For example, 12345XXXL2 and 12345ABCL3 are both reported as 12345.
Report right-hand characters	You want the library to report only the right-most *x* characters in the barcode, where x is any number from 1 to 16. This is the default setting. For example, if the barcode is 1234567L2 and you configure the library to report the 5 right-most characters, the library reports the barcode as 567L2. **Important:** Be careful when specifying the number of right-most characters to report. You may end up with duplicate barcodes reported. For example, 1234567L2 and ABCD567L2 are both reported as 567L2.

8. If you want to specify the number of barcode characters the library reports, enter a number from **1** to **16** in the **Select the number of characters to report** field. If your labels include a checksum, the number you enter includes the checksum character. The default number of characters is 16.
9. Click **Run Utility**. When the utility completes, the LCM reboots. After the library completes its initialization, it rescans the barcode labels of all media in the library. This rescan takes approximately 18 seconds per cartridge.

Determining the Barcode Label Type

A checksum character is an "invisible" character—readable by the barcode reader, but not shown in the human-readable text on the label. Its function is similar to a parity check.

See Barcode Label Specifications for Half-Inch Media on page 479 for detailed information about the required physical characteristics of barcode labels.

If you have...	The barcode labels...
Spectra Certified data cartridges with standard barcode labels	Have a barcode with eight human-readable characters followed by a checksum character that is not human-readable. The last two human-readable characters indicate the media type (for example, L4 indicates LTO-4 media and L5 indicates LTO-5 media).
Spectra Certified data cartridges with custom barcode labels	Are designed to a user's specification. Custom labels support up to 16 characters including an optional checksum character.
Barcode labels purchased from different vendors	Must always either include or not include a checksum. When ordering labels, make sure that you always specify the same type of barcodes (always include or always do not include a checksum). **Important:** Never mix media with checksummed and non-checksummed labels in the library.

Use the following steps to determine if the barcode labels on your cartridges include a checksum character.

Important

After the utility completes, the LCM reboots. After the library completes its initialization, it rescans the barcode labels of all media in the library. This rescan takes approximately 18 seconds per cartridge.

1. Log into the library as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Maintenance ···⁘ Tools**. The Maintenance Tools screen displays.
3. Select **Utilities**. The Utilities screen displays.
4. Click **Show Advanced**. The Advanced Utilities Confirmation screen displays.
5. Click **Next**. The Utilities screen refreshes to show a list of the advanced utilities.
6. Select the **Modify Barcode Reporting** utility. The screen refreshes to show the details for the utility.
7. Make sure that the options for the utility are set as follows:

For this field...	Make sure it is set to...
Select checksummed behavior	Ignore check-sum barcodes
Select Right or Left	Report right-hand characters
Select the number of characters to report: (1 - 16)	16

8. Examine each barcode label you want to test and make a note of the human-readable text on each.
9. Import the cartridges into a storage partition, then view the media inventory, either on the BlueScale Inventory screen (see Importing and Exporting Cartridges on page 204) or through your storage management software.
   - If the reported barcode exactly matches the human-readable text you recorded, then the barcode includes a checksum character.
   - If the reported barcode is missing the right-most character, then the barcode does not include a checksum character.
10. See Changing the Library's Barcode Reporting Configuration on page 114 to configure the barcode reporting to match your barcodes.

Configure a Package Server

Overview Configuring a package server is optional. A local package server can be used to store BlueScale packages downloaded from Spectra Logic for updating the BlueScale software or library component firmware. Update packages can also be downloaded directly from the Spectra Logic website to the memory card in the library's LCM or to a USB device.

Note: For additional information about BlueScale packages and how to use them, see Updating the BlueScale Software and Library Firmware on page 382.

User Privilege Requirements Only a user with superuser or administrator privileges can configure a package server in the BlueScale interface.

Configure a Package Server Use the following steps to configure, modify, or delete a local package server in the BlueScale interface.

1. Identify the server or servers you want to use for storing BlueScale packages. Make sure that these servers can access the Internet and that they are on the same network as the libraries you want to update.

   Note: Both Microsoft's Internet Information Services (IIS) and the Unix-based Apache server work as package servers.
2. Log into the library as a user with superuser or administrator privileges.

3. Select **Maintenance ···⁘ Package Update**. The Package Update screen displays.

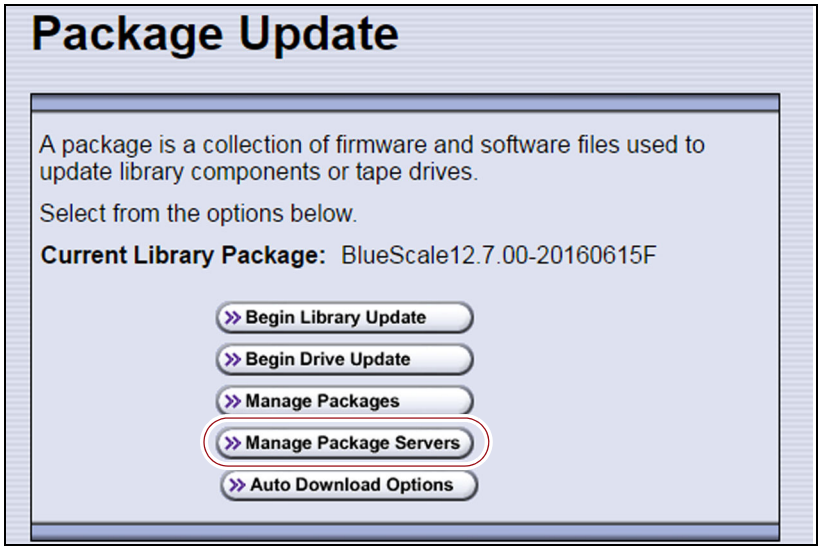


Figure 51 The Package Update screen.

4. Click **Manage Package Servers**. The Manage Package Servers screen displays, and provides the following information for each currently configured package server:

   - **Server name**—Name assigned to the server when it was added.
   - **Server configuration settings**—Includes the IP address of the package server, the port, the IP address of the proxy server (if configured), and the directory where BlueScale packages are stored.
   - **Auto Download setting**—Indicates whether Auto Download is configured. If configured (see Add a package server on page 120), the library checks the package server once a week for a library update package and drive firmware package newer than what the library is currently running. If a new package is available, the library downloads it, generates a system message, and displays an icon on the status bar to indicate the update is available (see Auto Download Icon on page 68). To modify auto download options, see Modify Auto Download Options on page 121.

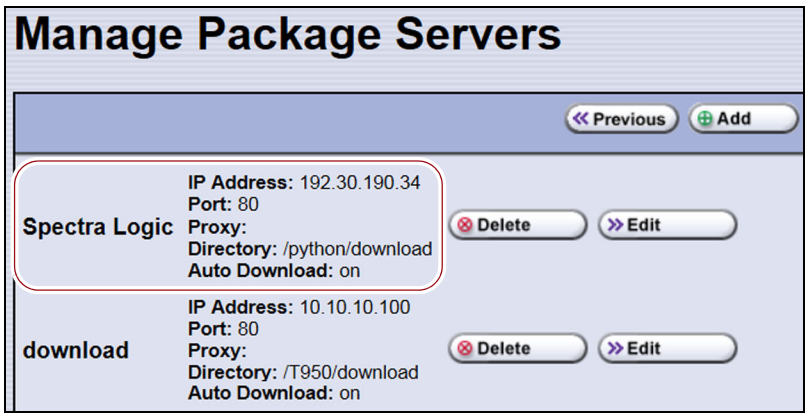
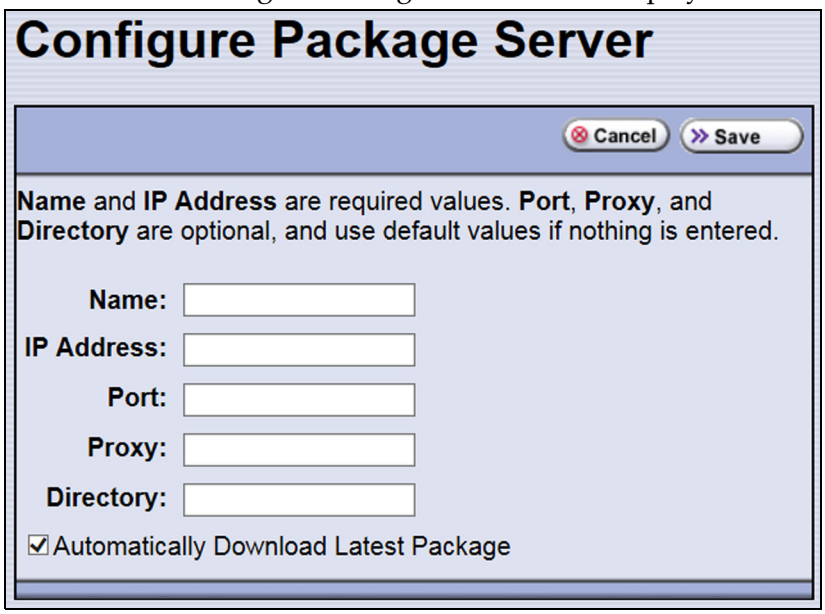


Figure 52 The Manage Package Servers screen.

5. Click the correct button to add, delete, or edit a package server.

Task	Procedure
Add a package server	**1.** Click **Add**. The Configure Package Server screen displays.  **Figure 53** The Configure Package Server screen. **2.** Fill in the requested information: ▪ **Required** — **Name** and **IP Address**. If no **Proxy** is set, the **IP Address** can be an IPv4 or an IPv6 address. If a **Proxy** is set, the **IP Address** must use IPv4. ▪ **Optional** — **Port**, **Proxy**, and **Directory** fields use default values if nothing is entered. The **Proxy**, if set, must use IPv4. **3.** Select or clear **Automatically Download Latest Package**. ▪ If selected, the library checks the package server once a week for a library update package and drive firmware package newer than what the library is currently running. If a new package is available, the library downloads it, generates a system message, and displays an icon on the status bar to indicate the update availability. ▪ If cleared, you must check for updates manually. **4.** Click **Save**. The screen refreshes and adds the new server to the list of available package servers. **Note:** If you specify the directory, make sure you include the full path to the directory where the BlueScale packages are stored.
Edit a package server	**1.** Click **Edit** next to the server's name and details. The Configure Package Server screen displays, with the appropriate fields completed. **2.** Edit the server information as necessary. **3.** Click **Save**.
Delete a package server	Click **Delete** next to the server's name and details. **Important:** There is no confirmation requested when you delete a package server. After you click **Delete**, the server is immediately removed from the list of available package servers. However, the packages on the server are not deleted.

Modify Auto Download Options

Overview When auto download is enabled for a package server (see Add a package server on page 120) you can configure when the library sends notification of a new downloaded package update or drive firmware update, and whether the download is automatically staged to library devices capable of staging.

> **Note:** For additional information about BlueScale packages and how to use them, see Updating the BlueScale Software and Library Firmware on page 382.

User Privilege Requirements Only a user with superuser or administrator privileges can configure auto download options.

Configure Auto Download Options Use the following steps to configure or modify auto download options.

1. Log into the library as a user with superuser or administrator privileges.
2. Select **Maintenance** ⋯⁘ **Package Update**. The Package Update screen displays.

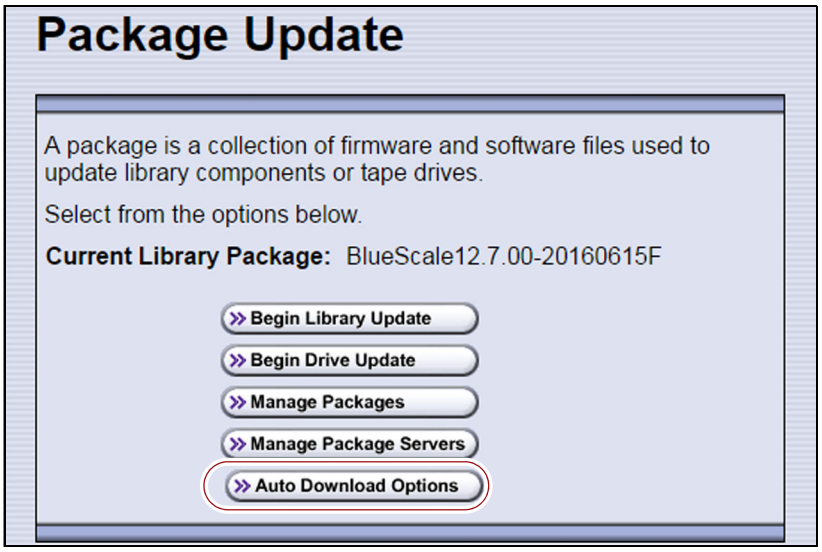


Figure 54 The Package Update screen.

3. Click **Auto Download Options**. The Auto Download Options screen displays showing the current auto download settings.

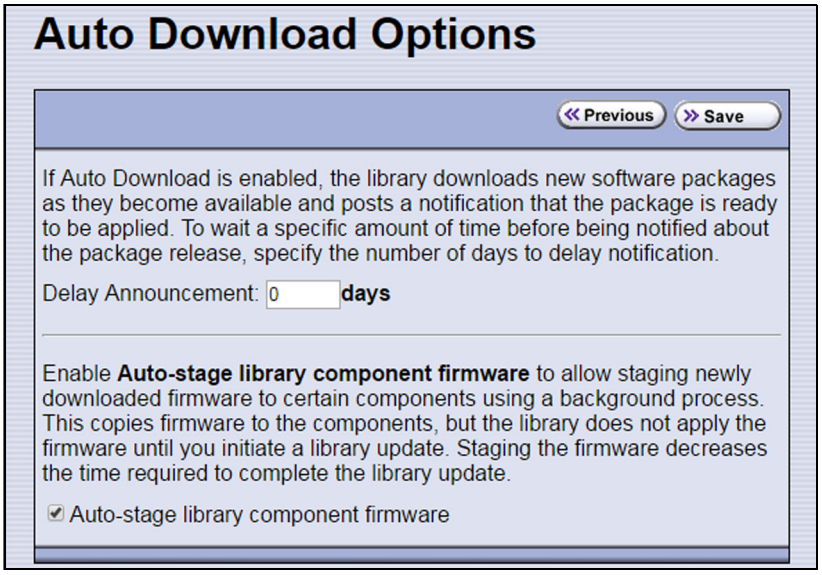


Figure 55 The Auto Download Options screen.

4. If you want to delay the notification about a new package, enter the number of days to delay in the **Delay Announcement** field.
5. Enable or disable auto-staging of component firmware by selecting or clearing **Auto-stage library component firmware**. The library does not apply the firmware until you initiate a library update. Enabling auto-staging decreases the time required to complete a library update.
6. Click **Save** to save the new settings.

BACKING UP THE LIBRARY CONFIGURATION

Overview Keeping valid backup copies of your library's configuration, the MLM and DLM databases, and BlueScale encryption keys ensures that you can easily restore the library in the event of a disaster. Having a backup of the library's configuration is also extremely useful if problems require you to replace the LCM or the memory card in the LCM. After the replacement procedure is complete, you can use the saved configuration to restore the library's settings, including the partitions, instead of having to manually re-enter all of the information.

Important Backing up the library configuration also backs up any BlueScale encryption keys that are stored in the library at the time the file is created.

Important The backup configuration can only be used to restore the library that generated the backup. The configuration is tied to the Hardware ID of the library and cannot be transferred to another library.

Options The library provides two methods for backing up the configuration:

- **Automatic**—See Use Automatic Backup of the Library Configuration.
- **Manual**—See Use Manual Backup of the Library Configuration on page 124.

If you have valid backups of the library's configuration and MLM database, you can use them to restore the library (see Restoring the Library Configuration on page 334).

See Back Up and Protect the Spectra Library Metadata on page 448 for additional information about backing up the library's configuration information, the MLM database, the DLM database, and any BlueScale encryption keys.

Use Automatic Backup of the Library Configuration

The Auto Configuration Save feature, which operates automatically, saves a backup of the library configuration, the MLM and DLM databases, and any stored BlueScale encryption keys to a time-stamped zip file on the memory card in the LCM. The zip file is named `<date-time>cfg.zip`, where `<date-time>` is the time stamp for when the backup was created. The library generates the Auto Configuration Save backup file once a week and whenever a partition is created or modified.

Notes:
- If the MLM database contains a large number of MLM and DLM records, writing the Auto Configuration Save file can take several minutes.
- The library does not generate an Auto Configuration Save backup file when you make configuration changes other than creating or modifying a partition.

As an extra security measure, you can configure the library to automatically email the time-stamped zip file to a previously configured mail recipient each time the backup file is created. Saving an external copy of the automatically generated configuration backup file ensures that you can recover the library configuration, the MLM and DLM databases, and the BlueScale encryption keys stored in the library in the event of a disaster.

When the recipient receives the email, they should verify the backup as described in Verify the Configuration Backup on page 126 and Verify the Database Backup File on page 276.

For detailed information about configuring a mail recipient for the Auto Configuration Save file and using it to restore the library, see:

- Enable Email for the Auto Configuration Save File on page 101
- Restore From an Auto Configuration Save File on page 335

Use Manual Backup of the Library Configuration

Overview Whenever you make a configuration change to the library that does not result in the library automatically generating a configuration backup file (for example, you entered activation keys after the creation date of the most current automatically generated backup file), you can manually back up the library configuration as described in this section.

Notes:

- The Save Library Configuration utility described in this section does not back up the MLM database or the DLM database.

  To back up the MLM and DLM databases, use the Save MLM Database utility, as described in Back Up the MLM and DLM Databases on page 274. After you create the backup, be sure to verify it as described in Verify the Database Backup File on page 276.

- Backing up the library configuration also backs up any BlueScale encryption keys that are stored in the library at the time the file is created.

User Privilege Requirements Only a user with superuser or administrator privileges can create a manual backup of the library configuration. See Configuring Library Users on page 80 for information about the three types of user groups and what types of privileges each has.

Back Up the Library Configuration

1. Log into the library as a user with superuser or administrator privileges.
2. If you want to save the configuration to a USB device, connect the device to a USB port on the LCM and allow time for the device to mount before continuing.

   Note: The **save library configuration to USB** option is only available if you connect a USB device to the LCM before you access the utilities screen (see Connect a USB Device to the Library on page 146).

3. Select **Maintenance ⋯⁘ Tools ⋯⁘ Utilities**. The Utilities screen displays a list of Basic Utilities.

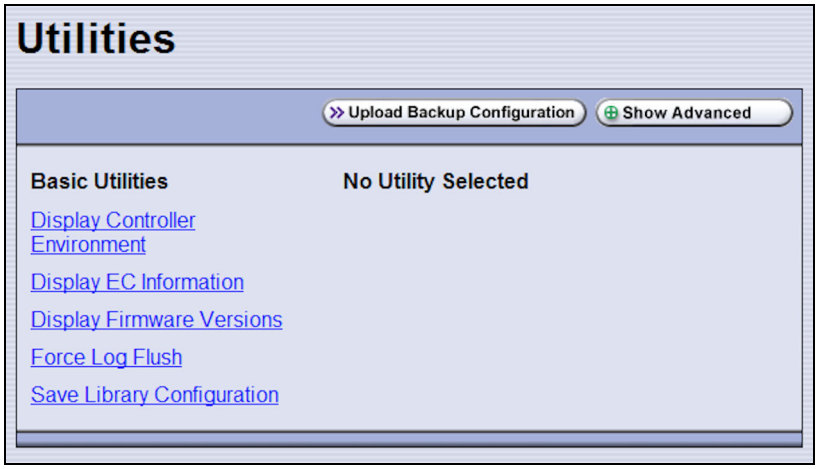


Figure 56 The Utilities screen showing the list of Basic Utilities.

4. Select the **Save Library Configuration** utility. The screen refreshes to show the details for the utility.

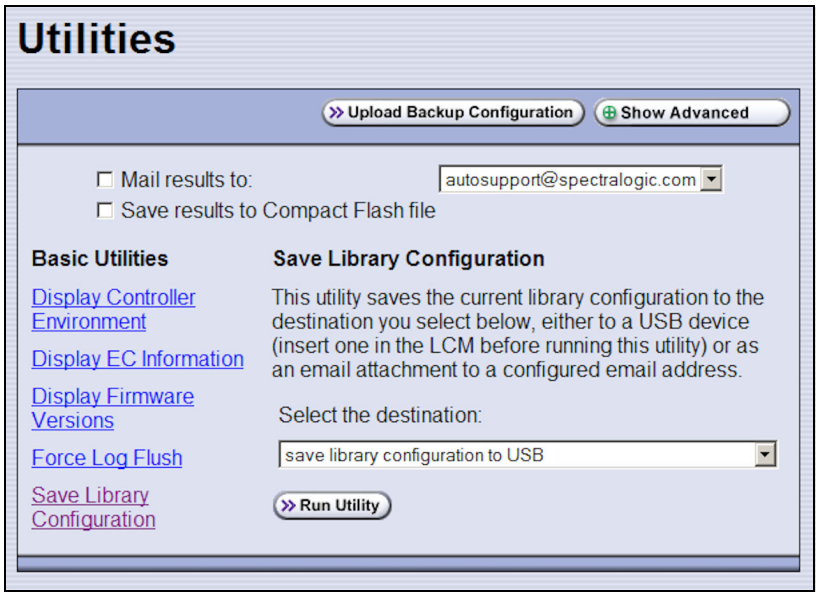


Figure 57 The Save Library Configuration utility.

5. Use the **Select the destination** drop-down list to select where you want to save the file.

   Note: Do not use the check boxes at the top of the screen. They act on the Utility Results message, not the configuration file.

Select...	To...
save library configuration to USB	Save the library configuration file to the USB device connected to a USB port on the LCM. The backup file is stored in a folder called `SavedConfigs\<date-time>`, where `<date-time>` is the time stamp for when the backup was created. The folder contains multiple configuration files with the format `cnnnnnn.cfg`, where *n* is a number between 0 and 9.
mail library configuration to [mail recipient]	Send the library configuration file as a zip file attached to an email addressed to a previously configured mail recipient (see Configure Mail Users on page 99). **Note:** Do not mail the file to *autosupport@spectralogic.com* unless Spectra Logic Technical Support specifically requested the file for troubleshooting.

6. Click **Run Utility**.

   After a brief delay, the Utility Results screen displays, showing that the configuration file was either saved or sent.

7. Confirm that the backup was successful, as described in Verify the Configuration Backup.

Verify the Configuration Backup

After creating a backup of your library configuration, use one of the methods described in the following sections to verify that the backup was successful as soon as possible after you create it.

When Saved to a USB Device

1. Plug the USB device into a USB port on an available computer.
2. Examine the list of files on the USB device and locate the `\SavedConfigs` folder.
3. Open the `\SavedConfigs` folder and verify that a folder with a name corresponding to the date and time you created the backup is present.
4. Open the time-stamped folder and confirm that it contains several configuration files named using the format `cnnnnnn.cfg`, where *n* is a number between 0 and 9. Make sure the files are more than 0 bytes in size.
5. If the configuration files are present and are more than 0 bytes in size, the backup was successful. Store the USB device in a safe location.

   Note: You can zip the files in the folder and email the zip file to others or make additional copies of the folder for safekeeping.

6. If the configuration files are not present, or if any of the files are 0 bytes in size, repeat the backup process (Use Manual Backup of the Library Configuration on page 124) using a different USB device.

When Sent as an Email Attachment

1. Open the email and confirm that it contains a zip file attachment.
2. Open the zip file and confirm that it contains several configuration files named using the format `cnnnnnn.cfg`, where *n* is a number between 0 and 9. Make sure the files are more than 0 bytes in size.
3. If the configuration files are present and are more than 0 bytes in size, the backup was successful. Save the zip file attachment to a safe location from which you can copy it to a USB device, if needed.

   Note: If desired, rename the zip file to indicate the date of the backup.
4. If the email attachment does not contain the configuration files or if one or more of the files are 0 bytes in size, repeat the backup process (Use Manual Backup of the Library Configuration on page 124) to send the email again.

Read Back Up and Protect the Spectra Library Metadata on page 448 for additional information about backing up the library's configuration information, the MLM and DLM databases, and BlueScale encryption keys (this information is collectively referred to as the library metadata).

CHAPTER 5

Library Operation

This chapter describes the following procedures for day-to-day operation of your library:

Topic	
Controlling the Library Power	page 129
Power On the Library	page 129
Power Off the Library	page 131
Monitoring Your Library	page 133
Check and Respond to Messages	page 134
Use Performance Metrics	page 137
View Robot Utilization Information	page 141
View Drive Status Information	page 142
View a Partition's World Wide Name	page 144
Using a USB Device	page 145
Continuing Backups While Using a USB Device	page 145
Connect a USB Device to the Library	page 146

CONTROLLING THE LIBRARY POWER

The library power is controlled using the front panel power button or the BlueScale Soft Power feature.

Power On the Library

1. Connect the provided power cord to the AC power connector and then connect it to the power source.
2. If you have an additional power supply, connect the additional power cord to the AC power connector and then to the power source.

   For redundant AC power configurations, connect each input to a separate branch circuit, which allows for failover in the event of a power failure in one of the circuits (see Power Specifications on page 465 for additional requirements).
3. Set the power switch(es) to the **on** position.

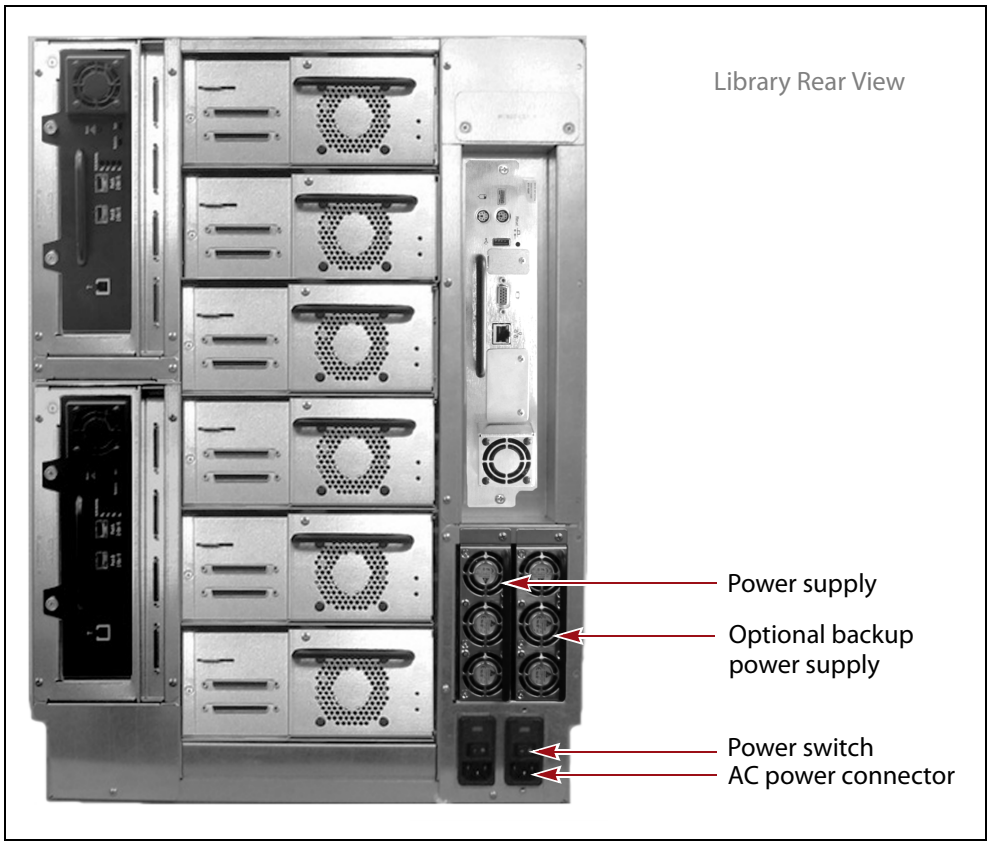


Figure 58 The AC power connector and power switch.

Caution

Caution: Double-pole/neutral fusing.

Attention: Double pôle/fusible sur le neutre.

Use the Front Panel Power Button

1. Press and hold the front panel power button until the button's LED illuminates and the LCD operator panel turns on.



Figure 59 Press and hold the front panel power button.

2. Wait while the library completes its power-on sequence. After the library completes its power-on sequence, the Library Initialization screen displays (see Figure 29 on page 71). This screen lists the required initialization steps and current status of the library's major components (Robotics and LCM). Text boxes provide descriptions about the currently active tasks.
3. After initialization is complete, the BlueScale login screen displays (see Figure 33 on page 75).

   Note: If the library cannot complete the initialization process, it generates system messages and enters maintenance mode. Contact Spectra Logic Technical Support for assistance (see Contacting Spectra Logic on page 7).

Use the Automatic Power-Up After Power Failure Feature

The Automatic Power-Up After Power Failure feature lets you configure the library to power on without user intervention after a power failure.

Notes:
- The Automatic Power-Up After Power Failure feature must be enabled on the System Setup screen (see Enable Automatic Power-Up After Power Failure on page 93).
- The library does not automatically power on if it was powered off using the front panel power button or the Soft Power feature.

Power Off the Library

Before powering off the library, use the following steps to prepare for shut-down.

1. Use your storage management software to stop any backups running to the library.
2. Pause PostScan if it is running (see Pause the PostScan Process on page 265). Any tapes currently being scanned are returned to their storage locations.
3. Power off the library using one of the methods described in the following sections.

   Note: If you intend to leave the library powered down for an extended length of time, set the AC power switches on the back of the library to the **off** position after you power off the library.

Use the Front Panel Power Button

To power off the library, press and hold the front panel power button for approximately 5 seconds (the button's LED starts flashing). The library begins its power-off sequence, which allows the BlueScale software and components to shut down gracefully.

Use the Soft Power Feature

The Soft Power feature disables the physical power button on the library front panel and enables the soft power button on the General Status screen. Using the Soft Power feature gives users with superuser privileges exclusive control over powering the library off; other types of users cannot power off the library, either by using the physical power button on the library front panel or the Soft Power button on the General Status screen.

Notes:
- The Soft Power feature is only available from the library's front panel touch screen interface; it is not available through the BlueScale web interface (RLC).
- When you click the Soft Power button, you must respond to a confirmation message before the library is powered off.
- The Soft Power feature must be enabled on the System Setup screen (see Enable Soft Power on page 94) before you can use it.
- The feature can only be enabled or disabled by a superuser.

Follow these steps to power off the library using the Soft Power feature:

1. Log into the library as a user with superuser privileges (see Log Into the User Interface on page 71).
2. From the toolbar, access the General Status screen.

3. Using the stylus, touch the blue power button on the picture of the library.

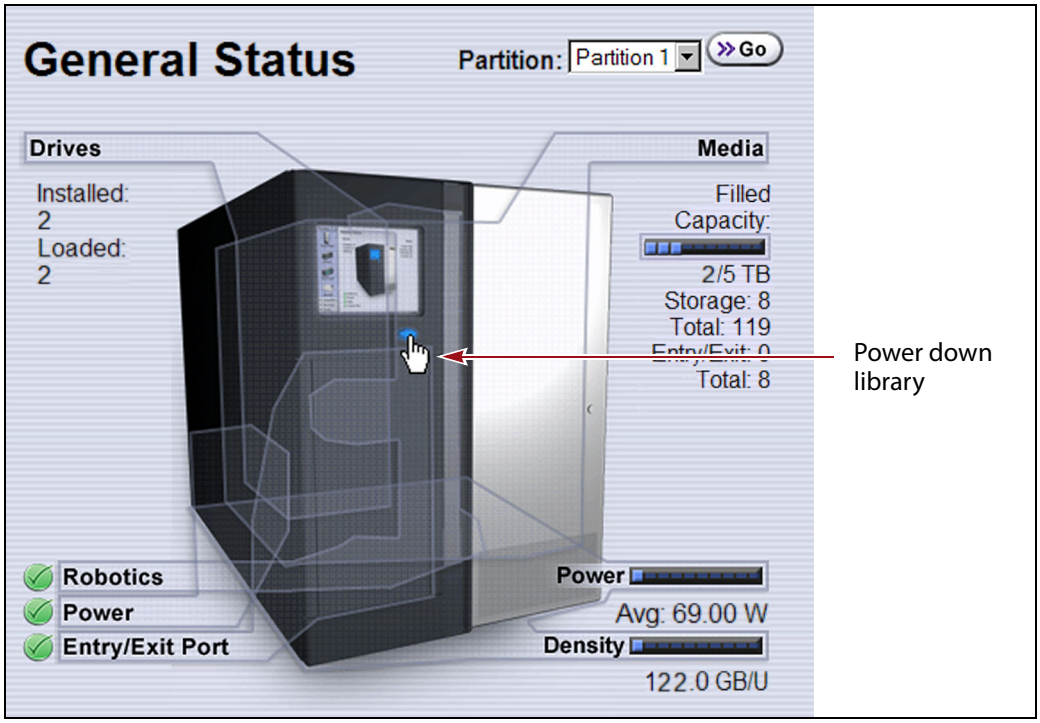


Figure 60 The Soft Power button.

When the cursor comes near the button, it changes to a pointing finger, as shown in Figure 60.

4. When you touch the button, the Soft Power Shutdown confirmation screen displays after a brief delay. Click **Continue** to power off the library.

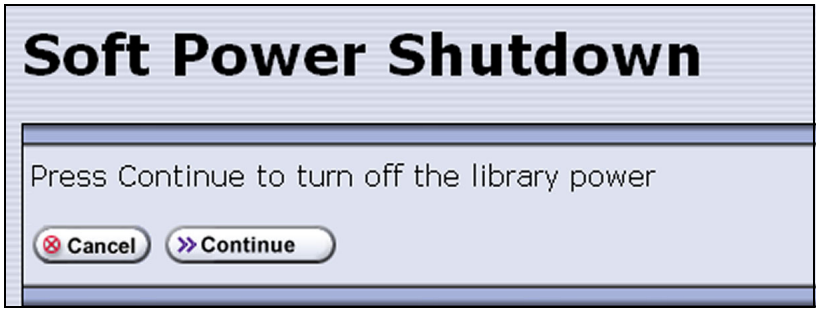


Figure 61 The Soft Power Shutdown confirmation screen.

MONITORING YOUR LIBRARY

Overview The BlueScale user interface provides a number of tools for monitoring the health and performance of the library, its components, and its media. The quickest way to obtain important information is to check the icons and bar graphs on the General Status screen (Figure 22 on page 60). They provide at-a-glance information about the status of major system components and resource usage, respectively. The icons on the status bar (see Figure 25 on page 67) provide additional system-level status information.

The following table lists where to find additional information about the health and performance of the library, its components, and its media.

Check...	To monitor...	For details, see...
System Messages	Events that resulted in system messages about the library and its operation.	Check and Respond to Messages on page 134
Performance Metrics	The performance of your library and its drives.	▪ View Drive Performance Statistics on page 137 ▪ View Power Consumption Statistics on page 139 ▪ View Storage Density Statistics on page 140
Robot Utilization Information	The percentage of time the robotics is being used while the library is powered on.	View Robot Utilization Information on page 141
Drive Status	The operational status, firmware level, and cleaning status of the drives.	▪ View Drive Status Information on page 142 ▪ Using a Global Spare Drive on page 348
Media Lifecycle Management (MLM)	The usage and health of MLM-enabled media in the library. **Note:** MLM also provides limited health information about media that is not MLM-enabled.	Chapter 8 – Configuring and Using Media Lifecycle Management, beginning on page 234
Drive Lifecycle Management (DLM)	The usage and health of the LTO drives in the library.	Chapter 9 – Using Drive Lifecycle Management, beginning on page 280
Hardware Health Monitoring	The health of key library components.	Using BlueScale Hardware Health Monitoring on page 318

User Privilege Requirements All users can view system messages and view performance metrics. The user privileges required to use the other monitoring tools depend on the tool.

Check and Respond to Messages

Check the library's system messages regularly. These messages provide important information about the library, its operation, and any library problems. Reviewing the messages is also the first step in troubleshooting.

Note: When you configure mail users, you can specify which types of system messages the library automatically emails to each mail user. See Configure Mail Users on page 99 for detailed information.

Use the BlueScale User Interface

Use the following steps to view BlueScale system messages through either the operator panel or a web browser.

1. Log into the library.
2. Select the System Status icon on the status bar. The System Messages screen displays.

   See Status Bar on page 67 for the location and description of the System Status icon.

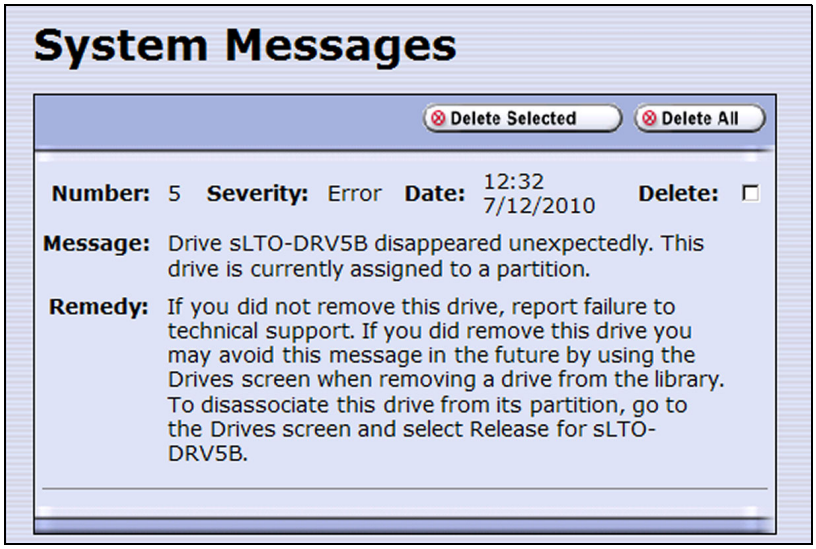


Figure 62 The System Messages screen.

The following table describes the severity ranking for messages.

Icon	Message Severity	Description	Response
	**Informational**	The library is working as intended. An event occurred that generated information about an operation or a system component. **Example:** The utility completed successfully.	No action is required.
	**Warning**	The library is working as intended. An event occurred that may require attention to keep the library running at 100%. **Example:** QuickScan did not complete, but will retry.	If the event was unexpected, determine the cause of the event and take remedial steps.
	**Error**	The library operation is impaired and requires user intervention. **Example:** QuickScan did not complete, and there is a tape stuck in a drive as a result.	Determine the cause of the error and take remedial steps.
	**Fatal Error**	The library experienced an event that prevents it from continuing operations. **Example:** The robot is not responding.	Examine any additional information in the message and take the required remedial steps.

3. Read the message(s), and follow any recommended steps.

   Note: Some error messages are followed by a series of errors that provide additional information. To understand the sequence of events, scroll back to view the first error message that was produced, then read the others for clarification.

   If you need assistance, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).

4. When you are finished reading the messages and complete the appropriate actions, you can select and delete individual messages or you can delete all of the messages.

Use Syslog

The BlueScale Syslog feature sends all system messages logged by the library to a previously configured Syslog server. Syslog is a standard for forwarding log messages over an Internet Protocol (IP) computer network. It provides separation of the software that generates log messages from the system that stores the messages.

Each system message the library sends to the Syslog server contains the original system message posted by the library and the remedy information associated with the system message.

See Syslog Server IP Address on page 94 for information about entering the IP address of the Syslog server. Entering a valid IP address enables the Syslog feature.

When enabled, the BlueScale Syslog feature automatically sends all system messages posted by the library to a single, previously configured Syslog server. The library transmits the messages to the Syslog server using the format:

```
<severity level>BlueScale_<library name>[PP]:(<message number>)
<message text>
```

where:

Variable	Definition	
severity level	Indicates the severity the library assigned to the message. This severity corresponds to the syslog priorities as follows:	
	This library system message severity...	**Corresponds to this Syslog priority...**
	Informational	6 (Informational)
	Warning	4 (Warning)
	Error	3 (Error)
	Fatal Error	2 (Critical)
library name	The name of the library, if configured. If the library name is not configured, this value is set to "UnknownLibrary." Refer to Library Name on page 90 for information about setting the library name.	
PP	Indicates the ID number of the process that was being performed by the library's BlueScale software when the system message was posted. This ID number is for internal use only.	
message number	Indicates the order in which the Syslog server received the messages. The counter increments each time a message is received, beginning at zero. The counter can be used to determine whether all messages are arriving at the Syslog server.	
message text	Shows the actual message posted by the library. Each system message posted by the library generates two Syslog messages; one for the message text and one for the remedy text. The two messages have the same message number, which is included at the beginning of the message.	

Use Performance Metrics

The library includes the following metrics for monitoring the performance of your library and its drives.

- View Drive Performance Statistics, on this page
- View Power Consumption Statistics on page 139
- View Storage Density Statistics on page 140

View Drive Performance Statistics

The Drive Performance metrics let you monitor the performance of your drives. This innovative feature helps you optimize drive performance through load-balancing, tuning your SAN, and identifying performance bottlenecks.

Note: The Drive Performance Monitoring option is disabled by default. Enable Drive Performance Monitoring on page 91 provides instructions for enabling this option.

Use the following steps to view the performance data.

1. Select **General** ⋯ **Metrics** from the toolbar menu. The screen for the last metric you viewed displays.
2. Select how you want to view the performance information from the available options:
   - **Total Library**—The consolidated statistics for all the drives in the library.
   - **Partition *n***—The statistics for the drives in the specified partition.
   - **Drive *n***—The statistics for a specific drive.
3. Select either **Drive Write Performance** or **Drive Read Performance** from the **Metric** drop-down menu.

   Note: If you enabled or disabled the Drive Performance Monitor option when a drive contained a cartridge, the drive is reported as empty on the Drive Performance screens.

4. Click **Go**. A screen showing the selected metric displays.

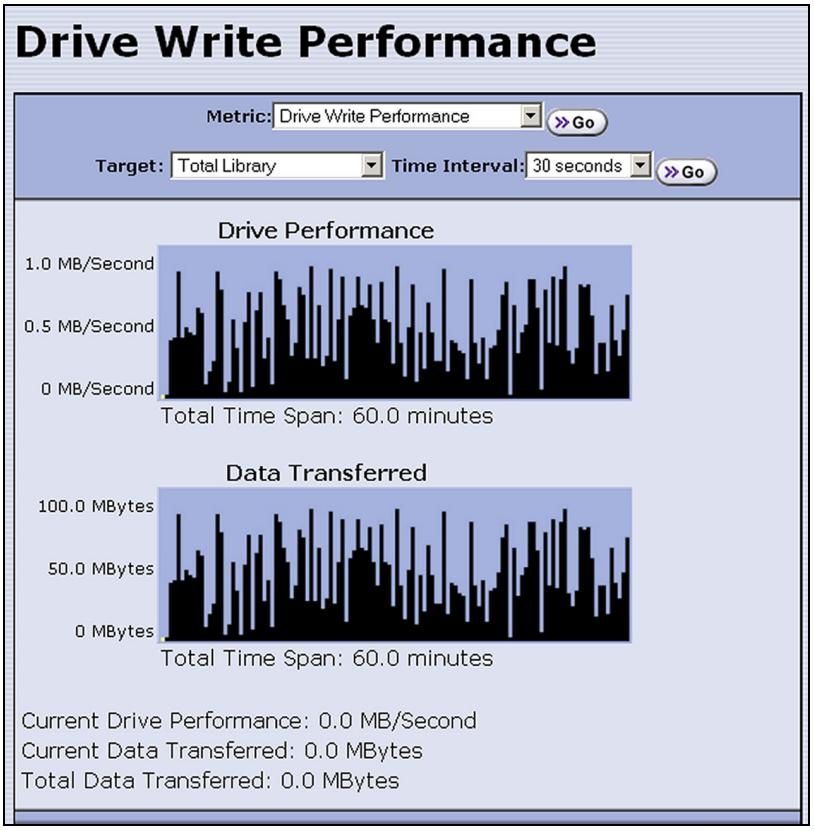


Figure 63 The Drive Performance Monitor screen (Write Performance for the Total Library shown).

5. Alternatively, you can view the Drive Performance metrics by selecting **Configuration ⋯⁘ Drives (or DLM)** and then clicking **Drive Performance**.

Note: The **Drive Performance** button is not present if Drive Performance Monitoring is not enabled (see Enable Drive Performance Monitoring on page 91).

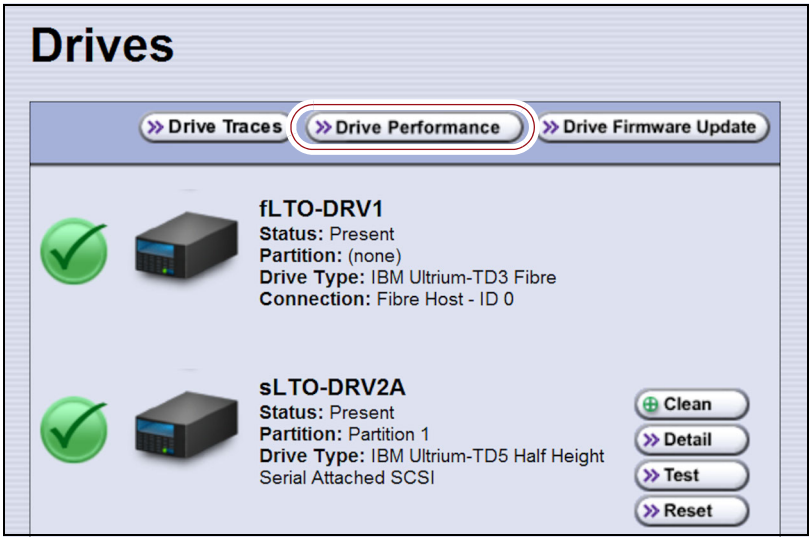


Figure 64 The Drives screen.

View Power Consumption Statistics

In addition to the Power bar graph on the General Status screen, the BlueScale EnergyAudit feature provides a configurable graphical display of the library's power consumption.

Use the following steps to view the power consumption data for the library.

1. Select **General** ···⁘ **Metrics** from the toolbar menu. The screen for the last metric you viewed displays.
2. Select which power consumption metric you want to view from the **Metric** drop-down menu:
   - Power Consumption (kWh)
   - Power Consumption (kWh/Ft^2)
   - Power Consumption (kWh/Ft^3)
   - Power Consumption (kWh/TB)
3. Click **Go**. A screen showing the selected metric displays.

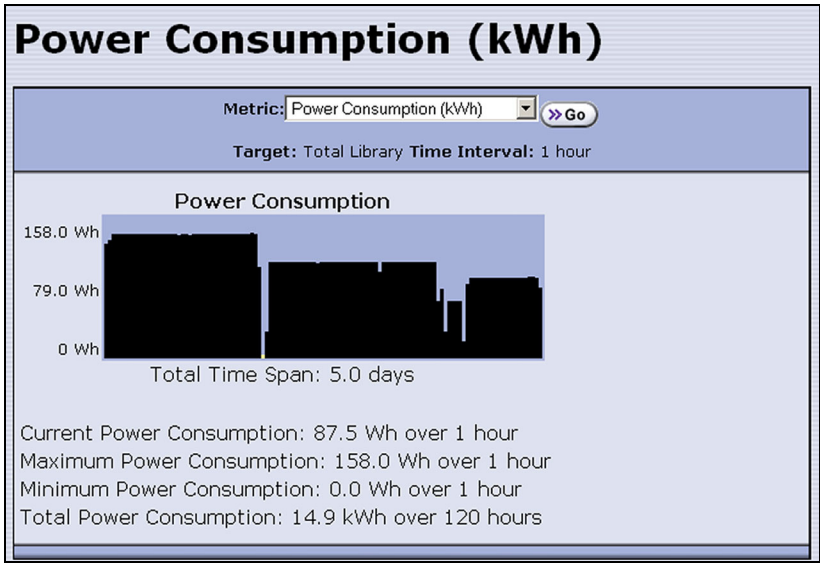


Figure 65 The Power Consumption metrics screen.

View Storage Density Statistics

The Storage Density metrics let you monitor the amount of data your library is capable of storing based on the number of data cartridges currently stored in the library.

Use the following steps to view the storage density data for the library.

1. Select **General** ···⁘ **Metrics** from the toolbar menu. The screen for the last metric you viewed displays.
2. Select **Storage Density** from the **Metric** pull-down menu.
3. Select the media type, if necessary, and the unit of measure for the density values.
4. Click **Go**. The Storage Density screen showing the selected metrics displays.

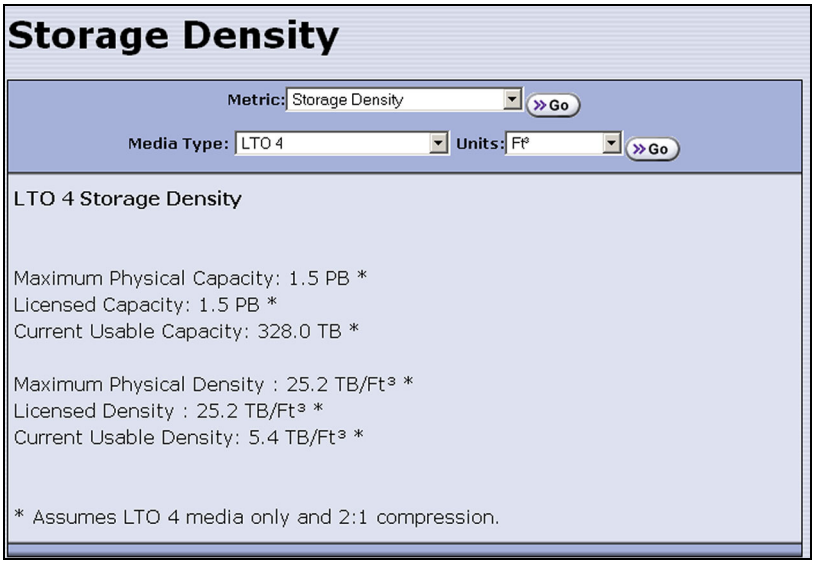


Figure 66 The Storage Density metrics screen.

View Robot Utilization Information

The Robot Utilization by Hour metric lets you monitor the percentage of each hour that the library's robotics are actively operating over the last 24 hours. The data is updated every hour while the library is powered on.

- The Robot Utilization by Hour metric can include up to 24 data points, one for each hour that data was collected over a 24-hour period. The first time period begins one full hour after the library is powered on. Data collected during the first partial hour following power-on is discarded as invalid data.
- The data is stored in volatile memory and is not retained when the library is powered off.

Use the following steps to view the robot utilization information.

1. Select **General** ⋯ **General Status** from the toolbar menu. The General Status screen displays.
2. Click **Robotics** to display the Robotics Status screen.
3. Select the **Usage** tab to display the Robot Utilization by Hour metric.

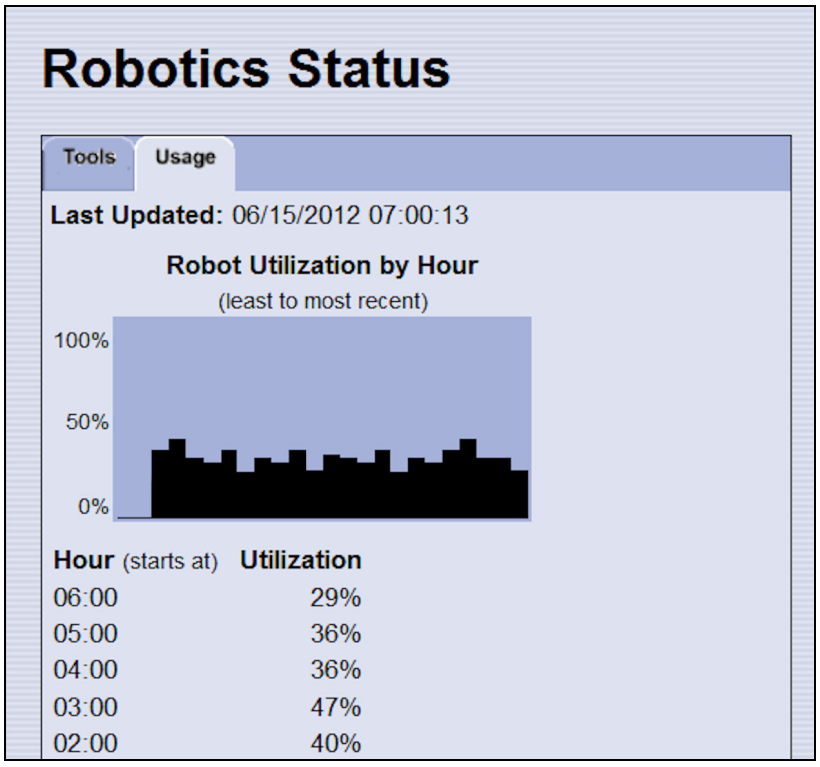


Figure 67 The Robotics Status screen.

View Drive Status Information

The drive status icon on the General Status screen indicates the overall status of the library's drives. If the status icon indicates that a drive is experiencing a problem, view the Drive and Drive Details screens for detailed information about a specific drive.

The Drive Details screen includes the drive firmware version and manufacturer's serial number, as well as more detailed status information. From the Drive Details screen you can access the Drive Lifecycle Management (DLM) report for the drive. See Chapter 9 – Using Drive Lifecycle Management, beginning on page 280 for detailed information about DLM.

Use the following steps to view information about the individual drives in the library.

1. Log into the library as a user with administrator or superuser privileges.
2. Select **Configuration** ···⁘ **DLM** (or **Drives** if DLM is not enabled) to display the Drives screen. This screen lists all of the drives in the library, along with basic information about each drive and the available operations for each drive.

   Note: The operations available for each drive depend on how you are accessing the BlueScale user interface and whether or not:

   - DLM is enabled
   - The drive is configured in a partition
   - Auto Drive Clean is enabled for the partition

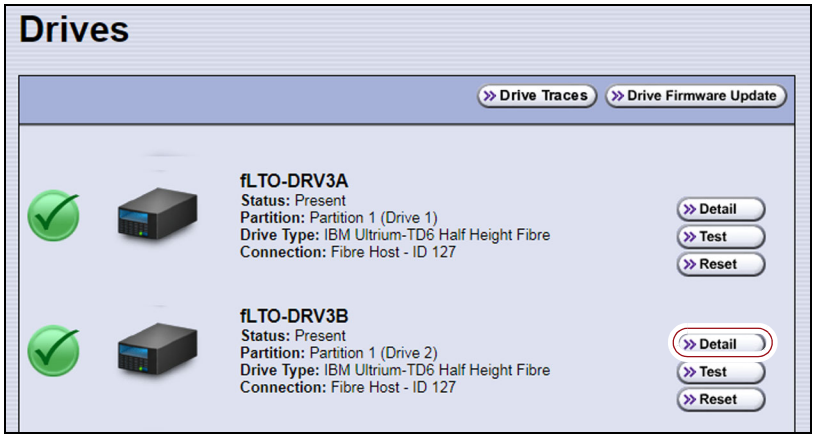


Figure 68 The Drives screen.

3. Click **Detail** next to the drive for which you want to view detailed information. The Drive Details screen displays.

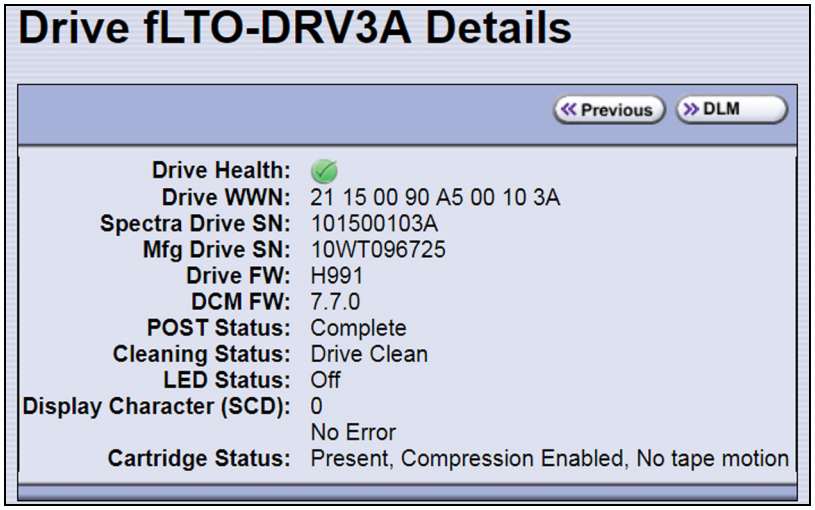


Figure 69 The Drive Details screen.

Field	Indicates
Drive Health	The drive health icon (see Using the Drive Health Icons on page 283).
Drive WWN	▪ The Fibre Channel WWN for the drive. See Drive Connectivity on page 53 for detailed information about the WWNs for drives. ▪ The SAS port identifier for a SAS drive. **Note:** This field is not present for SCSI drives.
Spectra Drive SN	The location-based serial number linked to the drive while it is in the library. This serial number makes it possible to replace one drive with another without having to reconfigure the storage management software that accesses the drive.
Mfg Drive SN	The serial number assigned to the physical drive by the drive manufacturer. This serial number is required for tracking the drives when they are not inside the library.
Drive FW	The firmware version being used by the drive itself.
DCM FW	The firmware version being used by the drive sled that houses the drive.
POST Status	Shows the results of the drive's POST (Power-On Self-Test).
Cleaning Status	Shows the status of the drive's Cleaning Tape Alert flag.
Library-based Clean	Shows the last time that the drive was cleaned using the Auto Drive Clean feature. **Note:** This field is only present when a cleaning partition is associated with the storage partition containing the drive.
LED Status	Shows the state of the drive's front panel status LED (see Interpreting the Status LED Information on page 362).
Display Character (SCD)	Shows the code displayed on the drive's single-character display (SCD) (see Interpreting the SCD Codes on page 362).
Cartridge Status	Indicates whether the drive is configured to compress data as it is written and whether the drive contains a cartridge. No tape motion indicates either that the drive is empty or, if the drive contains a cartridge, that the tape is not moving.

4. From the Drive Details screen click **DLM** to access the Drive Lifecycle Management (DLM) report for the drive (see Viewing and Saving a Detailed Drive Health Report on page 284).
5. Use the information on the Drive Details screen and the DLM report to troubleshoot drive problems (see Troubleshooting LTO Drives on page 358).

   If the drive is in an error state, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).

View a Partition's World Wide Name

When monitoring connections to multiple libraries through a Fibre Channel switch, knowing the World Wide Name (WWN) for a storage partition is useful for identifying a particular library.

Note: From the Fibre Channel switch, each storage partition defined in the library appears as an independent library connected to the Fibre Channel arbitrated loop or fabric.

To view the WWN for each storage partition configured in the library, select **Configuration** ···⁘ **Partitions**. The Shared Library Services screen displays.

Note: If multiple drives are configured as exporting controllers in a partition there are multiple WWNs for the partition. Click **Summary** to display the Partition Settings screen, which lists all of the WWNs.

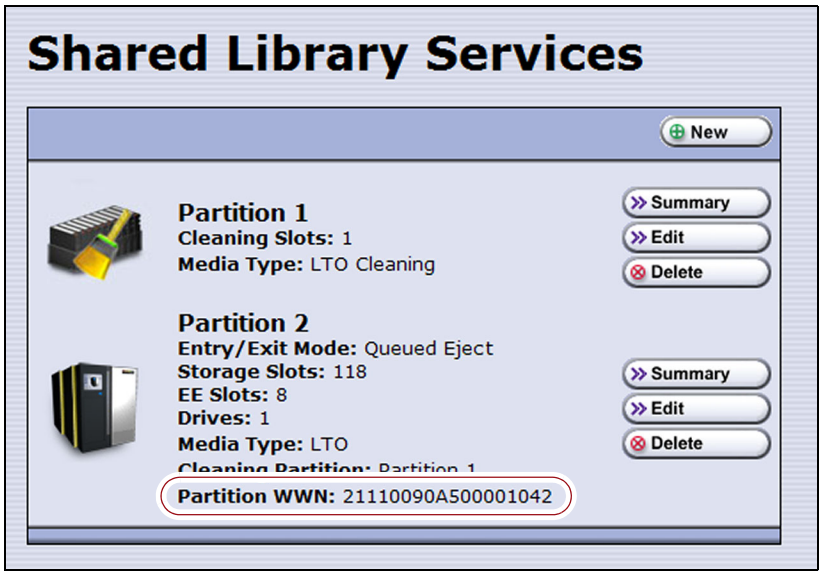


Figure 70 The WWN assigned to the partition.

See World Wide Names for Fibre Channel Partitions on page 51 for detailed information about the partition's WWN.

USING A USB DEVICE

You can plug a USB device into a USB port on the LCM for transferring information such as backing up or restoring the library configuration, backing up or restoring the MLM and DLM databases, importing or exporting BlueScale encryption keys, gathering log files, or to upload BlueScale software updates to the library.

Important After connecting a USB device, allow time for the device to mount before continuing.

Important Do not leave a USB device connected to the LCM indefinitely, unless specifically directed to do so by Spectra Logic Technical Support.

One Spectra Logic USB device is shipped with the library, but most types of USB devices work.

Important The library only recognizes FAT-formatted, not NTFS-formatted, USB devices.

If you are unable to access a USB device from the library, remove it and use a different one.

Continuing Backups While Using a USB Device

When using a USB device, keep the following requirements in mind:

It is...	to continue backups while...
Safe	Exporting or importing a BlueScale encryption key to a USB device.
	Saving library configurations and other information to a USB device.
	Capturing traces and saving the trace results data to a USB device.
Not Safe	Restoring a saved library configuration and other information from a USB device.
	Updating the library BlueScale software using an update package on a USB device..

Connect a USB Device to the Library

Notes:
- Not all USB devices are compatible with the library. If you are unable to access a USB device from the library, remove it and use a different one. If the LCM stops responding after you insert an incompatible USB device, reboot the LCM as described in Reset the LCM on page 329.
- The library only recognizes FAT-formatted, not NTFS-formatted, USB devices.
- Plug the USB device into the LCM *before* beginning a procedure that reads or writes data, to allow time for device recognition. For many utilities, the option to read from or write data to a USB device is not available if a USB device was not connected to the LCM before you select the utility.

To use a USB device, plug it into a USB port on the LCM.

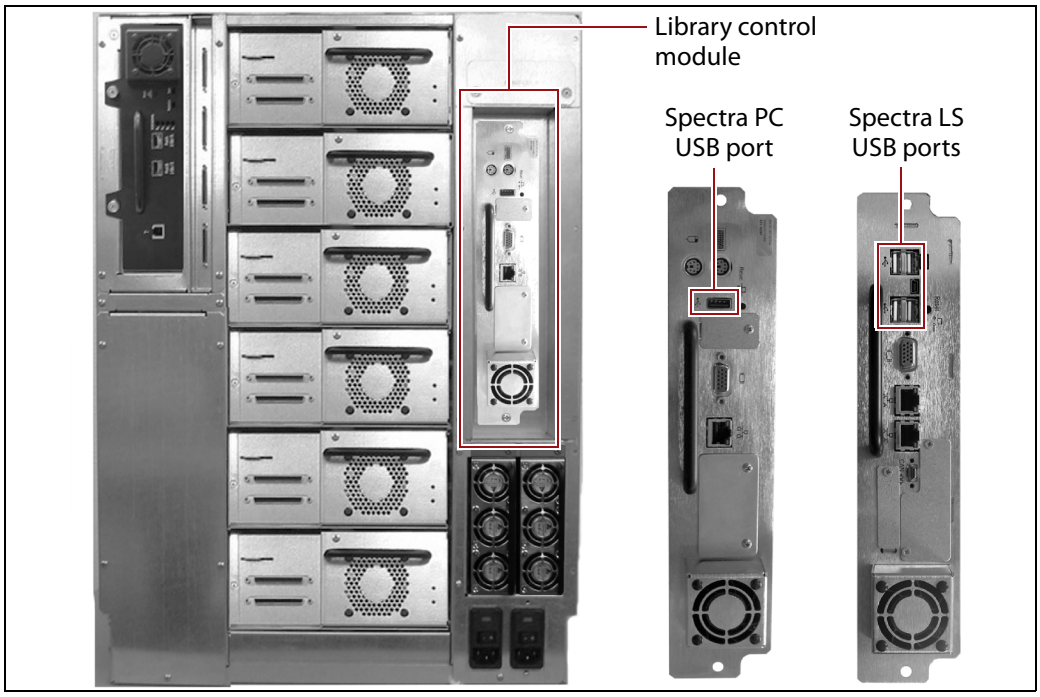


Figure 71 The USB port locations.

CHAPTER 6

Partition Management

This chapter describes how to use the BlueScale partition wizard to configure and manage partitions in the library.

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PARTITION CONFIGURATION OVERVIEW

Before you start configuring partitions in your library, it may be helpful to read the following:

- Library Partitions, beginning on page 40, to learn how the library uses storage partitions to create multiple virtual libraries.
- MLM PreScan and PostScan on page 241 to learn how the MLM PreScan and PostScan features interact with the storage partitions.

Partition Types and Requirements

The library supports two types of partitions: storage partitions and cleaning partitions. When configuring partitions, keep in mind the requirements in the following sections.

Global Considerations

The following information applies to both cleaning and storage partitions.

User Privilege Requirements Only users with superuser or administrator privileges can create or modify partitions.

Slot availability When a partition is created, the library automatically makes any slots that are not already configured for use in another partition available for use in the new partition. If all of the slots in your library are already licensed and assigned to existing partitions, you must modify one or more partitions to make slots available for creating a new partition (see Modifying an Existing Partition on page 194).

Background operations You cannot create, modify, or delete a partition if the library is actively running a Media Auto Discovery, PreScan, or PostScan operation, or if the library is performing certain other background processes (for example, updating drive firmware using the Update Drive Firmware wizard).

If you do not want to wait for a Media Auto Discovery, PreScan, or PostScan operation to complete, you can stop the Media Auto Discovery or PreScan operation or pause the PostScan operation. For other background operations, wait for the process to complete.

- To stop Media Auto Discovery or PreScan, click **Stop Discovery** on the Media Lifecycle Management Tools screen (see Stop the Discovery Process on page 256).
- To pause PostScan for one hour, click **Pause PostScan** on the Media Lifecycle Management Tools screen (see Pause the PostScan Process on page 265).

Cleaning Partitions and Auto Drive Clean

Cleaning Partition Overview A cleaning partition provides permanent storage for cleaning cartridges inside the library. This special-purpose partition is only used when Auto Drive Clean is enabled for one or more storage partitions and can be shared by multiple storage partitions. The cleaning partition does not have any drives associated with it.

Configuring a cleaning partition does not require an SLS activation key; nor does a cleaning partition count against the partition maximum for the library. If fewer than the physically present cartridge storage slots are licensed with a Capacity On Demand (CoD) key, the cleaning partition uses any cartridge slots that are not licensed. The slots assigned to the cleaning partition do not count against the licensed capacity. If all of the physically present slots are licensed, the cleaning partition can use any slots that were not already assigned to another partition.

Auto Drive Clean Functional Overview Auto Drive Clean uses the cleaning cartridges stored in the cleaning partition to provide automatic, library-based cleaning of LTO drives without user intervention. Automated drive cleaning results in fewer failed tape read/write operations and is the preferred method for cleaning drives. See Cleaning Cartridge Tracking on page 240 for information about how Media Lifecycle Management (MLM) manages the cleaning cartridges in the cleaning partition.

Note: Drive cleaning operations that are initiated by the storage management software cannot use the cleaning cartridges stored in a cleaning partition; the cartridges are not accessible to the storage management software.

When the drive is unloaded in response to a host request and the data cartridge is moved to its storage location, the library queries the drive to determine if it needs cleaning. If cleaning is required, the library delays notifying the host that the SCSI move command for the unloaded data cartridge is complete while it performs an automatic drive cleaning.

During the delay, the library retrieves a cleaning cartridge from the cleaning partition and inserts it into the drive. When the cleaning is complete, the library returns the cleaning cartridge to the cleaning partition and then notifies the host that the SCSI move command for the unloaded data cartridge is complete.

Automatic cleaning of drives does not occur more than once in any 12 hour period. If the next data cartridge load/unload cycle occurs within this 12 hour waiting period, a cleaning is not attempted unless the previous cleaning attempt failed due to an expired cleaning cartridge. When a cleaning fails, the cleaning is reattempted the next time the host unloads a data cartridge from the drive if the cleaning partition contains a good cleaning cartridge. If you want to clean the drive immediately after you receive the notification that a cleaning failed, you can initiate a manual cleaning (see Manually Cleaning a Drive on page 407).

Configuration Requirements for a Cleaning Partition and Auto Drive Clean

- Cleaning partitions do not count against the partition maximum.
- A cleaning partition can be shared by multiple storage partitions as long as the cleaning cartridges are compatible with the drive types in each storage partition.
- Cleaning partitions use any slots that are not licensed with a Capacity On Demand (CoD) key. If all of the slots are licensed, a cleaning partition uses any slots that are not already assigned to another partition.
- Configuring a cleaning partition and assigning it to one or more storage partitions automatically enables the Auto Drive Clean feature for those storage partitions (see Creating a Cleaning Partition on page 154 and Allocate Slots and Tape Drives on page 164).
- The drives in the storage partitions with an associated cleaning partition are cleaned automatically when a drive indicates that it needs cleaning. In addition, you can use the BlueScale user interface to initiate a manual cleaning. See Manually Cleaning a Drive on page 407.
- The option to perform a manual cleaning operation using a cleaning cartridge in a cleaning partition is only available for drives that are in storage partitions associated with a cleaning partition.

- The cleaning cartridges in the cleaning partition are inaccessible to the storage management software. If your storage management software supports automated drive cleaning and you plan to use this method to clean the drives, store one or more cleaning cartridges in the storage partition. The storage management software can then access the cleaning cartridges when needed.

Important If you store cleaning cartridges in the storage partition, make sure that they are identified as required by your storage management software to prevent the storage management software from attempting to use the cartridges for writing or reading data.

- If you do not configure a cleaning partition and associate it with the storage partitions, you must either use your storage management software to perform the cleaning or use the BlueScale user interface to manually move a cleaning cartridge to the drive that needs cleaning (see Manually Cleaning a Drive on page 407).
- If you configure a Global Spare drive for a partition, it is cleaned using a cleaning cartridge stored in the cleaning partition. If a cleaning partition is not associated with the storage partition, the Global Spare drive must be cleaned manually (see Manually Cleaning a Drive on page 407).

Configuring and Using Storage Partitions

- You can configure storage partitions either before or after you configure cleaning partitions. However, if you know that you want to use Auto Drive Clean with a storage partition, it is easier to configure the cleaning partition before you configure the storage partition.

  If you choose to create the storage partition before you create the cleaning partition, you later need to modify the storage partition to assign the cleaning partition to it (thereby enabling Auto Drive Clean for the partition).
- The library requires, at a minimum, one storage partition to be configured before you can use the library. Each storage partition must have a minimum of one slot assigned to it. Each storage partition must also have at least one drive assigned to it.
- By default, the library lets you create a single storage partition. If you need additional storage partitions, you must purchase a Shared Library Services (SLS) activation key.

  Notes:
  - Cleaning partitions do not require an SLS activation key and do not count toward the partition maximum.
  - The more partitions in a library, the longer each move can take. If move requests can be sent to several partitions at once, you may need to increase the timeout setting in your storage management software.

- When using multiple tape technology generations, Spectra Logic strongly recommends configuring separate partitions for each generation.
- When using a combination of Fibre Channel, SAS, and/or SCSI drives in the library, the drives using each interface must be in separate partitions.
- Partitioning is neither required nor recommended for configurations that have a mixture of full-height and half-height drives of the same generation and channel interface.
- Slots assigned to storage partition(s) count against the licensed capacity of the library.
- The robotic control path for each storage partition is provided either by a direct-attached Fibre Channel, SCSI, or SAS drive in the partition, or by an F-QIP.
  - You can configure a maximum of six physical exporters.
  - Drive exporters can be used for six different partitions or if you have LTO-5 and later generation drives, multiple exporters can be configured in the same partition. For example, if you configure a single partition with two exporting drives, you can only configure a maximum of four additional partitions.
  - An F-QIP can provide the robotic-control for up to 4 partitions.

PREPARING TO CONFIGURE PARTITIONS

Before you begin configuring partitions, gather the information listed in the following table.

Component	Description
Media type	Determine the type of media to be used in the partition. You can only select from media types that are compatible with the drives already installed in the library. If there are multiple drive technologies installed in the library, the media type you select determines the type of drive that can be used in the partition. Selecting a "Clean" media type starts the process of creating a cleaning partition for use with the specified media type. **Note:** Only one media type can be used in each partition.
Cleaning partition: number of slots	If you plan to use the Auto Drive Clean feature, determine the number of slots to be used for the cleaning partition. A cleaning partition can be shared by multiple storage partitions as long as the cleaning cartridges are compatible with the drives in the storage partitions.
Entry/Exit port	Determine if the E/E port uses standard, shared, or queued eject mode. See Allocate Slots and Tape Drives on page 164 for information about each configuration.

Component	Description
Storage partition: number of slots	Determine the number of slots to be used for the storage partition.
Drives assigned to the storage partition	Determine which drives to assign to the partition. Only drives that are already installed in the library and are compatible with the media type you select are available. Each storage partition must have at least one drive associated with it.
Global Spares	Determine which drives to designate as Global Spares if you plan to use this feature. See Assign Global Spare Drives on page 162 for detailed information about the requirements for using Global Spares. **Important:** If you plan to use one of the PostScan options that uses a Global Spare, one or more Global Spare drives must be configured for the partition.
PreScan and PostScan	Decide whether or not you want the library to scan the cartridges in the partition for media errors. See Using PreScan on page 256 and Using PostScan on page 257 for detailed information about the PreScan and PostScan features.
Encryption mode	Decide whether or not to encrypt data in the partition and what type of encryption and encryption key management to use. Depending on the version of BlueScale software, the Encryption screen does not display, or displays with all options grayed out, unless you are logged into the library as an encryption user and either created one or more BlueScale encryption keys, or configured a Spectra SKLM server. See the *Spectra Tape Libraries Encryption User Guide* for details.
Robotic control path	Decide on the exporting controller (tape drive(s) or F-QIP) for the library's robotics. **Important:** If the exporting controller is used by other partitions, wait for any moves in progress to complete, and make the controller offline to all host applications before creating a new partition. **Notes:** ▪ If you plan to select both ports on the exporting controller, make sure that the software used with the partition supports using multiple control paths and that the ports are cabled correctly. Selecting both ports provides redundancy, but requires software that supports two control paths to the robotics. ▪ The maximum number of exporters supported by the library is six. ▪ If you are using LTO-5 and later generation drives, you can select multiple drives as controllers and export the same changer interface over the drives to provide redundancy, as long as your storage management software can support this. These multiple paths cannot be used at the same time. Assigning multiple drive exporters to one partition may reduce the total number of partitions that can be configured in the library.

Component	Description
Controller port addressing	Decide what addressing mode and loop ID each port on the controller (F-QIP or exporting drive) uses. If you select soft addressing, each Fibre Channel port is assigned a unique address when it connects to the Fibre Channel arbitrated loop, fabric, or SAN. If you do not use soft addressing, each port uses the fixed Loop ID you set. **Note:** If F-QIPs are used to provide both the robotic control path and Fibre Channel connectivity for SCSI drives, you must configure the port addressing for both the exporting controller and the second F-QIP, if present (see Creating a Storage Partition Using Direct-Attached SCSI Drives on page 177).
Direct-attached Fibre Channel drive addressing	For each Fibre Channel drive, decide whether to use soft addressing or an assigned Loop ID. If you select soft addressing, each Fibre Channel port is identified by an address assigned to the drive when it connects to the Fibre Channel arbitrated loop, fabric, or SAN. If you do not use soft addressing, each port uses the fixed Loop ID you set.
SCSI IDs for direct-attached SCSI drives	If a partition uses direct-attached SCSI drives, each drive must be assigned a SCSI ID. The SCSI ID must be unique for the SCSI bus to which the drive is connected. Valid SCSI IDs on a wide SCSI bus are 0 – 15.
Drive visibility	If a partition includes SCSI drives with connectivity provided by an F-QIP, decide whether the drives connected to each F-QIP are visible (accessible) to external hosts through one or both of the F-QIP's Fibre Channel ports. **Note:** If you select both, make sure that the storage management software can handle server contention over drive use resulting from multiple paths to a drive.

CREATING A CLEANING PARTITION

The following sections describe using the BlueScale partition wizard to create a cleaning partition for your library.

If you know that you want to use Auto Drive Clean with a storage partition, it is easier to configure the cleaning partition before you configure the storage partition(s). If you choose to create the storage partitions before you create the cleaning partition, Auto Drive Clean is not enabled until you modify the storage partitions to assign a cleaning partition to them.

Note: If you want to configure the storage partitions first, skip to Creating a Storage Partition Using Direct-Attached Fibre Channel or SAS Drives on page 157.

Define the Initial Cleaning Partition Settings

1. Log in as a user with superuser or administrator privileges.

2. From the toolbar menu, select **Configuration ···⁘ Partitions** to display the Shared Library Services screen.

   - If one or more partitions are already created, the existing partitions are listed in alphabetical order. Click **New** to display the Name and Media Type screen.

     Note: If the **New** button is NOT displayed, then all slots in the library are allocated or the existing partition is configured for Standard Entry/Exit mode. You need to edit an existing partition to free up slots or change the Entry/Exit mode before you can create a cleaning partition.

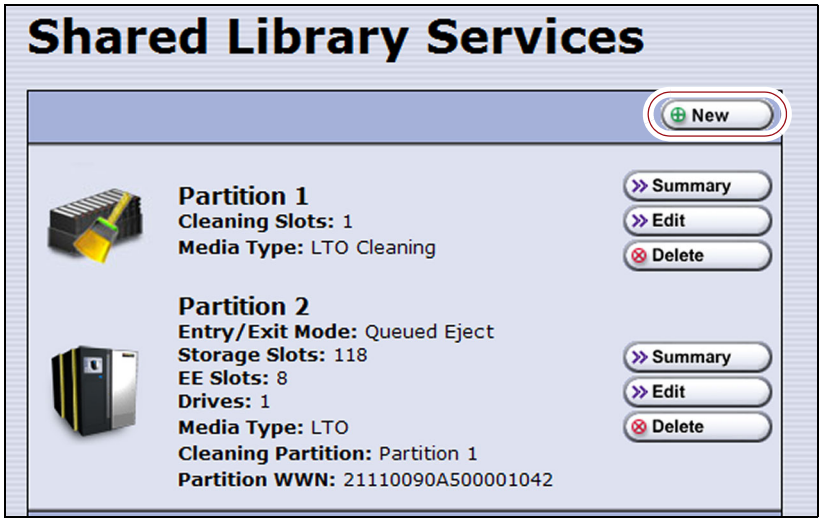


Figure 72 Click **New** on the Shared Library Services screen to begin creating the cleaning partition.

   - If the library does not currently have any partitions configured, select **Manually create a partition**, then click **New** to display the Name and Media Type screen.

Important Do not select the **Automatically create a partition** option. Doing so configures a storage partition using all of the licensed slots. You then need to modify the storage partition to make slots available for a cleaning partition.

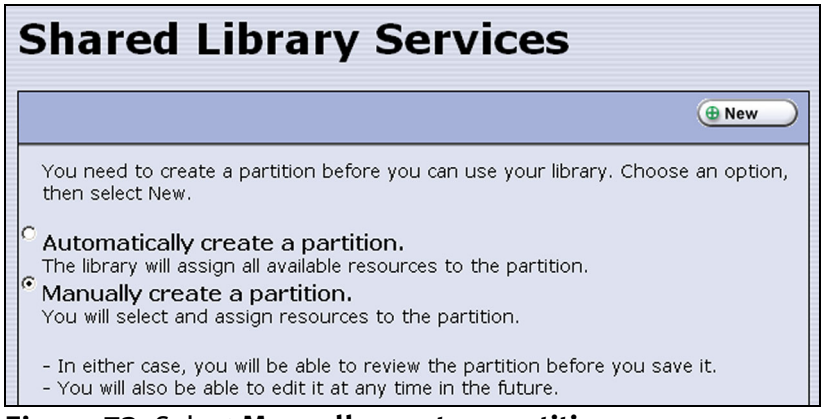


Figure 73 Select **Manually create a partition**.

3. Enter a name for the partition and select **LTO Clean** as the media type.

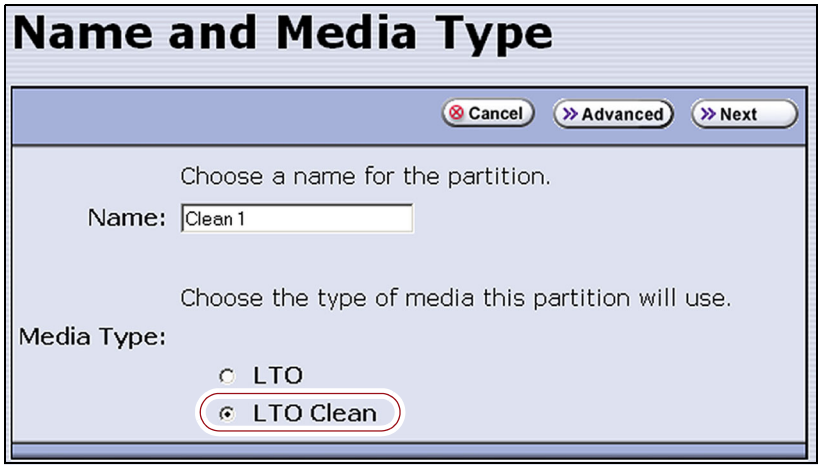


Figure 74 Enter a name for the partition and select **LTO Clean** to create a cleaning partition.

For this field...	Do the following...
Name	Enter a unique, descriptive name to identify the partition as a cleaning partition. Names can be any length and can include @ - _ /. and the space character. Partition names over 32 characters causes a scroll bar to display on some screens and are not recommended. **Note:** The default name for a cleaning partition is "Cleaning *n*", where *n* is a number. The partition names are listed alphabetically on many of the BlueScale screens. If you want the cleaning partitions to be listed after the storage partitions, precede the name with a "z" or "_".
Media Type	Select **LTO Clean** to create a cleaning partition.

Configure the Slots for the Partition

1. From the Name and Media Type screen, click **Next**. The Slots and Drives screen displays.

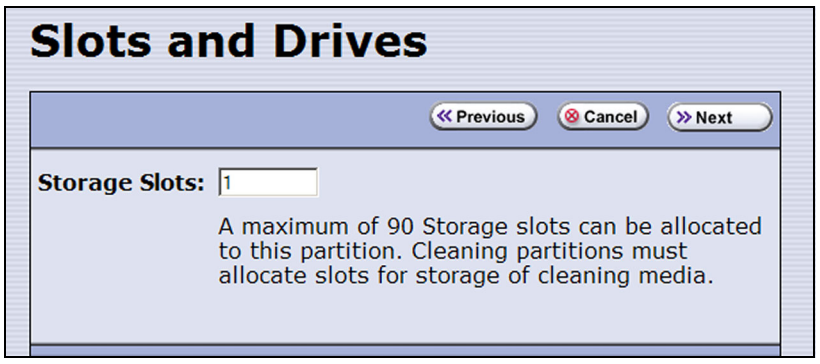


Figure 75 Specify the number of slots for the cleaning partition on the Slots and Drives screen.

2. Enter the number of slots you want to assign to the cleaning partition.
3. Proceed to Confirming and Saving the Partition Settings on page 191.

Creating a Storage Partition Using Direct-Attached Fibre Channel or SAS Drives

The following sections describe using the BlueScale partition wizard to create a new storage partition using direct-attached Fibre Channel or SAS drives. In this type of partition, the drives are directly attached to the Fibre Channel arbitrated loop or fabric. One or more drives in the partition provides the control path for SCSI motion commands issued by the host to control the robotics.

Notes:

- If you are using LTO-5 and later generation drives, you can select multiple drives as controllers and export the same changer interface over the drives to provide redundancy, as long as your storage management software can support this. These multiple paths cannot be used at the same time. Assigning multiple drive exporters to one partition reduces the total number of partitions that can be configured in the library.
- If you need to partition the library using direct-attached SCSI drives, see Creating a Storage Partition Using Direct-Attached SCSI Drives on page 177.
- If you need to partition the library using an F-QIP, see Creating a Storage Partition using F-QIP-Attached SCSI Drives on page 182.
- You cannot use F-QIP-attached SCSI drives and direct-attached Fibre Channel or SAS drives in the same partition.

Define the Initial Storage Partition Settings

You can select to either have the library automatically create a single storage partition that uses all of the available slots and drives or you can manually create storage partitions to your own specifications.

Important The drives you plan to use in the partition must be installed in the library before you start configuring the partition.

Important Components not configured in a partition may not display in the BlueScale interface for a few minutes after library initialization.

Automatically Create a Partition Use the following steps to use the BlueScale partition wizard to automatically create a single storage partition that uses all the slots that are licensed by the CoD key and all installed drives.

1. Log in as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Configuration ⋯⁘ Partitions** to display the Shared Library Services screen.
3. Select **Automatically create a partition** from the initial Shared Library Services screen (see Figure 73 on page 155) and click **New**.

   The option creates a single storage partition that uses all of the slots that are licensed by the CoD key and all installed drives.

   Notes:
   - This option is only available if all of the drives in the library are of the same type and there are currently no partitions, including cleaning partitions.
   - If you want to use Auto Drive Clean with the partition and the library does not contain any slots that are not licensed by the CoD activation key, you need to modify the partition after it is created to remove some of the slots assigned to it so that you can create a cleaning partition.
   - If you want to use the Global Spares option, you need to modify the partition after it is created to unassign one or more of the drives that were automatically assigned to the partition, and then reassign those drives as Global Spares.
   - If you want to use encryption with the partition, you need to modify the partition after it is created to enable encryption (see the *Spectra Tape Libraries Encryption User Guide*).
   - This option sets the Entry/Exit mode to Standard. If you plan to add another partition, you need to modify the automatically created partition to change the Entry/Exit mode to enable either Shared Entry/Exit or Queued Eject.

Manually Create a Partition Use the following steps to manually create the first storage partition in the library or to create additional storage partitions.

1. Log in as a user with superuser or administrator privileges. If you want to configure encryption in the partition, you must also log in as an encryption user (see the *Spectra Tape Libraries Encryption User Guide* for more details).

2. From the toolbar menu, select **Configuration ···⁘ Partitions** to display the Shared Library Services screen.

   - If one or more partitions already exist, the existing partitions are listed in alphabetical order. Click **New** to display the Name and Media Type screen.

     Note: If the **New** button is NOT displayed, then all slots in the library are allocated or the existing partition is configured for Standard Entry/Exit mode. You need to edit an existing partition to free up slots or change the Entry/Exit mode before you can create an additional partition.

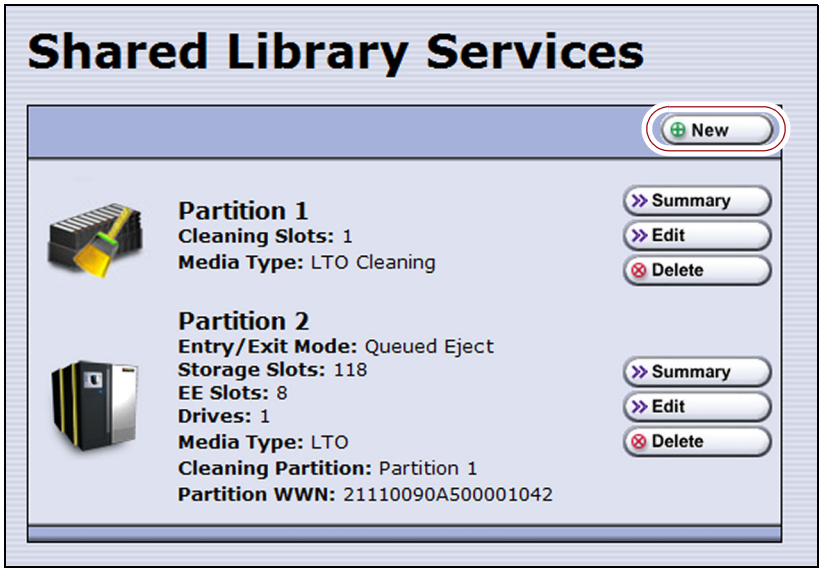


Figure 76 Click **New** on the Shared Library Services screen to begin creating the cleaning partition.

   - If the library does not currently have any partitions configured, select **Manually create a partition** and click **New** to display the Name and Media Type screen.

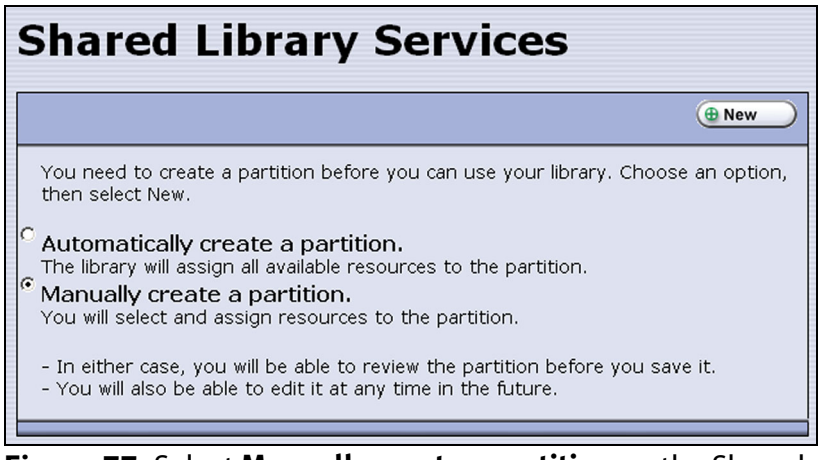


Figure 77 Select **Manually create a partition** on the Shared Library Services screen when there are no partitions.

3. Enter a name for the storage partition and select the media type.

   Note: If the storage partition media type is grayed out, then all licensed slots are assigned to partitions. Edit an existing partition to free up slots or purchase a Capacity on Demand key to increase the number of available slots.

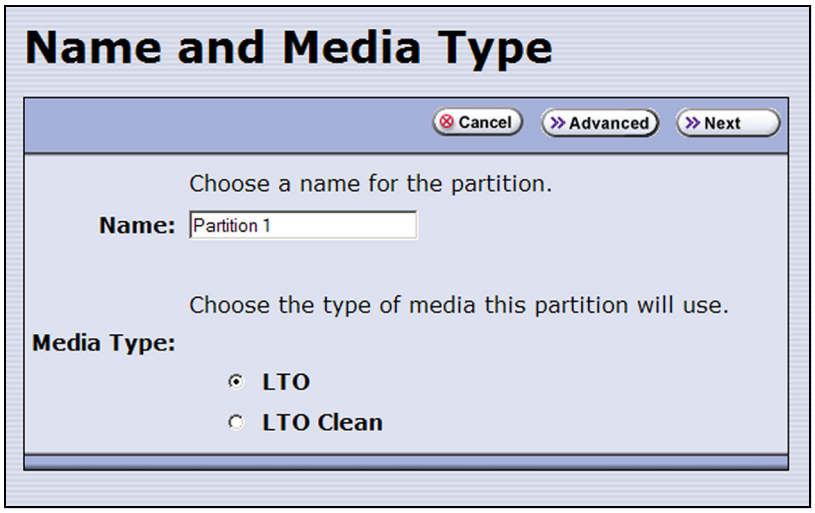


Figure 78 Enter a name for the partition and select the media type for the storage partition.

For this field...	Do the following...
Name	Enter a unique, descriptive name to identify the partition as a storage partition. Names can be any length and can include @ - _ /. and the space character. Partition names over 32 characters causes a scroll bar to display on some screens and are not recommended. The default name for a storage partition is Partition *n*, where *n* is a number. **Note:** In many of the BlueScale screens, the partitions are listed alphabetically. Keep this in mind when naming your partitions.
Media Type	Select **LTO** to create a storage partition that uses LTO drives and media. **Notes:** ▪ If your library contains a different drive technology, select the media type that corresponds to that drive technology. ▪ Select **LTO Clean** to create a cleaning partition (see Creating a Cleaning Partition on page 154).

Select the Robotic Control Path

One or more direct-attached drive in the partition is designated as the controller for the partition. This drive "exports" the partition to the hosts using the library, receiving and processing the robotic motion commands sent from the host to the robotics (see Robotics Connectivity on page 48).

Notes:

- For a partition using direct-attached drives, you can use any drive you plan to include in the partition as a controller.
- If you are using LTO-5 and later generation drives, you can select multiple drives as controllers and export the same changer interface over the drives to provide redundancy, as long as your storage management software can support this. These multiple paths cannot be used at the same time. Assigning multiple drive exporters to one partition reduces the total number of partitions that can be configured in the library.
- The maximum number of exporters supported by the library is six.
- Six drive exporters can be used for six different partitions, or multiple exporters can be configured in the same partition, reducing the maximum number of partitions.

1. From the Name and Media Type screen, click **Next**. The Robotic Control Path screen displays a list of the drives currently installed in the library.

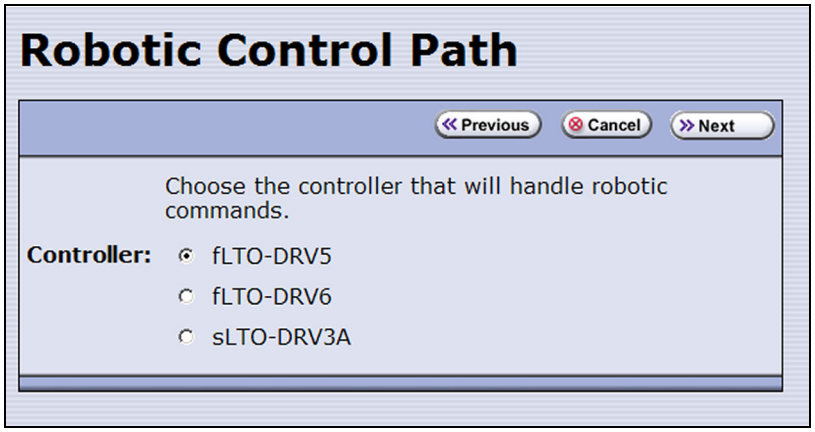


Figure 79 Select the exporting controller.

2. Select the drive(s) you want to use as the controller(s) and click **Next**.

Important If you select two different generations of drives to provide the robotic control path, then you are not able to assign a Global Spare to the partition because all of the drives in a partition with a Global Spare must match the technology generation of the Global Spare.

Important Do not select more than one drive to provide the robotic control path unless you know the storage management software can support this.

Assign Global Spare Drives

The Global Spare option lets you remotely substitute a working drive for a failed one using a spare drive in the library. Having a Global Spare drive in the library lets you continue your backup operations and replace the failed drive the next time you are physically present at the library. See Use the Global Spare Drive on page 349 for instructions on how to use the Global Spare drive in place of a failed drive.

Requirements Before you can configure the Global Spare option, the following requirements must be met:

- The partition must use direct-attached LTO Fibre Channel drives. The Global Spare feature is not available for use with other drive technologies.
- In addition to the drives assigned to the partition for use by the host software, the library must have direct-attached LTO Fibre Channel drives available for use as spares in the partition.
- All of the drives in a partition with a Global Spare must match the technology and generation of the Global Spare.
- The drives that are configured as Global Spares must be connected to the same Fibre Channel arbitrated loop or fabric as the drives they would replace. You may need to reconfigure your switch to access the Global Spare drive.

Partitions When configuring the partition, keep the following in mind:

- The type of drive you select as the Global Spare determines the type of drives that you can assign to the partition.
- The library prevents you from selecting drives that cannot be used as Global Spares, including drives already selected as controllers.
- Although a Global Spare drive can be shared by multiple partitions, the drive can only be used by one partition at a time. To ensure that each partition has access to a Global Spare when needed, configure one or more dedicated Global Spare drives for each partition.
- If drives of the required type are already installed, you can configure a drive as a Global Spare as part of the partition configuration process. If you do not currently have a drive that can be used as a Global Spare installed in the library, but install one later, you can edit the partition to configure Global Spares.

PostScan Requirements If you plan to use one of the MLM PostScan options that requires a Global Spare drive, you must configure at least one Global Spare drive for the partition.

Keep in mind that when the PostScan process starts, it "owns" the Global Spare drive it is using until all of the cartridges in the PostScan queue are processed (unless you pause the PostScan operation as described in Pause the PostScan Process on page 265). If a shared Global Spare drive is being used for PostScan it is not available for use as a spare. Configuring one or more dedicated Global Spare drives for each partition that uses PostScan is highly recommended.

Note: See Enable PostScan on page 262 for information about the PostScan feature.

Configuration Process Use the following steps to configure one or more Global Spare drives for the partition.

1. From the Robotic Control Path screen, click **Next**. The Spare Drives screen lists the drives that are available for use as Global Spares.

   If you do not want to configure spare drives, click **Next** again and skip to Allocate Slots and Tape Drives on page 164.

2. Select one or more of the available drives to be designated as spares. Drives that cannot be used as spares have grayed-out check boxes.

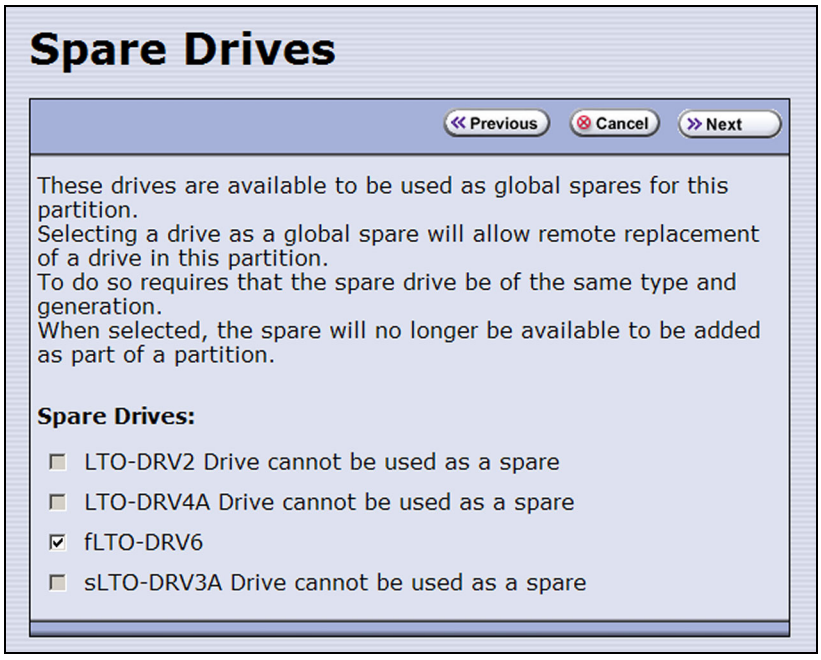


Figure 80 Select the drives you want to use as Global Spares.

Allocate Slots and Tape Drives

This section describes how the slots and drives are allocated to the partition. In addition, it describes how to configure the Entry/Exit mode for the partition.

Overview of Entry/Exit Modes

The Entry/Exit mode determines how the entry/exit port (E/E port) operates. When the mode is set to Standard, a single storage partition "owns" the entry/exit port; additional storage partitions cannot be configured.

Shared and Queued Ejects allow two or more partitions in the library to share the E/E port. When these modes are used, access to certain tapes and slots may be restricted and imports/exports may not be handled the way you expect.

For additional information about the Entry/Exit modes, log on to the portal (see Accessing the Technical Support Portal on page 435), open the Knowledge Base, and search for KBA-01770, *How do Shared IE and Queued Ejects function on the T120?*.

Standard Mode When the entry/exit port is set to Standard mode, the library's response to a Read Element Status (RES) command from the storage management software indicates that it has eight slots in the E/E port and that all of the slots are import-enabled, export-enabled, and accessible.

E/E Slot	Import-Enabled Bit	Export-Enabled Bit	Access Bit	Full Bit
1	Always set (allows use for tape imports)	Always set (allows use for tape exports)	Zero (0) when the E/E port is open (allows access by the storage management software)	Is set if a slot contains a tape, and cleared if a slot does not contain a tape
2				
3				
4				
5				
6				
7				
8				

The Full bit is set as appropriate, to indicate whether each slot has a cartridge in it. The storage management software has full import/export access to these slots at any time. All moves are physical moves to and from the E/E port slots, so the number of tapes that can be imported or exported by the software is limited by the physical capacity of the E/E port.

Shared Mode When the entry/exit port is set to Shared mode, the library's response to a Read Element Status (RES) command from the storage management software indicates that it has nine slots in the E/E port:

E/E Slot	Import-Enabled Bit	Export-Enabled Bit	Access Bit	Full Bit
1	Always set (allows use for tape imports)	Always cleared (exports to this slot are not allowed)	Is set ONLY for the selected partition during import operations.	Is set if a slot contains a tape, and cleared if a slot does not contain a tape
2				
3				
4				
5				
6				
7				
8				
9	Always cleared (imports from this slot are not allowed)	Always set (allows use for tape exports)	Always set (allow access by the storage management software)	Always cleared (the slot always appears empty)

- Slots 1 through 8 correspond to the physical slots in the E/E port and are import-only (the Import Enabled bit is set, but the Export Enabled bit is not). In addition, the slots have the Access bit cleared (access not allowed) until an import operation is initiated from the front panel of the library. When a front panel import operation is initiated for a partition, the Access bit for that partition is set, which enables access to the E/E port for import operations. The storage management software can then use the E/E port to import cartridges into the partition.

  Note: The Access bit is only set for the partition for which the import operation is requested. The E/E port remains inaccessible for any other partitions configured in the library.

- In addition to the eight physical slots, the E/E port has an additional virtual slot (slot 9), which is export-only (the Export Enabled bit is set, but the Import Enabled bit is not). In addition, the Access bit is always set, and the Full bit is always cleared. As a result, the response to an RES command indicates that slot 9 is always empty and available for export operations.

When the storage management software exports a cartridge, the cartridge remains in its current storage slot. No physical move occurs, although the library reports that the move is complete. The Exception bit for the slot where the cartridge is located is set to indicate that the slot is in an "abnormal" state. In addition, the Access bit for that slot is cleared to prevent the software from attempting to access the slot. Because the virtual export slot (slot 9) never contains a cartridge, the library continues to report that the slot is empty and available for use, regardless of the number of cartridges that are exported using this method.

When an Eject Queued Tapes operation is requested from the front panel, the exported cartridges are physically moved to the eight slots in the E/E port so that they can be removed from the library. After the cartridges are removed, all of the Exception bits that were set for the storage slots are cleared and the Access bits are set, making those slots once again accessible to the storage management software.

If the library is powered on with cartridges already in the E/E port, the cartridges are initially accessible by any partition, because the library does not know which partition should "own" them. In this case, selecting a partition and opening/closing the E/E port makes the cartridges accessible to the selected partition, just as with any import operation. A partition also gains ownership of the E/E port when you use the front panel to move cartridges to or from the E/E port.

Queued Eject Mode When the entry/exit port is set to Queued Eject mode, the library's response to a Read Element Status (RES) command from the storage management software indicates that it has only one export-only E/E slot.

E/E Slot	Import-Enabled Bit	Export-Enabled Bit	Access Bit	Full Bit
1	Always cleared (imports from this slot are not allowed)	Always set (allows use for tape exports)	Always set (allows access by the storage management software)	Always cleared (the slot always appears empty)

The single E/E slot is functionally identical to the virtual E/E slot in Shared mode. As with Shared Mode, the Exception bit is set and the Access bit cleared for any storage slots that contain cartridges that were exported.

When an Eject Queued Tapes operation is requested from the front panel, the exported cartridges are physically moved to the eight slots in the E/E port so that they can be removed from the library. After the cartridges are removed, all of the Exception bits that were set for the storage slots are cleared and the Access bits are set, making those slots once again accessible to the storage management software.

Because none of the slots in the E/E port are import-enabled, the only way to import cartridges into a partition is by using either a move queue or a bulk load command from the library front panel. This type of import operation does not automatically update the cartridge inventory maintained by the storage management software. Use the software to re-inventory the partition after the import operation is complete.

Configure the Slots, Drives, and Entry/Exit Mode

Use the following steps to allocate drives and storage slots for the partition and to configure how the E/E port is used.

Notes:

- Slots must first be licensed with a CoD activation key in order to be available for use in a partition. See Enter Activation Keys on page 87.
- Each storage partition must have a minimum of one slot and one drive assigned to it.
- Slots assigned to the cleaning partition are separate from the slots assigned to a storage partition.
- If a storage partition that has the Entry/Exit mode set to Standard mode already exists, you must modify the existing partition to change the Entry/Exit mode to enable either Shared Entry/Exit or Queued Eject.

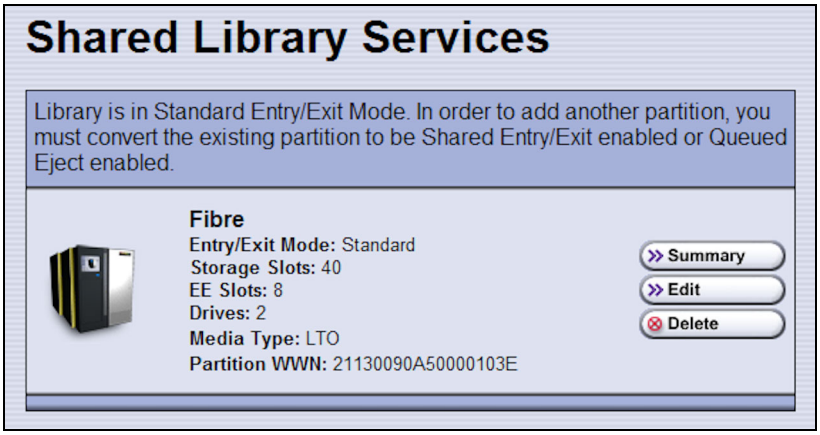


Figure 81 Shared Library Services screen for a single automatically generated partition.

Use the following steps to configure the slots, drives, and Entry/Exit mode.

1. From the Spare Drives screen, click **Next**. The Slots and Drives screen displays:

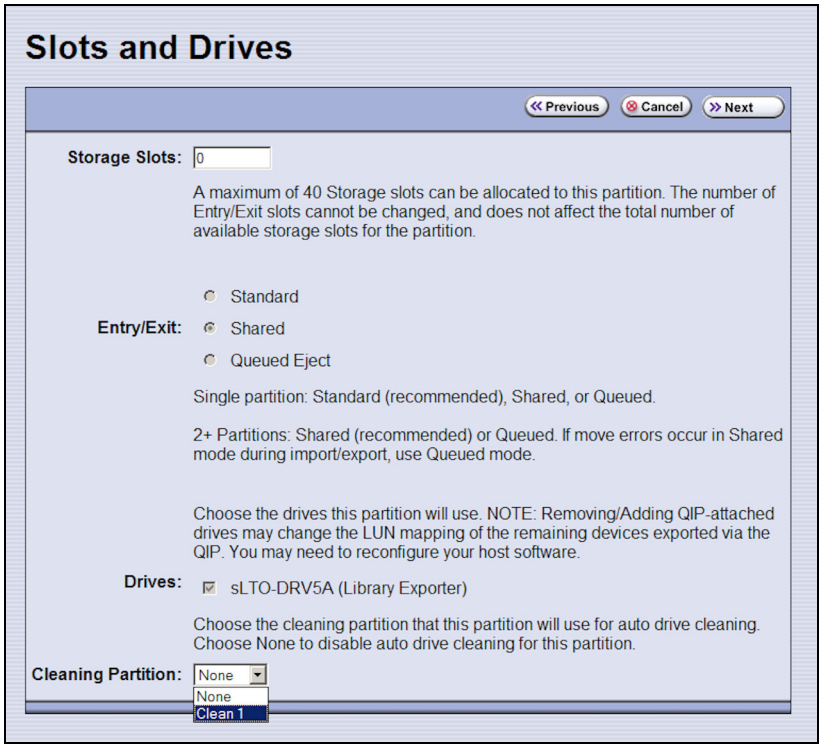


Figure 82 Enter the number of storage slots. Select the Entry/Exit mode, drives, and cleaning partition.

2. Complete the following information in the Slots and Drives screen.

For this field...	Do the following...
Storage Slots	Enter the number of slots to assign to this partition. **Notes:** ▪ If you plan to create multiple partitions, be sure to reserve enough slots to configure the other partitions. ▪ If you licensed all of the slots in the library and want to use a cleaning partition, you must subtract the number of slots you want to use for the cleaning partition from the total number of slots available for the storage partition. ▪ If you did not license all of the slots in the library, the unlicensed slots are available for use in cleaning partitions.
Entry/Exit	Select the appropriate E/E port mode. ▪ If you want the library to have only one storage partition, select **Standard** (recommended). ▪ If you plan to configure multiple storage partitions, select **Queued Eject** (recommended). **Note:** If you want to associate a cleaning partition with a storage partition, you must select Queued Eject.

For this field...	Do the following...
Drives	Select the drives to be dedicated to this partition. Drives that cannot be used in the partition have grayed out check boxes. Any drive already selected as a controller is automatically selected and cannot be cleared. **Important:** If you plan to use MLM to monitor media health, Spectra Logic strongly recommends that you configure LTO-4 and later generation drives in separate partitions and that you do not routinely share LTO-4 media between LTO-4 drives and later generation drives. This ensures the accuracy of the LTO-4 media health data (see Media Health Score on page 238). **Notes:** ▪ If you enabled Global Spares (see Assign Global Spare Drives on page 162), you can only select direct-attached Fibre Channel drives of the same generation as the Global Spare drive assigned to the partition. ▪ If you plan to mix multiple generations of cartridges in the same partition, make sure that the drives in the partition are compatible with every generation (see LTO Read/Write Compatibility on page 478 for compatibility information). ▪ Mixing drive types (Fibre Channel, SAS, or SCSI) in a partition is not allowed.
Cleaning Partition	Select the name of the cleaning partition to be used for the drives in the storage partition. Associating a cleaning partition with the storage partition enables the Auto Drive Clean feature for the partition. If you do not want to enable Auto Drive Clean or if you did not yet configure a cleaning partition, select **None**. **Note:** The option to select a cleaning partition is only available if you previously configured a cleaning partition that uses the same type of media as the storage partition (see Creating a Cleaning Partition on page 154). If you create a cleaning partition later, edit the storage partition to associate the cleaning partition with it.

Enable and Configure MLM PreScan and PostScan

When MLM is enabled, you can configure the partition to use the MLM PreScan and PostScan features. The available features depend on the drive type used in the partition. See Using PreScan on page 256 and Using PostScan on page 257 for information about these features.

Notes:
- MLM is enabled by default. If you want to use PreScan and PostScan but do not see the MLM Media Verification screen, check to see if MLM is disabled (see Enabling MLM and Configuring Global Settings on page 244).
- If your partition uses direct-attached SCSI drives or a drive technology other than LTO, skip to Select the Encryption Mode on page 173.

Drive Type	PreScan	PostScan			Drive Firmware Required
		FullScan	QuickScan	QuickScan with Global Spares	
LTO-4, Fibre Channel	**available**	**available**	**available**	**available**	97F9 or later
LTO-5, Fibre Channel	**available**	**available**	**available**	**available**	B170 or later
LTO-5, SAS	**available**	unavailable	**available**	unavailable	B170 or later
LTO-6, Fibre Channel	**available**	**available**	**available**	**available**	C9T4 or later
LTO-6, SAS	**available**	unavailable	**available**	unavailable	C9T4 or later
LTO-7, Fibre Channel	**available**	**available**	**available**	**available**	FA11 or later
LTO-7, SAS	**available**	unavailable	**available**	unavailable	FA11 or later
LTO-8, Fibre Channel	**available**	**available**	**available**	**available**	HB83 or later
LTO-8, SAS	**available**	unavailable	**available**	unavailable	HB83 or later
LTO-9, Fibre Channel	**available**	**available**	**available**	**available**	NCA1 or later
LTO-9, SAS	**available**	unavailable	**available**	unavailable	NCA1 or later

Use the following steps to configure PreScan and PostScan for the partition.

1. From the Slots and Drives screen, click **Next**. The MLM Media Verification screen displays.

   Note: If you do not want to use the PreScan and PostScan features, click **Next** again and skip to Select the Encryption Mode on page 173.

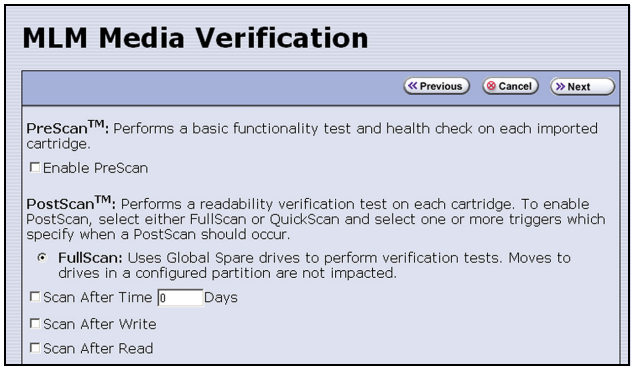


Figure 83 The Media Verification screen when the partition uses LTO-4 drives.

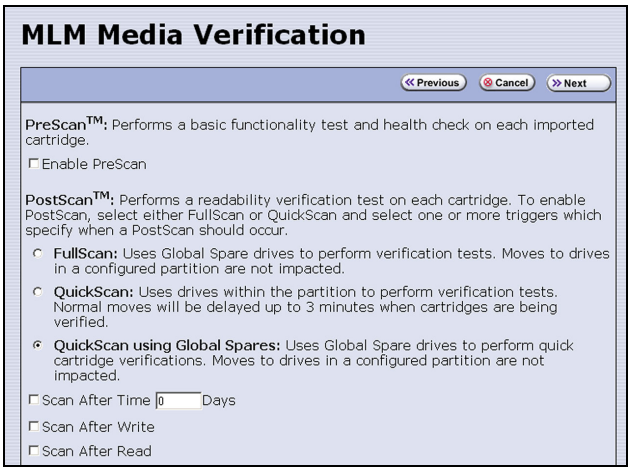


Figure 84 The Media Verification screen when the partition uses LTO-5 and later generation drives.

2. Enable and configure the PreScan and PostScan options for the partition.

   Notes:
   - Selecting any of the PostScan triggers automatically enables the selected PostScan option for the partition.
   - If you enable PostScan, the option for Spectra SKLM encryption is not available when you get to the Encryption screen.
   - The automatic PostScan operation configured on this screen only verifies MLM-enabled LTO cartridges. If your partition uses LTO cartridges that are not MLM-enabled, you must add them to the PostScan queue manually (see Request a Manual PostScan on page 262).

Select this option...	To...	Default
Enable PreScan	Enable the PreScan feature. When enabled, PreScan replaces the more basic Media Auto Discovery process. See Using PreScan on page 256 for information about this option.	Disabled (Cleared)
FullScan	Enable the FullScan feature. When enabled by selecting one or more PostScan triggers, FullScan uses a Global Spare drive assigned to the partition to verify all of the data on each cartridge. See Using PostScan on page 257 for information about this option. **Note:** FullScan is not available unless a Global Spare drive is configured for the partition.	Disabled (no PostScan triggers selected)

Select this option...	To...	Default
QuickScan	Enable the QuickScan feature. When enabled by selecting one or more PostScan triggers, QuickScan uses one of the drives in the partition to verify the data on a single wrap, from the beginning of the tape (BOT) to the end of the wrap or the end of recorded data (EOD), whichever comes first. See Using PostScan on page 257 for information about this option. **Note:** QuickScan is only available if the partition uses LTO-5 or later generation Fibre Channel drives.	Disabled (no PostScan triggers selected)
QuickScan using Global Spares	Enable the QuickScan using Global Spares feature. When enabled by selecting one or more PostScan triggers, QuickScan uses a Global Spare drive assigned to the partition to verify the data on a single wrap, from the beginning of the tape (BOT) to the end of the wrap or the end of recorded data (EOD), whichever comes first. See Using PostScan on page 257 for information about this option. **Notes:** ▪ QuickScan using Global Spares is not available if a Global Spare drive is not configured for the partition. ▪ QuickScan using Global Spares is only available if the partition uses LTO-5 or later generation Fibre Channel drives.	Disabled (no PostScan triggers selected)
PostScan Triggers	Enable PostScan and configure one or more triggers. ▪ **Verify After Time** — Add the cartridges in the partition to the automatic PostScan queue after the specified number of days pass since the last scan. Enter the number of days in the **Days** field. ▪ **Verify After Write** — Add a cartridge to the automatic PostScan queue each time data is written to it. ▪ **Verify After Read** — Add a cartridge to the automatic PostScan queue each time data is read from it. **Note:** Selecting any of these triggers automatically enables the selected PostScan option.	Disabled (All Cleared)

Select the Encryption Mode

Depending on the version of BlueScale software, the Encryption screen does not display, or displays with all options grayed out, unless you are logged into the library as an encryption user and either created one or more BlueScale encryption keys or configured a Spectra SKLM server.

Note: If you do not want to enable encryption for the partition you are configuring, click **Next** and proceed to Configure the Drive Fibre Channel Addressing on page 175.

Requirements You can enable BlueScale Encryption for the partition and assign an encryption key to it if the storage partition uses an LTO-4 or later generation tape drive and you created a BlueScale encryption key.

- If the storage partition uses LTO-5 or later generation drives and you configured a Spectra SKLM server, you can enable Spectra SKLM encryption key management for the partition.

Important To use Spectra SKLM encryption key management with your library, all LTO-5 drives in the encrypted partition must use firmware version C7RC or later. LTO-6 and later generations drives can use any firmware supported by the library.

Notes:
- See the *Spectra Encryption User Guide* for detailed instructions about configuring and using encryption in the library.
- Any options that are not supported for the partition you are currently configuring, are grayed out.
- If you are not logged in as an encryption user, or did not either create an encryption key or configure a Spectra SKLM server, proceed to Configure the Drive Fibre Channel Addressing on page 175. You can modify the partition to use encryption later, as described in this section.
- You can only use one type of encryption in a partition.
- Spectra SKLM key management and BlueScale encryption are not compatible with each other. Data encrypted using one type of encryption key management cannot be decrypted using another.
- If PostScan was enabled on the MLM Media Verification screen and Spectra SKLM Encryption cannot be selected.

Use the following steps to configure encryption in the partition.

1. On the Slots and Drives screen, click **Next**. The Encryption screen displays.

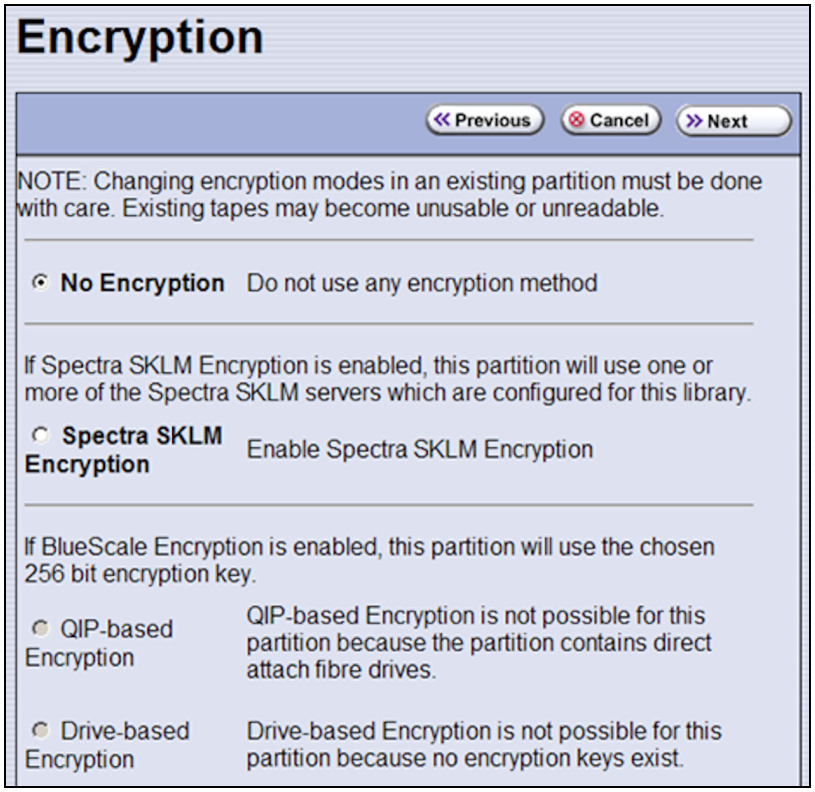


Figure 85 Select whether to use encryption in the partition.

2. Select the type of encryption you would like to enable:

   Note: See the *Spectra Tape Libraries Encryption User Guide* for detailed instructions.

Encryption Option	Description
No Encryption	Turns off encryption. None of the data in the partition is encrypted.
Spectra SKLM Encryption	Turns on Spectra SKLM Encryption key management for drive-based encryption using direct-attached LTO-5 and later generation drives. **Note:** If PostScan is enabled for the partition, do not select Spectra SKLM Encryption.
BlueScale Encryption: QIP-based	Turns on BlueScale Encryption key management for QIP-based encryption using F-QIP-attached, SCSI LTO-2, LTO-3, or LTO-4 drives. All key management tasks are performed through the BlueScale user interface. **Options**: ▪ **Enable Compression —** Turn on compression. ▪ **Enable Clear File at BOT —** Reserve a portion of the media at the beginning of the tape for unencrypted data. If you select this option, the tape headers are unencrypted so that any compatible drive can read the header information on an encrypted tape.

Encryption Option	Description
BlueScale Encryption: Drive-based	Turns on BlueScale Encryption key management for drive-based encryption using direct-attached LTO-4 and later generation drives. All key management tasks are performed through the BlueScale user interface. **Note:** If you have BlueScale Encryption Professional edition and multiple encryption keys configured on the library, select the primary key for the partition. This key is used when encrypting and decrypting data. Then, select none, one, or up to eight keys to be associated with the partition for decrypting data.

Configure the Drive Fibre Channel Addressing

For partitions containing Fibre Channel drives, the Fibre Channel Loop ID screen configures the Fibre Channel addressing used by each drive in the partition. In general, you want to select the same type of addressing for every drive in a partition.

1. From the MLM Media Verification screen or the Encryption screen, click **Next**. The Fibre Channel Loop ID's screen displays.

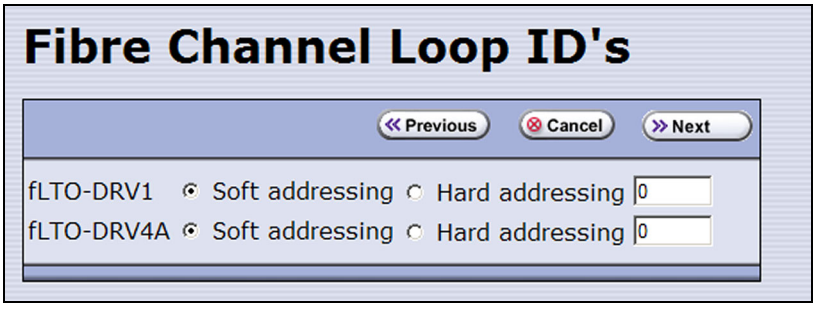


Figure 86 Select the type of addressing to be used by the Fibre Channel drives.

2. Select **Soft Addressing** or **Hard Addressing** for each of the drives listed.
   - The drives use soft addressing by default. A drive is assigned a soft address when it connects to the Fibre Channel arbitrated loop or fabric.
   - If you select **Hard Addressing**, enter a value between 0 and 125 in the text field. This value is the Loop ID used by the drive when it connects to the Fibre Channel arbitrated loop or fabric. The ID you enter must be unique for every device in the loop or fabric.

Notes:
- Spectra Logic recommends using soft addressing where possible for Fibre Channel drives.
- SAS tape drives do not have Loop IDs.

Specify the Partition Users

1. From the Fibre Channel Loop ID's screen, click **Next**. The Partition Users screen displays.

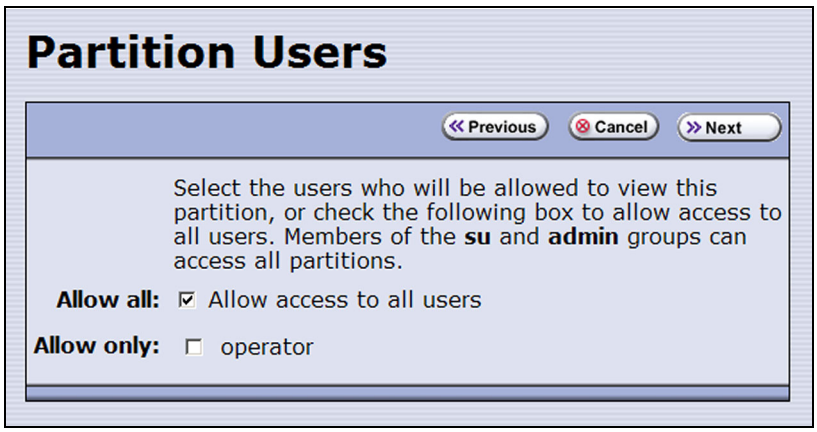


Figure 87 Select which users can access the partition.

2. Select the users who are allowed access to this partition. Only users who were previously configured can be selected (see Configuring Library Users on page 80).

   Notes:
   - All of the users who are configured with operator privileges are listed under **Allow only**. Select one or more of these users to enable partition-based security for operators.
   - If you did not configure additional Operator level users, you can do so later and then edit the partition to give them access.
   - Superusers and administrators always have full access to all partitions.

3. Proceed to Confirming and Saving the Partition Settings on page 191.

CREATING A STORAGE PARTITION USING DIRECT-ATTACHED SCSI DRIVES

The following sections describe using the BlueScale partition wizard to create a new storage partition using direct-attached SCSI drives.

Notes:
- If you need to partition the library using direct-attached Fibre Channel or SAS drives, see Creating a Storage Partition Using Direct-Attached Fibre Channel or SAS Drives on page 157.
- If you need to partition the library using an F-QIP, see Creating a Storage Partition using F-QIP-Attached SCSI Drives on page 182.

In this type of partition, one of the direct-attached SCSI drives in the partition provides the control path for SCSI motion commands issued by the host to control the robotics. Each drive in the partition is connected to a separate SCSI bus.

Important Spectra Logic does not support daisy-chaining LTO-4 SCSI drives. LTO-3 SCSI drives can be daisy-chained, but must be limited to two drives on a single SCSI bus. Daisy-chaining other devices on the same SCSI bus as a drive is not supported.

Important A direct-attached SCSI drive partition does not support Global Spares, the MLM PostScan feature, or Spectra SKLM encryption.

Define Initial Storage Partition Settings

For a step-by-step, detailed explanation of the steps in this section, see Define the Initial Storage Partition Settings on page 157.

Automatically Create a Partition. If you want the library to automatically create the storage partition, select **Automatically create a partition** from the initial Shared Library Services screen and then follow the prompts.

Manually Create a Partition. Use the following steps to manually create a direct-attached SCSI drive library storage partition:

1. Log in as a user with superuser or administrator privileges.
2. Select **Configuration** ⋯ **Partitions** to display the Shared Library Services screen. See Figure 73 on page 155.
3. Select **Manually create a partition** and click **New** to display the Name and Media Type screen.
4. Click **New** to display the Name and Media Type screen (see Figure 78 on page 160).
5. Enter a name for the storage partition and select the media type.

Select the Robotic Control Path

One direct-attached SCSI drive in the partition is designated as the controller for the partition. This controller "exports" the partition to the hosts using the library, receiving and processing the robotic motion commands sent from the host to the robotics.

Notes:
- Only drives corresponding to the media type you selected in the Name and Media Type screen (Figure 74 on page 156) are listed as potential controllers.
- You can use any drive you plan to include in the partition as the controller.
- An F-QIP cannot be configured for the purpose of providing the robotic control path in a partition with direct-attached drives.

1. From the Name and Media Type screen, click **Next**. The Robotic Control Path screen displays a list of the drives currently installed in the library.

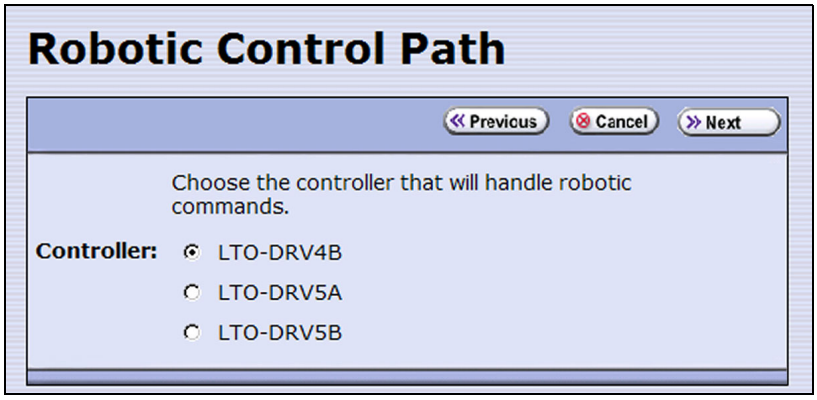


Figure 88 Select the drive that provides the control path for the robotics.

2. Select the drive that provides the control path for the robotics.

Allocate Slots and Tape Drives

For a step-by-step, detailed explanation, see Allocate Slots and Tape Drives on page 164.

1. From the Robotic Control Path screen, click **Next**. The Slots and Drives screen displays.
2. Complete the following information in the Slots and Drives screen.
   - **Storage Slots**: Enter the number of storage slots to assign to this partition.
   - **Entry/Exit**: Standard, Shared, or Queued.
   - **Drives**: Select the drives to be dedicated to this partition.
   - **Cleaning Partition**: Select the name of the cleaning partition to be used for the drives in the storage partition.

Enable PreScan

When MLM is enabled, you can configure the partition to use the MLM PreScan feature instead of the more basic Media Auto Discovery process. To take advantage of this feature, your drive must have the following drive firmware version, or later:

Drive Type	Drive Firmware required
Direct-Attached SCSI LTO-2	5AT0 or later
Direct-Attached SCSI LTO-3	93G0 or later
Direct-Attached SCSI LTO-4	97F9 or later

Note: PostScan is not available for direct-attached SCSI drives.

1. From the Slots and Drives screen, click **Next**. The MLM Media Verification screen displays.
2. If you want the library to use PreScan, select **Enable PreScan**.

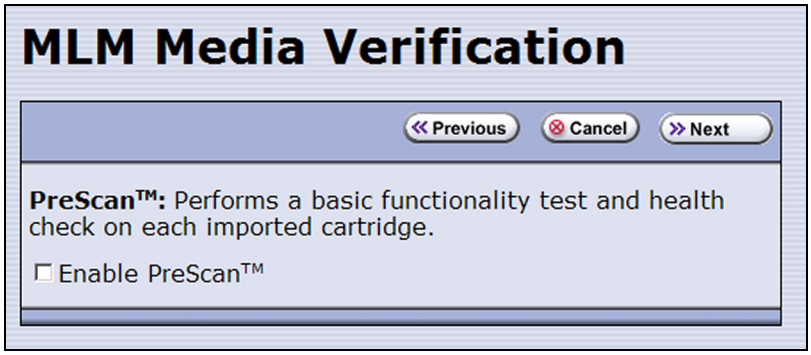


Figure 89 Select whether to enable PreScan for the partition.

3. Click **Next**.
   - If the SCSI IDs screen appears, proceed to Configure the Drive SCSI ID on page 181.
   - If the Encryption screen appears, you have the option of configuring encryption for the partition or clicking **Next** to navigate to the SCSI IDs screen.

Select the Encryption Mode

Note: If you do not want to enable encryption for the partition you are configuring, click **Next** and proceed to Configure the Drive SCSI ID on page 181.

Requirements You can enable BlueScale Encryption for the partition and assign an encryption key to it if the storage partition uses an LTO-4 direct-attached SCSI tape drive and you created a BlueScale encryption key.

Depending on the version of BlueScale software, the Encryption screen does not display, or displays with all options grayed out, unless you are logged into the library as an encryption user and have created one or more BlueScale encryption keys.

Notes:
- If you are not logged into the encryption feature or did not create an encryption key, proceed to Configure the Drive SCSI ID on page 181. You can modify the partition to use encryption later, as described in this section.
- LTO-2 and LTO-3 direct-attached drives do not support drive-based encryption. If you need to encrypt data using these drives, you must use them in an F-QIP-attached partition (see Creating a Storage Partition using F-QIP-Attached SCSI Drives on page 182).
- Spectra SKLM encryption is incompatible with LTO-4 or earlier generation drives.
- See the *Spectra Encryption User Guide* for detailed information about configuring and using encryption in the library.

Use the following steps to configure encryption for the partition.

1. From the Slots and Drives screen, click **Next**. The Encryption screen displays.

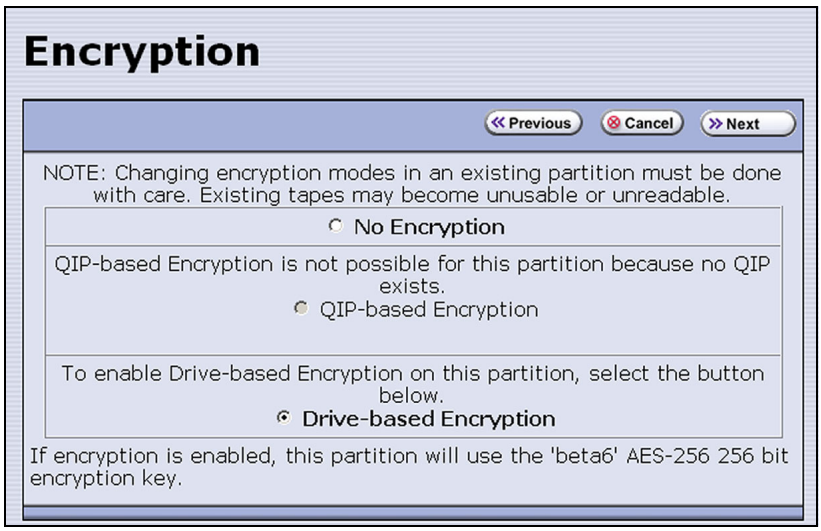


Figure 90 Select whether to use encryption in the partition.

2. Select the type of encryption you would like to enable:

Encryption Option	Description
No Encryption	Turns off encryption. None of the data in the partition is encrypted.
BlueScale Encryption: QIP-based	QIPs are not supported in direct-attached SCSI drive partitions and QIP-based encryption cannot be selected.
BlueScale Encryption: Drive-based	Turn on BlueScale Encryption key management for drive-based encryption using direct-attached SCSI LTO-4 drives. All key management tasks are performed through the BlueScale user interface. **Note:** If you have BlueScale Encryption Professional edition and multiple encryption keys configured on the library, select the primary key for the partition. This key is used when encrypting and decrypting data. Then, Select none, one, or multiple additional keys to be associated with the partition for decrypting data. A maximum of eight decryption keys can be assigned to one partition.

3. Click **Next**.

Configure the Drive SCSI ID

The SCSI ID for each drive determines how the drive is addressed on the SCSI bus.

1. From the MLM Media Verification screen, click **Next**. The SCSI ID's screen displays.

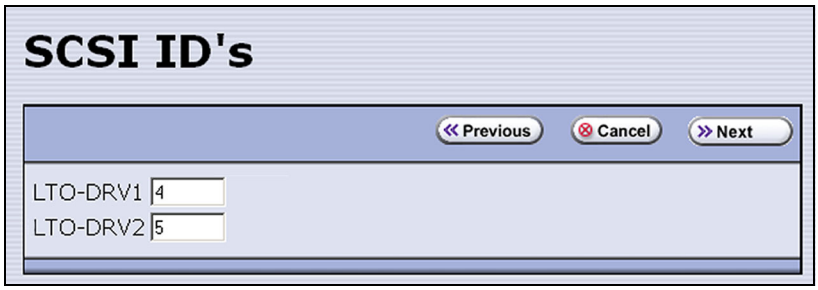


Figure 91 Enter a SCSI ID for each drive in the partition.

2. Enter a **SCSI ID** for each drive.

   Each device on the SCSI bus must have a unique SCSI ID. SCSI IDs can range from 0 to 15 on a wide SCSI bus.

Important Make sure that the SCSI IDs you specify are not assigned to other devices on the same SCSI bus. Assigning the same SCSI ID to multiple devices on the same SCSI bus causes communication problems on the bus.

Specify the Partition Users

1. From the SCSI ID's screen, click **Next**. The Partition Users screen displays (see Figure 87 on page 176).
2. Select the users who are allowed access to this partition. Only users that were previously configured can be selected (see Configuring Library Users on page 80).

   Notes:
   - All of the users who are configured with operator privileges are listed under **Allow only**. Select one or more of these users to enable partition-based security for operators.
   - If you did not configure additional Operator level users, you can do so later and then edit the partition to give them access.
   - Superusers and administrators always have full access to all partitions.
3. Proceed to Confirming and Saving the Partition Settings on page 191.

CREATING A STORAGE PARTITION USING F-QIP-ATTACHED SCSI DRIVES

The following sections describe using the BlueScale partition wizard to create a new storage partition using F-QIP-attached SCSI drives.

Notes:
- If you want to use direct-attached drives, see Creating a Storage Partition Using Direct-Attached SCSI Drives on page 177.
- If your library uses E-QIPs to provide network connectivity, refer to the documentation that accompanied your library when you received it for information about configuring E-QIP-based storage partitions.

Important QIPs are only supported as legacy devices. They are no longer available for purchase.

Define Initial Storage Partition Settings

For a step-by-step, detailed explanation, see Define the Initial Storage Partition Settings on page 157.

Automatically Create a Partition If you want the library to automatically create the storage partition, select **Automatically create a partition** from the initial Shared Library Services screen and then follow the prompts.

Manually Create a Partition Use the following steps to manually create an F-QIP controlled library storage partition:

1. Log in as a user with superuser or administrator privileges.
2. Select **Configuration** ···⁘ **Partitions** to display the Shared Library Services screen (see Figure 73 on page 155).
3. Select **Manually create a partition** and click **New** to display the Name and Media Type screen.
4. Click **New** to display the Name and Media Type screen (see Figure 78 on page 160).
5. Enter a name for the storage partition and select the media type.

Select the Robotic Control Path

One F-QIP in the partition is designated as the controller for the partition. This controller "exports" the partition to the hosts using the library, receiving and processing the robotic motion commands sent from the host to the robotics.

1. From the Name and Media Type screen, click **Next**. The Robotic Control Path screen displays a list of the controllers currently installed in the library.

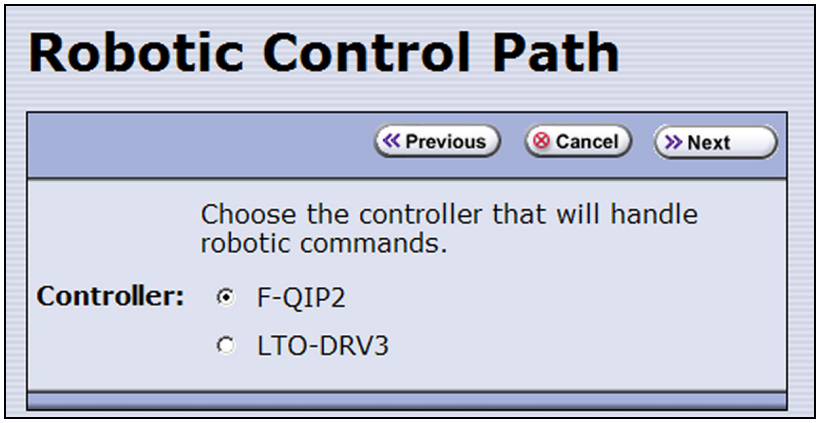


Figure 92 Select the F-QIP that provides the control path for the robotics.

2. Select the controller that provides the control path for the robotics.

Allocate Slots and Tape Drives

For a step-by-step, detailed explanation, see Allocate Slots and Tape Drives on page 164.

1. From the Robotic Control Path screen, click **Next**. The Slots and Drives screen displays.
2. Complete the following information in the Slots and Drives screen.
   - **Storage Slots**: Enter the number of storage slots to assign to this partition.
   - **Entry/Exit**: Standard, Shared or Queued.
   - **Drives**: Select the drives to be dedicated to this partition.
   - **Cleaning Partition**: Select the name of the cleaning partition to be used for the drives in the storage partition.

Enable PreScan

When MLM is enabled, you can configure the partition to use the MLM PreScan feature instead of the more basic Media Auto Discovery if the drives in the partition meet the following requirements.

Drive Type	Drive Firmware required
F-QIP-Attached SCSI LTO-3	93G0 or later
F-QIP-Attached SCSI LTO-4	94D0 or later

1. From the Slots and Drives screen, click **Next**. The MLM Media Verification screen displays.
2. If you want the library to use PreScan, select **Enable PreScan** (see Figure 89 on page 179).
3. Click **Next**.
   - If the Partition Users screen appears, proceed to Specify the Partition Users on page 186.
   - If the Encryption screen appears, you have the option of configuring encryption for the partition or clicking **Next** to navigate to the Partition Users screen.

Select the Encryption Mode

Note: If you do not want to enable encryption for the partition, click **Next** and proceed to Specify the Partition Users on page 186.

Requirements. You can enable BlueScale Encryption for the partition and assign an encryption key to it if the storage partition is using LTO-2, LTO-3, or LTO-4 F-QIP-attached SCSI drives, and you created a BlueScale encryption key.

Depending on the version of BlueScale software, the Encryption screen does not display, or displays with all options grayed out, unless you are logged into the library as an encryption user and have created one or more BlueScale encryption keys.

Notes:

- If you are not logged into the encryption feature or did not create an encryption key, proceed to Specify the Partition Users on page 186. You can modify the partition to use encryption later, as described in this section.
- The encryption performed by encryption-enabled LTO-4 and later generation tape drives is not compatible with the encryption performed by an encryption-enabled F-QIP.
- Spectra SKLM encryption is incompatible with LTO-4 and earlier drives.
- See the *Spectra Encryption User Guide* for detailed information about configuring and using encryption in the library.

Use the following steps to configure encryption for the partition.

1. From the Slots and Drives screen, click **Next**. The Encryption screen displays.

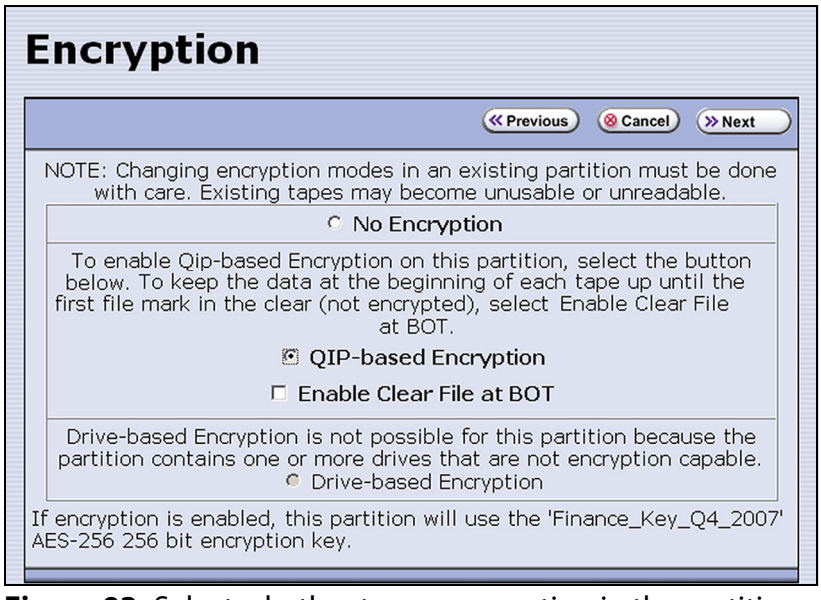


Figure 93 Select whether to use encryption in the partition.

2. Select the type of encryption you would like to enable:

Type	Configures the partition to...
No Encryption	None of the data in the partition is encrypted. This is the default setting.
BlueScale Encryption: QIP-based	Turn on BlueScale Encryption key management for F-QIP-based encryption using F-QIP-attached SCSI LTO-2, LTO-3, or LTO-4 drives. All key management tasks are performed through the BlueScale user interface. **Options**: ▪ **Enable Compression** Turn on compression. ▪ **Enable Clear File at BOT** Reserve a portion of the media at the beginning of the tape for unencrypted data. If you select this option, the tape headers are unencrypted so that any compatible drive can read the header information on an encrypted tape.
BlueScale Encryption: Drive-based	The drive-based encryption option is not supported for F-QIP-attached SCSI drives.

3. Click **Next**.

Specify the Partition Users

1. From the MLM Media Verification screen, click **Next**. The Partition Users screen displays (see Figure 87 on page 176).
2. Select the users who are allowed access to this partition. Only users that were previously configured can be selected (see Configuring Library Users on page 80).

Notes:
- All of the users who are configured with operator privileges are listed under **Allow only**. Select one or more of these users to enable partition-based security for operators.
- If you did not configure additional Operator level users, you can do so later and then edit the partition to give them access.
- Superusers and administrators always have full access to all partitions.

Configure the Robotic Path Visibility

Robotic path visibility determines whether one or both of the Fibre Channel ports on the exporting controller (F-QIP) provide the robotic control path to the robotics.

Notes:
- Selecting both ports provides a redundant connection to the robotics, but requires software that supports two control paths to the robotics.
- The WWPN of the Fibre Channel port on the exporting controller is used as the WWN for the partition. See World Wide Names for Fibre Channel Partitions on page 51 for detailed information about the relationship between the Fibre Channel port on the exporting controller and WWNs for partitions.

1. From the Partition Users screen, click **Next**. The Robotic Path Visibility screen displays.
2. Select the port(s) to activate for robotic control on the controller.

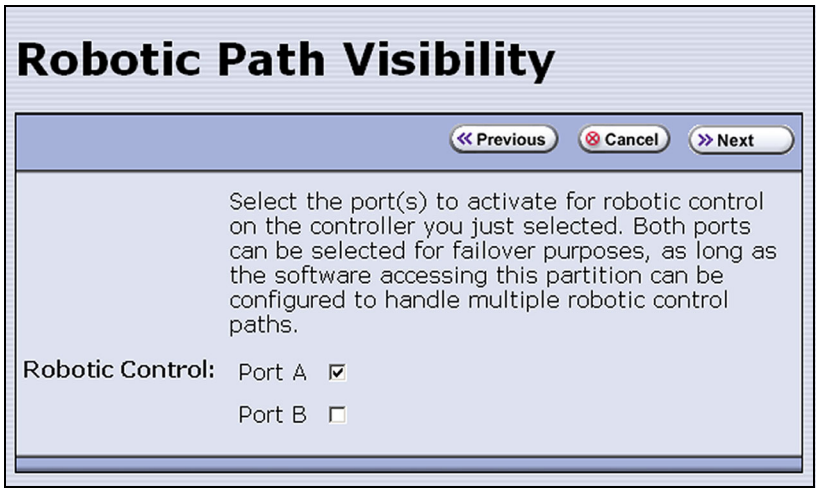


Figure 94 Select the port on the F-QIP that is used to communicate with the robotics.

3. From the Robotic Path Visibility screen, click **Next**. The Drive Visibility screen displays.

4. Select the port(s) through which each drive is visible to the outside world.

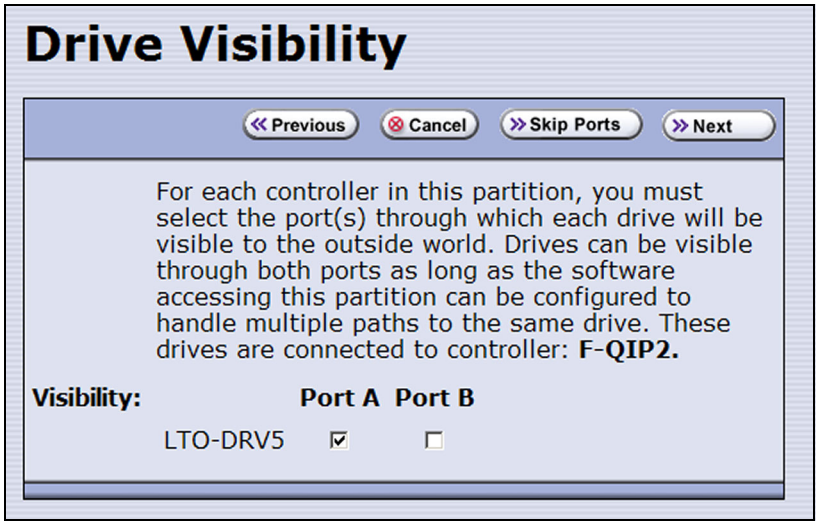


Figure 95 Select the port on the F-QIP that is used to communicate with each drive in the partition.

Configure the Port Addressing for the Exporting Controller

The F-QIP you selected to provide the robotic control path for the robotics is said to "export" the partition to the host. In this context, the F-QIP is referred to as the exporting F-QIP. See Robotics Connectivity on page 48 for additional information.

Each F-QIP can provide connectivity for up to four SCSI drives. If your library contains more than four drives, you need two F-QIPs.

Notes:
- The port addresses for the exporting controller (F-QIP) also apply to any drives connected to that F-QIP.
- When one or more of the drives in the partition are connected to the second F-QIP, a separate F-QIP Settings screen configures the port addresses for any drives in the partition that are connected to both F-QIPs. The settings for each F-QIP must be configured separately.

If you previously configured the F-QIP settings for both of the F-QIPs and do not want to make any configuration changes, click **Next** on the F-QIP Configuration screen to proceed to Confirming and Saving the Partition Settings on page 191.

Use the following steps to configure the port addressing for the exporting controller and the second F-QIP, if present.

1. From the Drive Visibility screen, click **Next**. The Exporting F-QIP Configuration screen displays.

Notes:
- An F-QIP can be the exporting controller for up to eight partitions. If this is the case, a confirmation screen displays to warn you that any changes you make are applied to all partitions associated with the exporting controller.
- If the partition uses both F-QIPs and you already configured the exporting F-QIP, the F-QIP Configuration screen displays instead of the Exporting F-QIP Configuration screen.

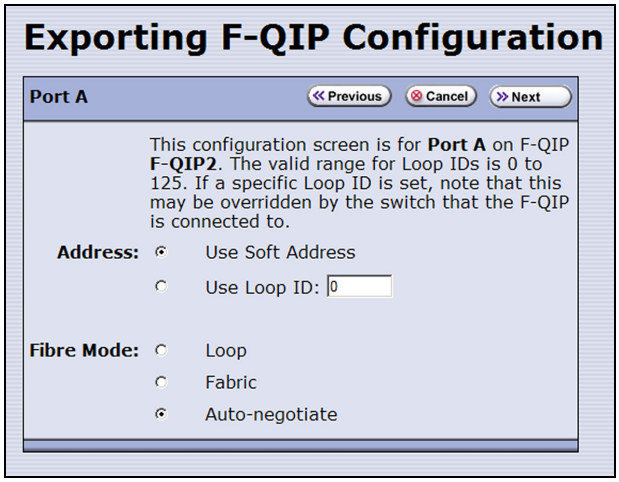


Figure 96 The Exporting F-QIP Configuration screen for robotics.

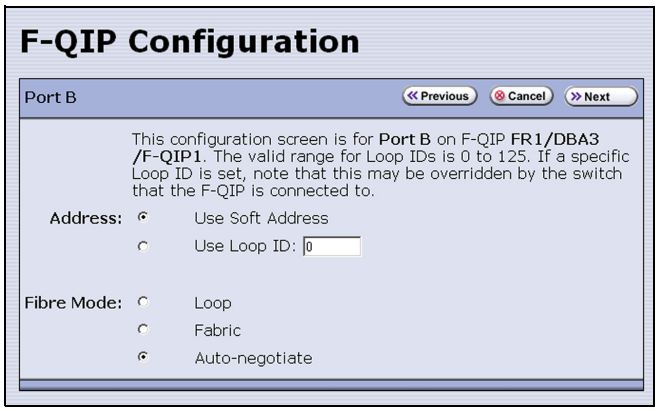


Figure 97 The F-QIP Configuration screen for SCSI drives connected to the second F-QIP.

2. Select one of the following combinations for the **Address** and **Fibre Mode**:
   - **Use Soft Address** and **Fabric**.
   - **Use Soft Address** and **Auto-negotiate**.
   - **Use Loop ID** and **Loop**. The Loop ID must be between 0 and 125.
   - **Use Loop ID** and **Auto-negotiate**. The Loop ID must be between 0 and 125.

Note: If you select **Loop** as the Fibre Mode, the Fibre Channel switch to which the exporting controller is connected may override your settings.

3. If necessary, configure any additional F-QIP ports.

If...	Then...
▪ All of the drives in the partition are connected to the exporting F-QIP, —AND— You only selected one port on the Robotic Path Visibility screen, —AND— You selected the same port on the Drive Visibility screen, —OR— ▪ You already configured all Fibre Channel ports,	Proceed to Confirming and Saving the Partition Settings on page 191.
▪ All of the drives in the partition are connected to the exporting F-QIP, —AND— You selected both ports on the Robotic Path Visibility screen or the Drive Visibility screen, —OR— ▪ You selected different ports on the Robotics Visibility and Drive Visibility screens,	**1.** Repeat the configuration steps in this section to configure the other Fibre Channel port on the exporting controller. **2.** After you finish configuring the second port, proceed to Confirming and Saving the Partition Settings on page 191.
Some or all of the drives in the partition are not connected to the exporting F-QIP,	**1.** Repeat the configuration steps in this section to configure the ports on the F-QIP(s) used to provide connectivity for the drives. **2.** After you finish configuring the second port, proceed to Confirming and Saving the Partition Settings on page 191.

CONFIRMING AND SAVING THE PARTITION SETTINGS

After you finish configuring a partition, confirm and save the partition settings to complete the creation process.

Note: If you want to save the configuration to a USB device, connect the device to the USB port on the LCM (see Connect a USB Device to the Library on page 146) and allow time for the device to mount before continuing.

1. After you complete the configuration screens for the partition as described in the previous sections, click **Next**. The Save Library Configuration screen displays.

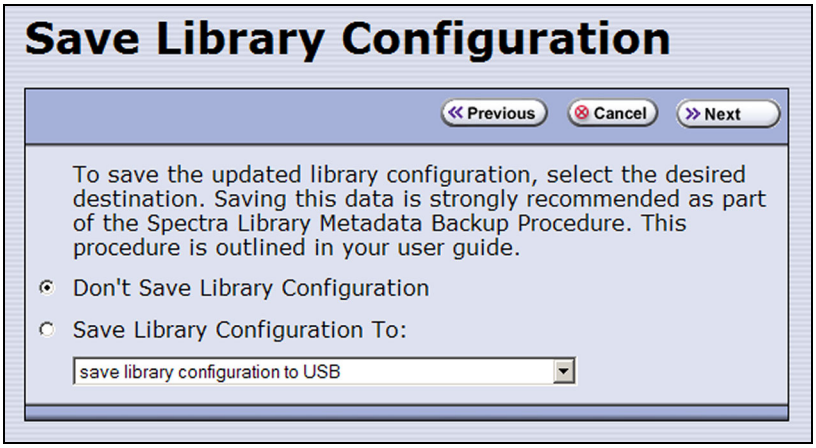


Figure 98 The Save Library Configuration screen.

2. Select whether you want to save the current library configuration.
   - **Don't Save Library Configuration** — A backup of the changed library configuration is not saved.
   - **Save Library Configuration To** (highly recommended)—Saves a backup of the library configuration to the selected destination. Using this option is highly recommended to ensure that you can easily restore the library configuration, if necessary.

     Select whether to save the library configuration file to a USB device or to email it to an already-configured mail recipient (see Configure Mail Users on page 99).

   Note: Do not use the default *autosupport@spectralogic.com* email recipient. Spectra Logic does not save emailed configuration files unless they are specifically requested for troubleshooting.

3. Click **Next**. The Save Partition screen displays.

   Note: The Save Partition screen on your library may be different from the one shown in Figure 99 or Figure 100. The information on this screen varies depending on the type of partition you configured and the options you chose.



Figure 99 The Save Partition screen for a cleaning partition.

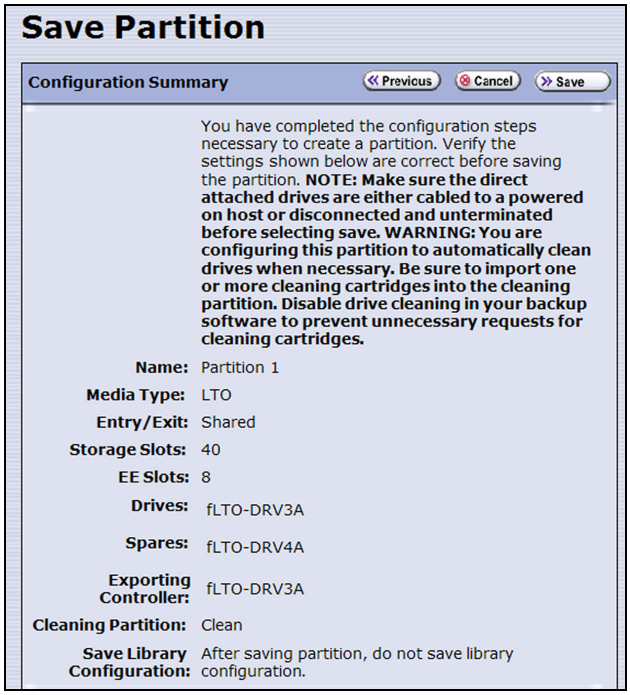


Figure 100 The Save Partition screen for a storage partition that uses a Global Spare and a cleaning partition.

4. Review the information on the screen and confirm that all settings are correct for this partition's configuration.
   - If the configuration information is correct, proceed to Step 5.
   - If the configuration information is not correct, do one of the following:
     - Click **Previous** to move backward through the configuration screens until you reach the settings that need to be corrected. Make any necessary corrections, then click **Next** to move forward through the screens and return to the Save Partition screen.

       Note: If the screen requiring the correction is toward the beginning of the configuration process, it may be easier to click **Cancel** and repeat the entire configuration process.

       As you move backward through the configuration screens, the values are reset to their default values. After you reach the desired screen and make the necessary changes, advance through the screens and re-enter the necessary information.

     - Click **Cancel** to configure the partition again from the beginning.

5. Click **Save**. The library requires several minutes to store the configuration information, after which the Shared Library Services screen redisplays with the partition you just created added to the list of partitions.



Figure 101 The Shared Library Services showing a cleaning partition and storage partition.

Notes:
- If you assigned a cleaning partition to the storage partition, the partition icon changes as shown in Figure 101.
- When you save the partition, the library automatically generates a configuration backup file and saves it to the memory card in the LCM. This backup file contains the library configuration, the MLM and DLM databases, and any BlueScale encryption keys that are currently stored in the library.
- If you configured the email option for the automatically generated backup file, the library sends an email with the backup file attached to the specified recipient (see Enable Email for the Auto Configuration Save File on page 101).

6. To configure another storage partition, repeat the entire configuration process, beginning with:
   - Creating a Storage Partition Using Direct-Attached Fibre Channel or SAS Drives on page 157

     —OR—
   - Creating a Storage Partition Using Direct-Attached SCSI Drives on page 177

     —OR—
   - Creating a Storage Partition using F-QIP-Attached SCSI Drives on page 182
7. To configure another cleaning partition, repeat the entire configuration process, beginning with Creating a Cleaning Partition on page 154.

MODIFYING AN EXISTING PARTITION

Overview This section describes how to edit or modify an existing partition. You might want to modify an existing partition for any of the following reasons:

- **Assign a Cleaning Partition**—If you created a cleaning partition and now want to assign it to the storage partition, you need to modify the Slots and Drives screen for the storage partition to add the cleaning partition.
- **Change E/E port operation mode**—If you need to convert a Standard mode partition to either Shared Entry/Exit or Queued Eject mode so that you can create multiple partitions.
- **Assign a Global Spare Drive**—If you want to designate one of the installed drives as a Global Spare, you need to modify the Spare Drives screen to assign the drive to the partition.
- **Create a New Cleaning or Storage Partition**—If you previously created one or more partitions that use all of the available slots in the library, and now want to create and use a new partition, you need to reduce the number of slots assigned to an existing partition to provide the slots needed for the new partition. If you want to create a storage partition, you may also need to install additional drives or unassign drives that were previously assigned to other partitions.
- **Rename Partition**—If you want to rename the partition, you need to modify it in the Name and Media Type screen.
- **Disable PreScan or Change the PostScan Settings**—If you want to change the settings that you chose (to take advantage of a new Global Spare drive, for example), you need to select a different setting in the MLM Media Verification screen.
- **Enable or Disable Encryption**—If you need to modify encryption settings for the partition, you need to log in as an encryption user and make the necessary changes.

Preparation Before making changes to an existing partition, review the information at the beginning of this chapter to be sure that you address any requirements (see Partition Types and Requirements on page 148). In addition, address the following recommendations and requirements:

- Spectra Logic strongly recommends backing up the library configuration, either to a USB device or as an attachment to an email sent to a previously configured mail recipient, before you make changes.
- When reducing the number of slots assigned to a partition, physically export any cartridges in those slots, as described in Importing and Exporting Cartridges on page 204, *before* you remove slots from the partition.

Important By default, the library deletes empty slots from a partition first. However, if all of the slots are full, the library is forced to delete populated slots. When this happens, the cartridges in the deleted slots are no longer accessible through BlueScale or the storage management software. You must add the slots to either a new or an existing partition before the cartridges can be accessed again.

Auto Configuration Save When you make a change to a partition, the library generates an auto-configuration save file and saves it to the memory card in the LCM. If you configured the email option for the Auto Configuration Save file, an email containing the updated library configuration, as well as the MLM and DLM databases, are sent to the specified recipient (see Enable Email for the Auto Configuration Save File on page 101).

Note: Do not use the default *autosupport@spectralogic.com* email recipient. Spectra Logic does not save emailed configuration files unless they are specifically requested for troubleshooting.

Modify a Partition Use the following steps to modify an existing partition.

1. Log into the library as a user with superuser or administrator privileges.
2. Select **Maintenance** ⋯ **MLM** to display the Media Lifecycle Management Tools screen. If Media Auto Discovery, PreScan, or PostScan is running (as indicated by the presence of a **Stop Discovery** or **Pause PostScan** button, respectively), do the following:
   - Click **Stop Discovery** to temporarily stop Media Auto Discovery or PreScan (see Figure 140 on page 256).
   - Click **Pause PostScan** to pause the PostScan for one hour (see Figure 143 on page 265).

3. If you configured the partition to use encryption or if you want to enable encryption in a partition that did not previously use it, select **Security ···⁘ Encryption** to log into the BlueScale Encryption feature. The Encryption User Login screen displays.



Figure 102 Log into the encryption feature if you need to change the encryption setting for the partition.

   a. Type the encryption user password, if one is set. Otherwise, leave the password blank.

   b. Click **OK** to display the Encryption Configuration screen.

   After you log into the encryption feature, you can modify the encryption settings for the partition (see Select the Encryption Mode on page 185). You can also configure encryption settings and manage BlueScale encryption keys. See the *Spectra Encryption User Guide* for detailed information about enabling and configuring encryption for a partition.

4. From the toolbar menu, select **Configuration ···⁘ Partitions** to begin the partition configuration process. The Shared Library Services screen displays.



Figure 103 The Shared Library Services screen.

5. Click either **Summary** or **Edit**. Either option can be used when modifying a partition.

   - If you click **Summary** next to the partition that you want to edit, the Partition Settings screen displays, showing summary information related to the selected partition.

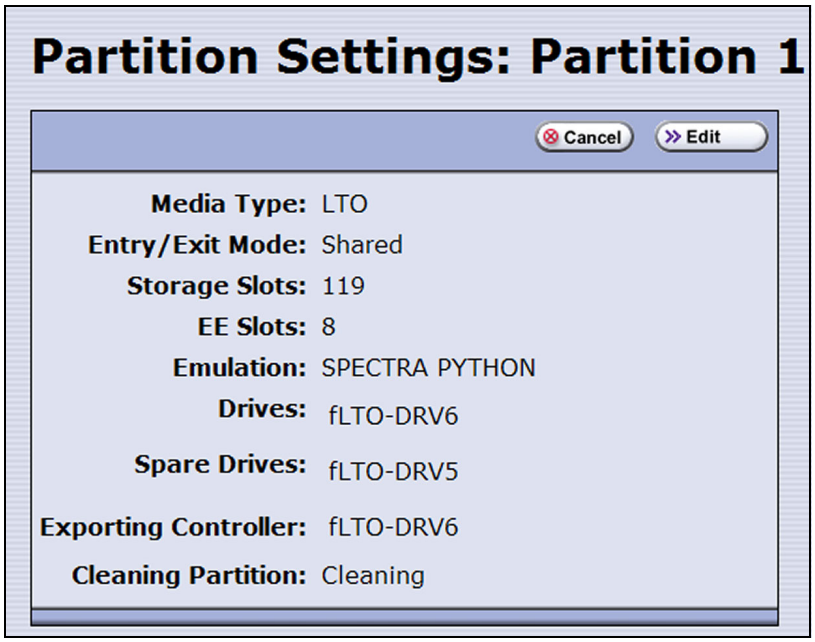


Figure 104 The Partition Settings screen.

If you want to make changes or see all of the configuration settings for the partition, click **Edit**. If you do not want to make any changes to the partition, click **Cancel** to return to the Shared Library Services screen.

   - If you click **Edit** from either the Partition Settings screen or the Shared Library Services screen the Name and Media Type screen displays.

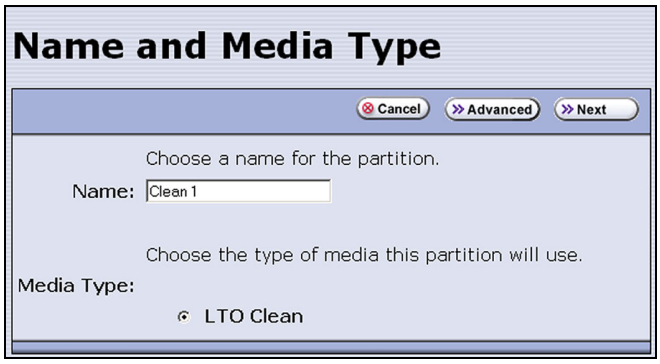


Figure 105 The Name and Media Type screen for a cleaning partition.

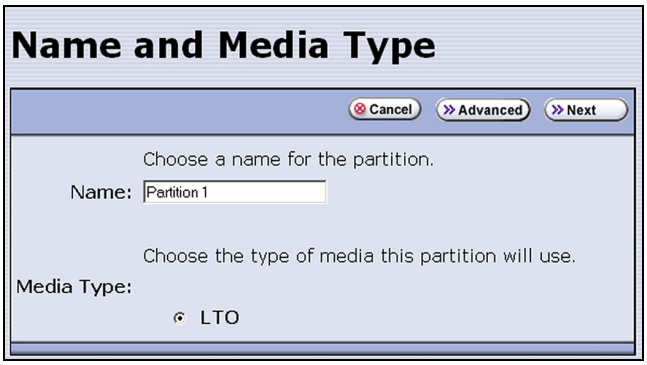


Figure 106 The Name and Media Type screen for a storage partition.

6. The Name and Media Type screen is the beginning of a series of configuration screens. Depending on the type of partition you are modifying, follow the instructions for creating the partition to modify the partition.

   To modify a cleaning partition, see:

   - Creating a Cleaning Partition on page 154

     —OR—

   To modify a storage partition, see:

   - Creating a Storage Partition Using Direct-Attached Fibre Channel or SAS Drives on page 157

     —OR—

   - Creating a Storage Partition Using Direct-Attached SCSI Drives on page 177

     —OR—

   - Creating a Storage Partition using F-QIP-Attached SCSI Drives on page 182

   Notes:
   - You cannot change the media type (and thus the drive type) specified for the partition.
   - If you need to convert a Standard mode partition to either Shared Entry/Exit or Queued Eject mode, work through the BlueScale partition wizard until you reach the Slots and Drives screen, then follow the instructions to change the Entry/Exit mode.

DELETING A PARTITION

Overview When you delete a partition, the drives and slots previously assigned to that partition can be reassigned to an existing partition or used to create a new partition.

Preparation Before deleting an existing partition, review the information at the beginning of this chapter to be sure that you address any requirements (see Partition Types and Requirements on page 148). In addition, make sure you address the following:

- Spectra Logic strongly recommends backing up the library configuration, either to a USB device or as an attachment to an email sent to a previously configured mail recipient, before you delete a partition.
- To ensure that you do not inadvertently mix cartridges from one storage partition with that from another, use your storage management software to eject all of the cartridges from the storage partition. The library moves the media to the entry/exit port. Export the media from the library as described in Importing and Exporting Cartridges on page 204.

Important Any cartridges remaining in the slots that were assigned to the partition are not accessible until the slots are assigned to another partition.

- If the storage partition is configured to use Global Spares, edit the partition and deselect all of the drives that are designated as Global Spares for the partition.
- If the storage partition is configured to use BlueScale Encryption, make sure that you export the encryption key for any cartridges that were in the partition (see the *Spectra Encryption User Guide* for more information). The encryption key is required in order to access the data on the cartridges at a later date.
- If you plan to delete a cleaning partition, edit any storage partitions that use the cleaning partition to disassociate the cleaning partition from the storage partition.

Auto Configuration Save When you delete a partition, the library automatically generates a configuration backup file and saves it to the memory card in the LCM. If you configured the email option for the Auto Configuration Save file, an email with the backup file as an attachment is sent to the specified recipient (see Enable Email for the Auto Configuration Save File on page 101).

Note: Do not use the default *autosupport@spectralogic.com* email recipient. Spectra Logic does not save emailed configuration files unless they are specifically requested for troubleshooting.

Procedure Use the following steps to delete an existing partition.

1. Log in as a user with superuser or administrator privileges.
2. Select **Maintenance ⋯⁘ MLM** to display the Media Lifecycle Management Tools screen. If Media Auto Discovery, PreScan, or PostScan is running (as indicated by the presence of a **Stop Discovery** or **Pause PostScan** button, respectively), do the following:
   - Click **Stop Discovery** to temporarily stop Media Auto Discovery or PreScan (see Figure 140 on page 256).
   - Click **Pause PostScan** to pause the PostScan for one hour (see Figure 143 on page 265).
3. From the toolbar menu, select **Configuration ⋯⁘ Partitions**. The Shared Library Services screen displays.
4. Click **Delete** for the partition you want to delete. A Feedback Required screen displays.
5. Select whether you want to save the current library configuration.
   - **Don't Save Library Configuration** — A backup of the changed library configuration is not saved.
   - **Save Library Configuration To** (highly recommended) — Saves a backup file of the changed library configuration to either a USB device connected to the LCM or as an attachment to an email sent to a previously configured recipient (see Configure Mail Users on page 99). Using this option is highly recommended to ensure that you can easily restore the library configuration if necessary.
6. Click **Ok** to confirm that you want to delete the partition or click **Cancel** to return to the Shared Library Services screen.

   The screen refreshes. The deleted partition is no longer listed on the Shared Library Services screen.

CHAPTER 7

Media Management

This chapter describes media management—importing, exporting, and moving cartridges—in the library. Also refer to Chapter 8 – Configuring and Using Media Lifecycle Management, beginning on page 234 for additional information.

Topic	
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Cartridge Import and Export Choices	page 202
Operation Considerations	page 202
Restrictions	page 203
Importing and Exporting Cartridges	page 204
Import Cartridges Using Bulk Load	page 205
Export Cartridges Using Bulk Unload	page 207
Import a Cartridge into a Specific Slot	page 208
Export Specific Cartridges from the Library	page 210
Use Queued Ejects	page 211
Using the Shared Entry/Exit Port	page 212
Understanding the Library Inventory	page 213
Preparing Cartridges for Use	page 214
Cartridge Guidelines and Requirements	page 214
Prepare the Cartridges for Use	page 215
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IMPORT AND EXPORT OVERVIEW

Importing cartridges into the library and exporting cartridges from the library are the primary interactions you have with the physical library. You load cartridges into the library during your initial setup, and both import and export cartridges during normal day-to-day backup operations.

Cartridge Import and Export Choices

Single Cartridge Load Option (day-to-day operations) For normal day-to-day operation, import individual cartridges using the E/E port. You can import as many tapes as needed using this option.

Bulk Load Option (initial library installation) When you first install your library and load media for use, you may prefer to use the Bulk Load option to save setup time.

Operation Considerations

Partition Management You must have a partition defined before you can import media. See Chapter 6 – Partition Management, beginning on page 147 for additional information.

Cartridge Labeling Make sure that each cartridge is labeled with a unique barcode. The barcode labels on Spectra Certified Media contain information about the media type. To ensure that the correct type of cartridges are stored in a partition, the library prevents you from importing the wrong cartridge type into a partition.

Barcode Information Barcode information is stored in volatile memory. The library inventory is scanned during library initialization and is maintained as long as the library is powered on. The inventory is actively updated as cartridges are moved within the library or imported and exported from the library.

Inventory Update The library automatically updates its physical inventory whenever cartridges are imported into or exported from a partition. However, the inventory maintained by the storage management software may not be automatically updated when the physical inventory changes. Check with your storage management software vendor for proper import/export operations.

Queued Ejects You have the option of either exporting cartridges from the library immediately or queuing them for export at a later time using the Queued Eject feature. When using the Queued Eject feature, the ejected cartridges are not physically moved to the entry/exit port until they are exported from the library using the front panel. See Use Queued Ejects on page 211.

Restrictions

Using the BlueScale Web Interface (RLC) The import and export options are not available when you access the library using a remote connection to the BlueScale web interface (RLC). These operations are always performed from the local BlueScale user interface on the library operator panel.

Background Operations You cannot import, export, or exchange cartridges if the library is actively running a background operation such as Media Auto Discovery, PreScan, or PostScan.

If you do not want to wait for a Media Auto Discovery, PreScan, or PostScan operation to complete, you can stop the Media Auto Discovery or PreScan operation or pause the PostScan operation. For other background operations, wait for the process to complete.

- Click **Stop Discovery** on the Media Lifecycle Management Tools screen to stop a Media Auto Discovery or PreScan operation (see Stop the Discovery Process on page 256).
- Click **Pause PostScan** on the Media Lifecycle Management Tools screen to pause the PostScan operation for one hour (see Pause the PostScan Process on page 265).

Auto Discovery Media Auto Discovery is a background operation that uses the drives in a partition to discover newly imported LTO cartridges and add them to the MLM database. The discovery process cannot begin while the hosts are actively loading cartridges into or unloading cartridges from the drives. If you import cartridges during this time, the library posts a failure message stating that no drives are available to perform the discovery process.

Either wait until the library is idle before beginning the import or manually start the discovery process for imported cartridges when the library is idle. See Discover Cartridges Manually on page 254 for instructions.

IMPORTING AND EXPORTING CARTRIDGES

This section describes how to import cartridges into the library and export them from the library.

Important Before loading cartridges into the library, allow them to acclimate to the ambient environment for 24 hours. See Tape Media Specifications on page 476.

Before you can import cartridges you must create one or more partitions (see Chapter 6 – Partition Management, beginning on page 147). All import and export operations use the E/E port located on the front of the library.



Figure 107 The T120 E/E port opened.

Import Cartridges Using Bulk Load

Use the bulk load option when importing multiple cartridges into a partition. When performing a bulk load, the library robotics loads the cartridges into the storage slots sequentially, beginning with the cartridge in slot 1 of the E/E port. Each cartridge is moved to the first available storage slot for the partition. The process continues until all of the cartridges in the E/E port are moved into the partition.

Follow these steps to import multiple cartridges into a partition:

Important If you are loading cartridges into multiple partitions, import all of the cartridges for each partition as a group.

1. From the toolbar menu, select **General** ⋯⁘ **Import/Export**.
2. From the Partition drop-down list, select the partition into which you want to import the cartridges, and click **Go**.

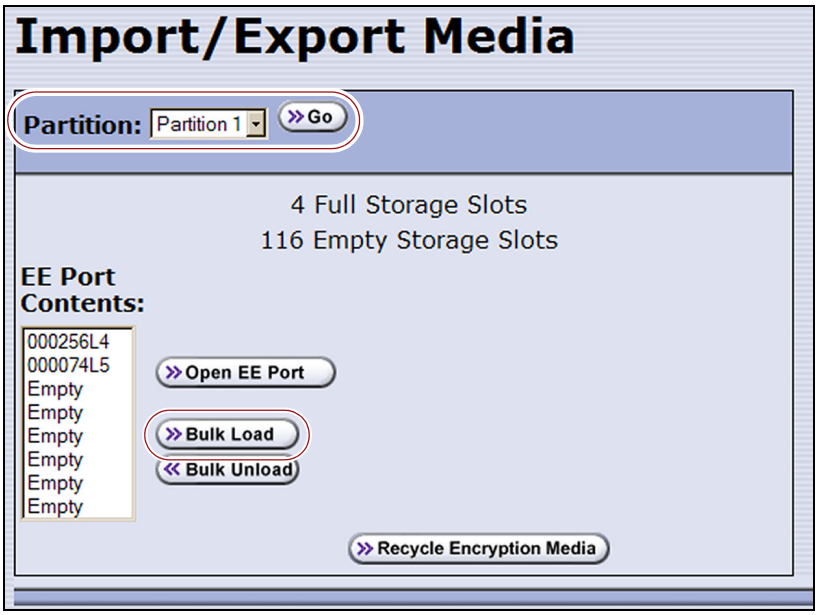


Figure 108 The Bulk Load button.

3. Click **Bulk Load**. A confirmation screen appears.
4. Click **Yes** in response to the confirmation request.
5. When the E/E port opens and a Feedback Required screen prompts you to load the cartridges, fill the E/E port slots with the cartridges you want to import.

6. Click **Continue** to close the E/E port. If you take more than 10 minutes to respond, the operation times out.



Figure 109 Feedback window for bulk loading media.

The library moves the cartridges from the E/E Port to the partition storage slots.

Notes:
- The maximum number of cartridges you can import depends on the number of empty slots available in the partition. To increase the number of cartridges you can import into the partition, modify the number of slots assigned to the partition (see Allocate Slots and Tape Drives on page 164).
- If all licensed slots are in use, you need to add capacity to your library using the CoD feature described (see Library Support and Upgrades on page 458).

7. Repeat Step 2 on page 205 through Step 6 until all of the cartridges are imported into the partition.
8. After you load the last cartridges to be imported into the E/E port, click **Stop Loading**. The Import/Export Media screen redisplays.

Export Cartridges Using Bulk Unload

Follow these steps to export multiple cartridges from a partition:

1. Select **General** ···⁘ **Import/Export**.
2. From the Partition drop-down list, select the partition from which you want to export cartridges and click **Go**.

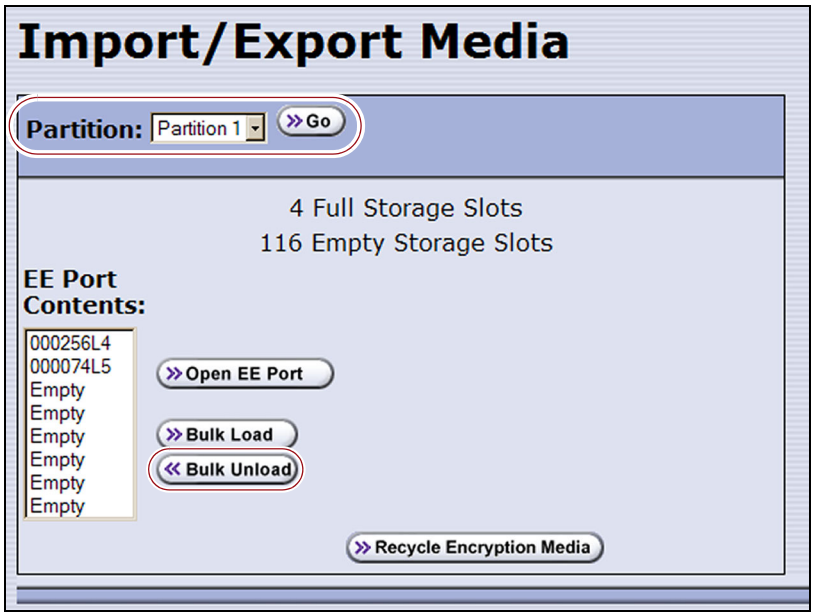


Figure 110 The Bulk Unload button.

3. Click **Bulk Unload**.
4. Click **Yes** in response to the confirmation request.

   The library moves the first set of eight cartridges in the partition into the E/E port.
5. When the E/E port opens and a Feedback Required screen prompts you to unload the cartridges, remove the cartridges from the E/E port slots.

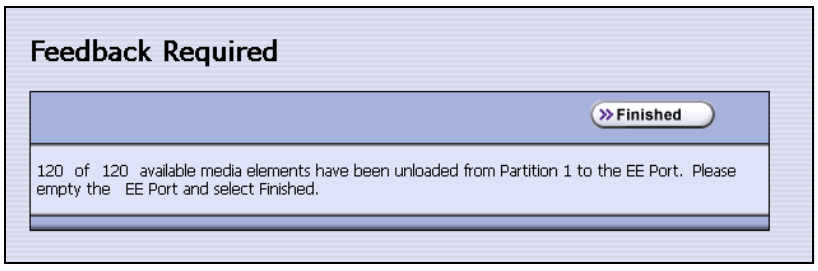


Figure 111 Feedback Required screen for bulk unloading.

6. Click Continue to close the E/E port. If you take more than 10 minutes to respond, the operation times out.
7. Repeat Step 5 and Step 6 until all of the cartridges are exported.
8. When all of the cartridges are exported, click **Finished** on the Feedback Required screen. The Import/Export Media screen displays.

Import a Cartridge into a Specific Slot

Follow these steps if you want to import a cartridge to a specific slot in the partition:

1. Select the partition.
   a. Select **General** ···⁘ **Import Export**.
   b. Use the drop-down list to select the partition into which you want to load the cartridges and click **Go**.

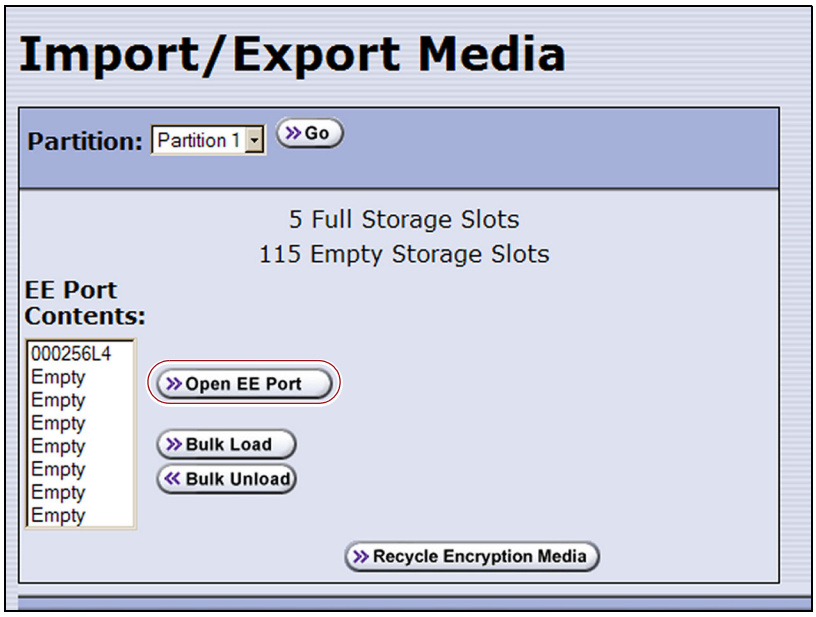


Figure 112 The Open EE Port button.

2. Load one or more cartridges into the E/E port slots:
   a. Click **Open EE Port** to open the E/E port.
   b. Insert the cartridges into empty slots in the E/E port.
   c. Click **Close EE Port**. After the E/E port closes, the library scans the E/E port for new cartridges.
3. Select **Inventory** from the General toolbar. The Inventory screen displays (Figure 113 on page 209).

4. Select the partition into which you want to move the cartridges from the drop-down menu list and click **Go**.

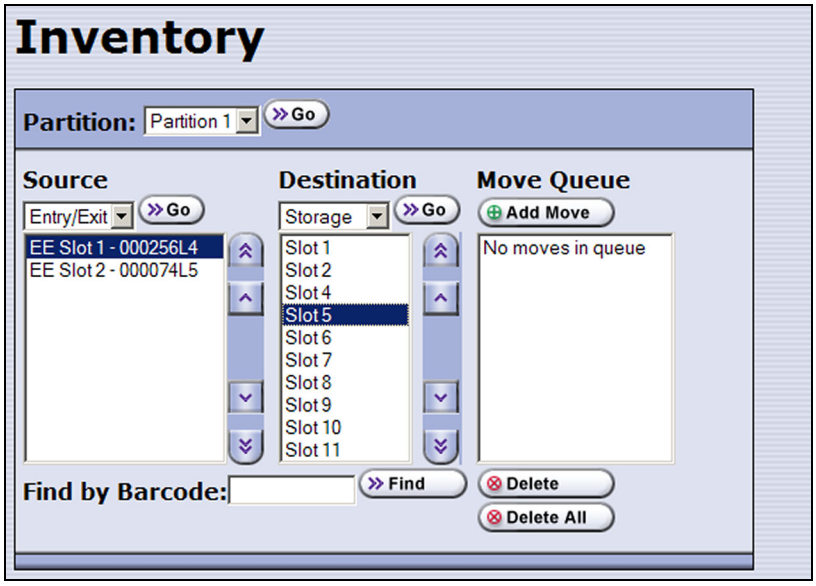


Figure 113 The Inventory screen.

5. Select the source and destination for each cartridge in the E/E port.
   a. Select **Entry/Exit** from the **Source** drop down list and click **Go**.
   b. Select **Storage** from the **Destination** drop-down list and click **Go**.
   c. Highlight the first cartridge you want to move in the **Source** list.
   d. Highlight the destination slot for the cartridge in the **Destination** list.
   e. Click **Add Move** to add the move to the Move Queue list.
   f. Repeat Step c through Step e for each additional cartridge you want to import.
6. Click **Start Moves**.

   When the moves are complete, a Move Status screen shows whether each move was successful.

Export Specific Cartridges from the Library

Follow these steps to export specific cartridges from the library:

1. Select the partition.
   a. Select **General** ···⁘ **Inventory**. The Inventory screen appears.
   b. Use the partition drop-down list to select the partition you want to export the cartridges from and then click **Go**.

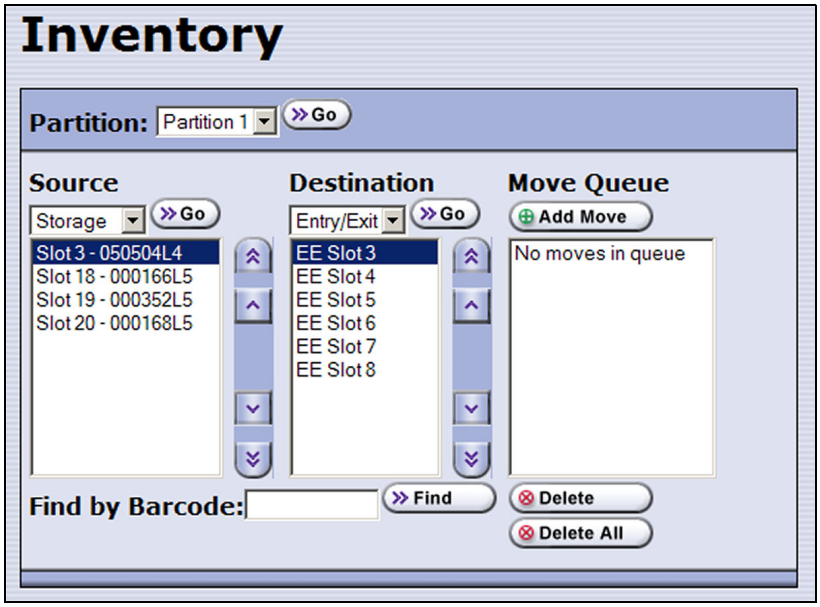


Figure 114 The Inventory screen.

2. Select the source and destination for each cartridge in the E/E port.
   a. Select **Storage** from the **Source** drop-down list and click **Go**.
   b. Select **Entry/Exit** from the **Destination** drop-down list and click **Go**.
   c. Highlight the first cartridge you want to move in the **Source** list.
   d. Highlight the destination slot for the cartridge in the **Destination** list.
   e. Click **Add Move** to add the move to the Move Queue list.
   f. Repeat Step c through Step e for each additional cartridge you want to import.
3. Click **Start Moves**. When the moves are complete, a Move Status screen shows whether each move was successful.

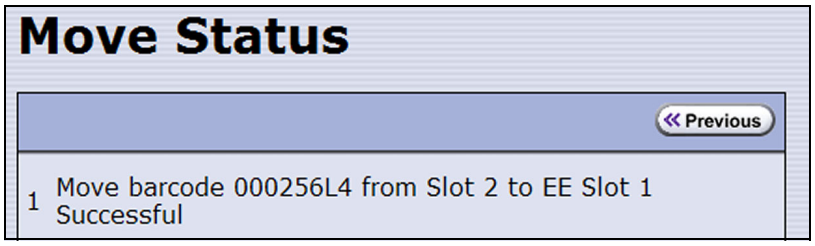


Figure 115 The Move Status screen.

4. Remove the cartridges from the E/E port.
   a. Select **Import/Export** from the General Toolbar.

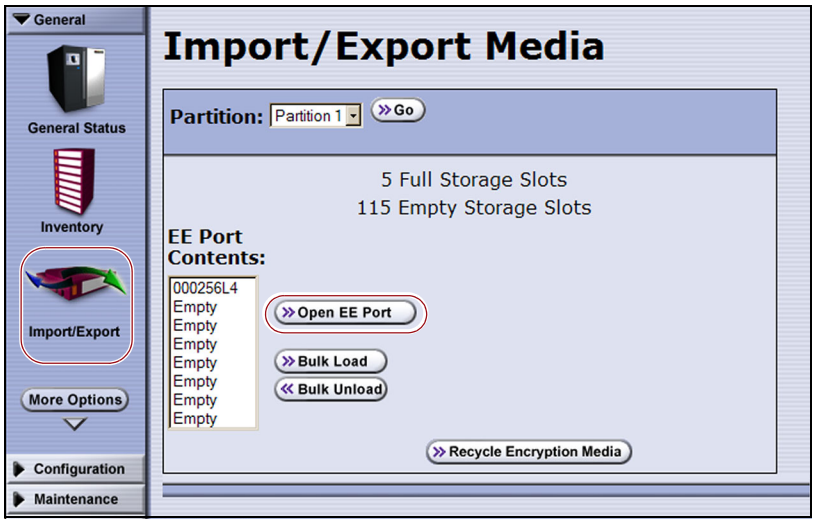


Figure 116 The Import Export Media screen.

   b. Click **Open EE Port**. The library E/E port opens.
   c. Remove the cartridges from the E/E port, then click **Close E/E port**.
   d. If the move queue contained more cartridges than would fit in the E/E port, the process repeats until all of the moves are processed.

Use Queued Ejects

When the storage management software ejects a cartridge, an asterisk appears next to the cartridge barcode in the Inventory screen if the partition is configured to use Queued Ejects. The cartridge remains in the partition storage slot until you are ready to physically export the cartridge from the library. See Queued Eject Mode on page 166 for more information about the Queued Eject mode for the E/E port.

1. Select **General** ···⁘ **Inventory** to display the Inventory screen.
2. Select the desired partition from the drop-down list and click **Go**.

3. Click **Eject Queued Tapes** to move the cartridges to the E/E port.

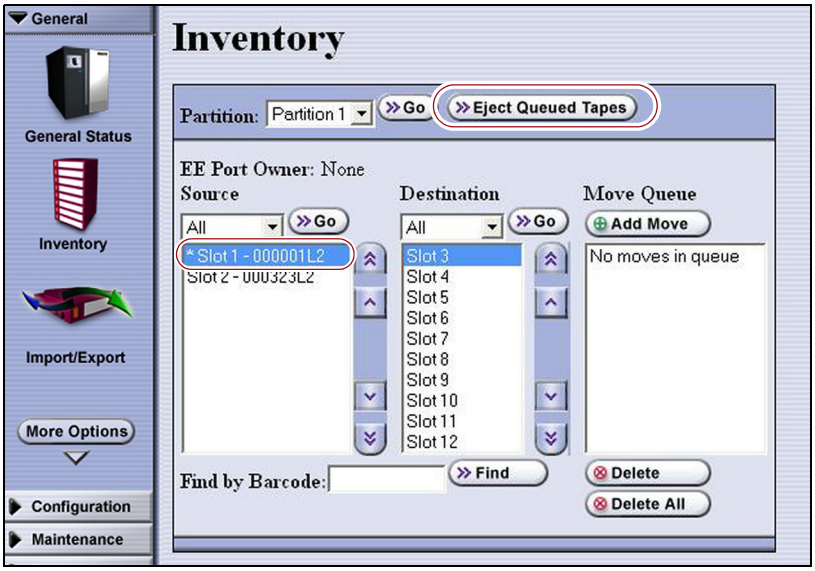


Figure 117 Inventory screen with queued tapes.

4. When the E/E port opens, remove the cartridges.

USING THE SHARED ENTRY/EXIT PORT

When the E/E port is configured to use Shared mode, the General Status screen shows nine entry/exit slots instead of eight (shown circled in Figure 118). The ninth slot is a virtual slot used for export operations and makes it possible for multiple partitions to share the E/E port. As with queued ejects, this virtual export slot is actually a storage slot in the partition that contains a cartridge that was ejected by the storage management software.

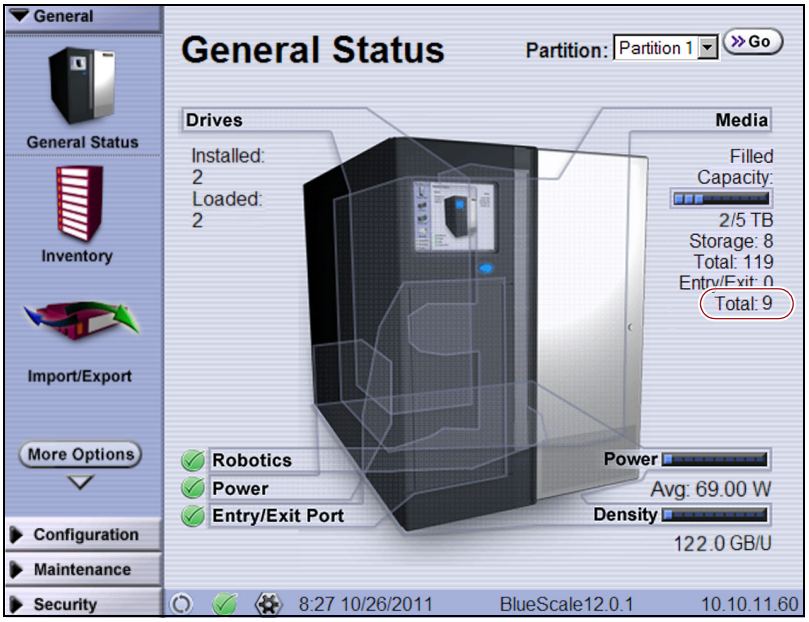


Figure 118 The General Status Screen with 9 total E/E slots.

When importing cartridges into the library, the eight physical slots in the E/E port are only accessible to one partition at a time to prevent cartridges from accidentally being swapped between partitions. You cannot import the cartridges in the E/E port into multiple partitions.

During export operations, all of the cartridges in the partition that were ejected by the storage management software and queued for export are moved to the slots in the E/E port so that they can be removed from the library. See Shared Mode on page 165 for additional information about the Shared mode for the E/E port.

UNDERSTANDING THE LIBRARY INVENTORY

The inventory is a record of all the cartridges stored in the library and their current locations (for example, in a specific slot, or in a drive). As cartridges are imported into a partition, the library's barcode reader reads the barcode label on each cartridge. The library uses this barcode information to maintain its physical inventory, which is stored in the LCM.

The Inventory screen, available from the General toolbar, lets you interact with the cartridge inventory in the following ways:

If you want to...	The inventory screen lets you...
View information about the cartridges in a partition,	▪ View the cartridges located in a storage partition, the entry/exit port, or a drive. ▪ View the cartridges located in a cleaning partition and identify expired cartridges. An "x" appears next to the slot number if the cleaning cartridge is expired. ▪ Download an XML file that lists the inventory of every location in the selected storage partition (see Download the Cartridge Inventory on page 219).
Locate a specific cartridge in the partition,	Search for a cartridge using either its barcode label information or its slot location (see Locating a Specific Cartridge on page 222).
Move a cartridge from one location to another,	▪ Find and select a specific cartridge within a partition and move it to another location (see Moving Cartridges Within a Partition on page 223). ▪ Automate a series of moves in a storage partition by uploading a specially formatted ASCII text file that contains a sequence of moves to the partition (see Move Cartridges Using an ASCII Move File on page 227).

PREPARING CARTRIDGES FOR USE

You must prepare the cartridges before loading them into the library.

Cartridge Guidelines and Requirements

When preparing cartridges for use, keep the following guidelines and requirements in mind:

Spectra Certified Media For best performance, use Spectra Certified Media (both data and cleaning cartridges), which guarantees both media compatibility and the cartridge itself over its lifetime. Using Spectra Certified Media also lets you take full advantage of the library's Media Lifecycle Management (MLM) features. See Chapter 8 – Configuring and Using Media Lifecycle Management, beginning on page 234 for detailed information about using MLM to monitor the health of data and cleaning cartridges.

Multiple Tape Technology Generations When using multiple tape technology generations, Spectra Logic strongly recommends configuring separate partitions for each generation.

Barcode Labels To ensure that the library can properly maintain its media inventory, make sure that all cartridges have unique barcode labels. For your convenience, all Spectra Certified Media is available pre-labeled with sequential barcode labels. Optional custom barcode sequences can be ordered, if desired.

- **Data cartridges**—The library automatically notifies you whenever you attempt to import unlabeled cartridges or cartridges whose labels indicate that the LTO generation is not supported by the partition.
- **Cleaning cartridges**—If you plan to use a cleaning partition and the Auto Drive Clean feature, the cleaning cartridges must be identified with "CLN" at the beginning of the barcode sequence on their labels. This requirement applies to both standard and custom barcode labels.

Write Protection Before loading data cartridges into the library, make sure that the write-protection switch is properly set. For normal backup operations, the write protect switch is set to the write-enabled or unlocked position. The write-protect switch is typically set to the write-protect or locked position when the cartridge is removed from the library for storage and during restore operations.

Prepare the Cartridges for Use

Use the following steps to prepare the individual cartridges to be loaded into the library.

1. If your cartridges are unlabeled, prepare and affix a barcode label to each cartridge. Position each label in the indented area on the cartridge, as illustrated below. See Barcode Label Specifications for Half-Inch Media on page 479 for detailed information about supported requirements for barcode labels.

Caution Do not place labels on any surface of the cartridge except the area shown in Figure 119. A label can become dislodged and damage the drive.

Important Before importing cartridges into the library, allow them to acclimate to the ambient environment for 24 hours.

Important If you are using Auto Drive Clean, all cleaning cartridges must be identified with "CLN" at the beginning of the barcode sequence on their labels. This requirement applies to both standard and custom barcode labels.

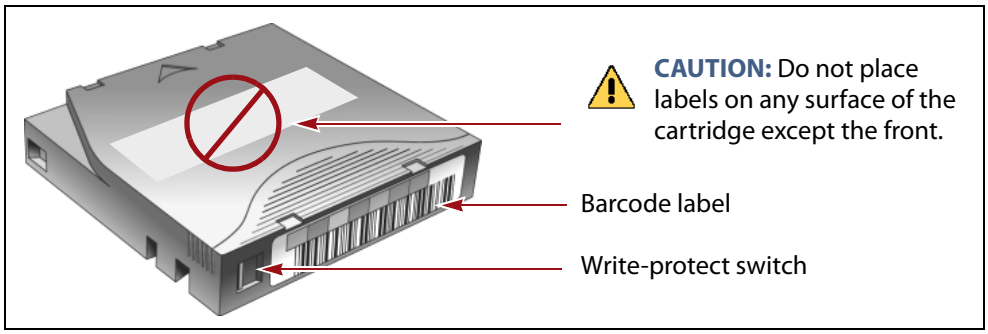


Figure 119 Attach barcode labels to cartridges and check write-protect switch setting.

2. Depending on whether you plan to write data to a cartridge or restore data from a cartridge, make sure the write-protect switch on the cartridge is set for the desired operation.

   Note: Cleaning cartridges do not have a write-protect switch.

If the switch...	The cartridge is...
Does not cover the opening	Write-enabled. Data can be written to or read from the tape.
Does cover the opening	Write-protected. Data can be read from the tape. Data cannot be written to or erased from the tape.

M8 Media

When the library loads an unused LTO-7 tape cartridge with a barcode label ending with "M8" into an LTO-8 tape drive with firmware HB82 or later, the drive attempts to initialize the tape for M8 density, increasing the density from 6 TB to 9 TB. Once initialized, the tape can no longer be written to or read by an LTO-7 drive.

To use the M8 feature, make sure that your tape library uses the default barcode reporting configuration or a configuration that reports the last two characters, not including the checksum. See Configure Barcode Reporting on page 113 for details of the default barcode reporting configuration and instructions for changing the barcode configuration.

If the tape drive determines that the tape cartridge does not meet the unused criteria, the M8 initialization fails and the tape retains LTO-7 density. If the library or your storage management software reports an M8 initialization failure, Spectra Logic recommends replacing the barcode on the tape with an L7 barcode.

Note: M8 tapes cannot be read by or written to by LTO-9 drives.

LTO-9 New Media Optimization

With its increased density, LTO-9 media require a one-time initialization process to optimize data placement for each new cartridge before it is used for writing data. The media optimization process takes place automatically on the first load of a new LTO-9 cartridge in an LTO-9 tape drive. The process typically takes between 40 and 60 minutes, but can take up to 2 hours. All Spectra Certified LTO-9 media is initialized before it ships and does not need to go through this optimization process.

Important After the LTO-9 new media initialization starts on a non-Spectra Certified tape, using the front panel to move the tape from the drive aborts the initialization process, requiring the drive to go through mid-tape recovery. The next time the tape is moved to a drive, the initialization process starts over.

Important All Spectra Certified LTO-9 media is initialized before it ships and does not need to go through the optimization process.

VIEWING AND DOWNLOADING THE CARTRIDGE INVENTORY

Overview The Inventory screen provides information about the cartridge inventory for each of the partitions configured in the library. It also provides options for interacting with that inventory to move cartridges from one location to another.

Requirements When using the Inventory screen, keep the following requirements in mind:

- Any user with operator privileges who is assigned to the partition and all users with superuser or administrator privileges can view and download the cartridge inventory.
- Downloading an XML file containing the current cartridge inventory for a partition requires either a remote connection to the library using the BlueScale web interface (RLC) or a USB device connected to the LCM.

View the Cartridge Inventory for a Location

Note: You can also view the cartridge inventory for a specific location using the Media Lifecycle Management Report screen (see Using MLM Reporting on page 266).

1. Log into the library.
2. From the toolbar menu, select **General** ⋯ **Inventory**. The Inventory screen displays showing the information for the last partition that was viewed.
3. Select the partition for which you want to view the inventory from the **Partition** drop-down list, then click **Go**. The screen refreshes to show the cartridge inventory for the **Source** type that was selected the last time the Inventory screen was viewed.

   Note: The **Destination** list shows the empty locations of the selected destination type.

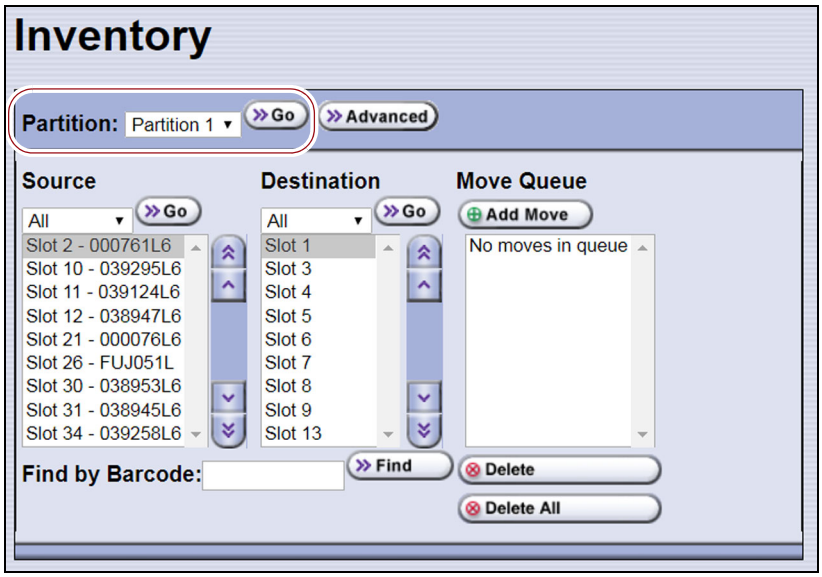


Figure 120 The Inventory screen.

4. Use the **Source** drop-down list to select the location for which you want to view the cartridge inventory, then click **Go**. The **Source** list refreshes to display a list of the cartridges in the requested location type.

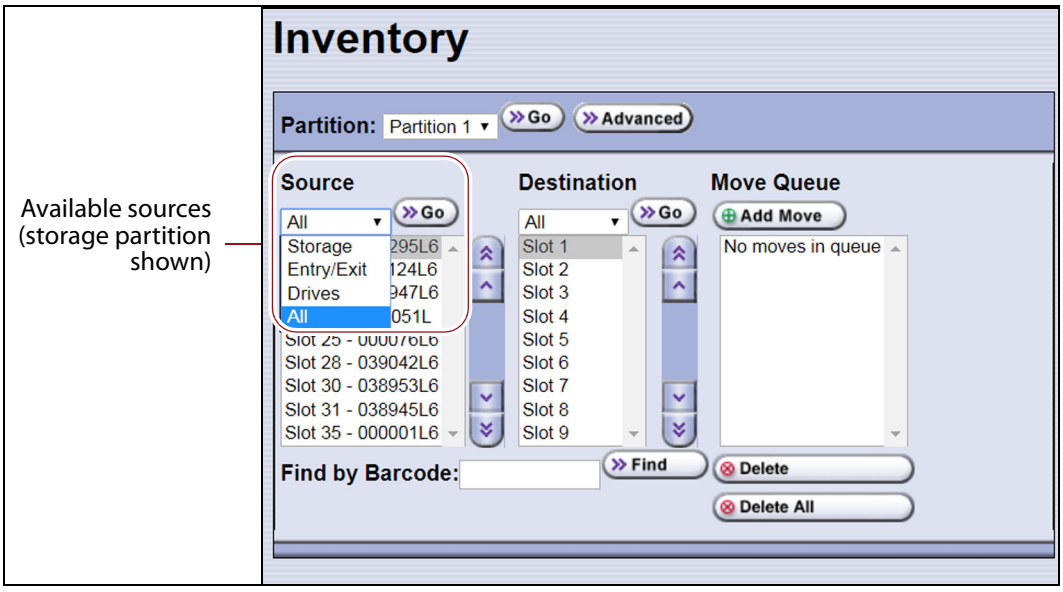


Figure 121 Select the source type for which you want to view the inventory.

Notes:
- The available sources depend on the type of partition selected.
- If the selected source does not contain any cartridges, the source list shows "No sources found."

Partition Type	Available Sources
Storage	▪ **Storage** — Lists the barcodes of the cartridges currently in the selected partition. ▪ **Entry/Exit** — Lists the barcodes of the cartridges currently in the entry/exit port. ▪ **Drives** — Lists the barcode of the cartridge currently in each drive assigned to the partition. Only drives that contain a cartridge are included in the list. ▪ **All** — Lists all of the cartridges in the partition, regardless of location.
Cleaning	▪ **Cleaning** — Lists the cleaning cartridges currently in the selected cleaning partition. ▪ **All** — Lists all of the cartridges in the partition, regardless of location. **Note:** If an "x" appears next to the slot number in the source list for a cleaning partition, the cleaning cartridge is expired.

Download the Cartridge Inventory

If desired, you can download the inventory for the selected partition as an XML file. You can use the information in the downloaded inventory when creating a move queue file (see Move Cartridges Using an ASCII Move File on page 227).

- If you are using the BlueScale user interface from the operator panel, the cartridge inventory is saved as an XML file on a USB device that is connected to the LCM.
- If you are accessing the library using the BlueScale web interface, the cartridge inventory is displayed using the XML format in a new browser window on the computer that you are using to access the library. From there you can save the file to a convenient location for later use.

  If a USB device is connected to the LCM, you can also save the XML file to the USB device.

The inventory lists the following information for all of the slots in the partition, the entry/exit port and for the drives in the partition.

- For each slot and drive, the list shows the location ID and indicates whether or not it is full (occupied).
- For each occupied slot or drive, the list also indicates the barcode information of the cartridge.

  Note: You can also use the XML command interface to obtain the full inventory of the partition, including both full and empty slots and drive numbers (see the *Spectra Tape Libraries XML Command Reference* for more details).

Usage Requirements Downloading an XML file containing the current cartridge inventory requires either a remote connection to the library using the BlueScale web interface (RLC) or a USB device connected to the LCM.

Use the following steps to download the inventory.

1. Log into the library.
2. If you want to save the XML file containing the cartridge inventory to a USB device, connect the device to the USB port on the LCM and allow time for the device to mount before proceeding (see Connect a USB Device to the Library on page 146).
3. From the toolbar menu, select **General** ⋯ **Inventory**. The Inventory screen displays, showing the information for the last partition that was viewed on either the Import/Export Media screen or the Inventory screen.
4. If you want to download the inventory for a partition other than the one currently displayed, select the desired partition from the **Partition** drop-down list, then click **Go** (see Figure 120 on page 217).

5. Click **Advanced** to display the options for uploading moves and downloading the inventory.

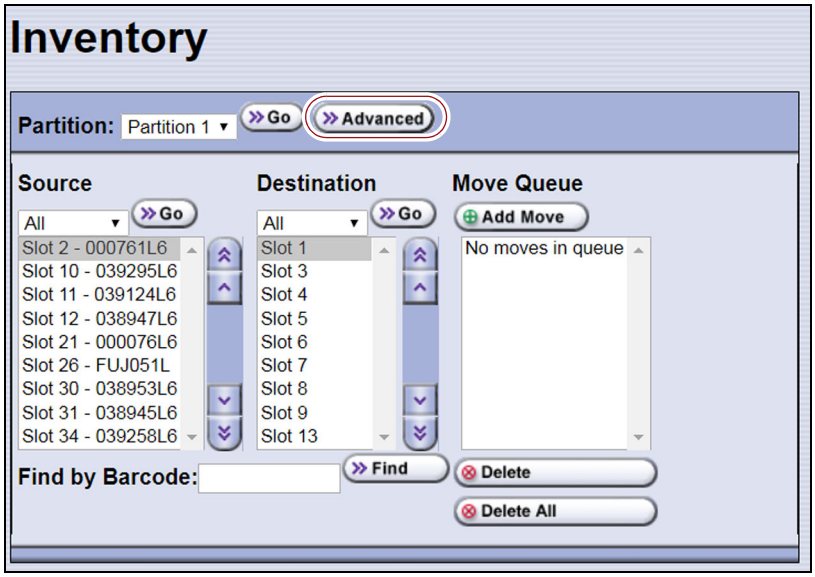


Figure 122 Select **Advanced** to display the advanced options for the selected partition.

6. On the Advanced Inventory screen, select the **Download Inventory** tab.

Important

The option to download the inventory file to a USB device is grayed out if the USB device is not connected to the LCM before you click **Advanced** on the inventory screen.

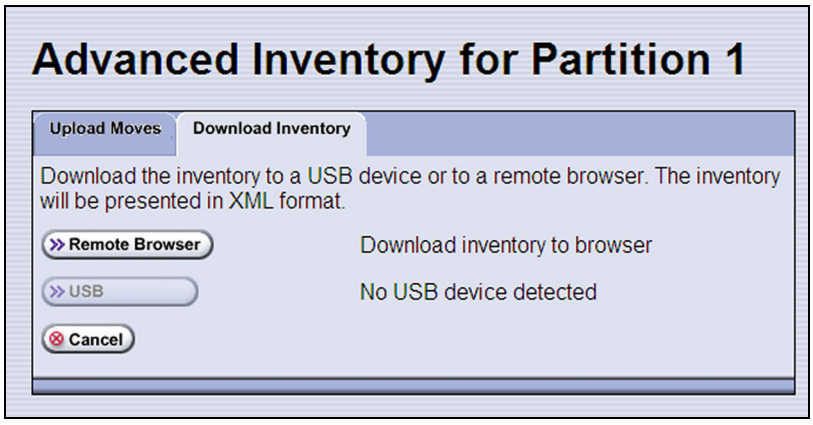


Figure 123 Select the download option for the inventory file.

7. Select the desired option for downloading the inventory file. As soon as you make your selection, the download process begins.

Select...	To...
Remote Browser	Automatically open the XML file on the computer accessing the library's BlueScale web interface. **Notes:** ▪ This option can only be selected if you are accessing the library using the BlueScale web interface (RLC). ▪ If the application associated with XML files is a web browser, the XML file opens in a new browser window.
USB	Save the XML file to the root of the USB device connected to the LCM. The file name uses the following format: `[Partition Name]_[yyyy-mm-dd]_[hh_mm_ss].xml` **Note:** This option can only be selected if you connected a USB device to the LCM before you clicked **Advanced**.

8. If the XML file was successfully saved to the USB device or if the library detected errors, a Download Verification screen displays. If errors are reported, resolve them and then repeat the download process.

   Note: The Download Verification screen does not display if file successfully downloads to the remote computer.

9. Open the XML file.

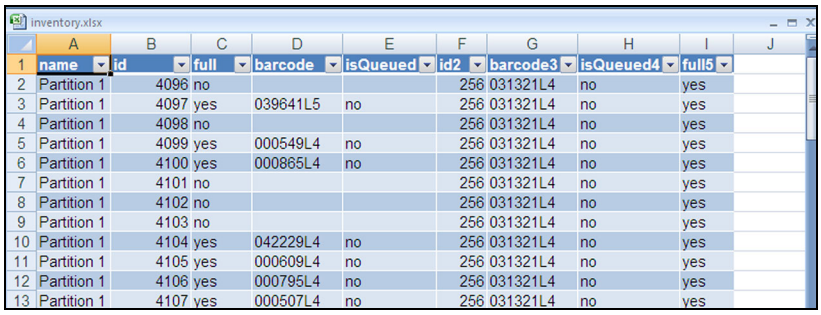
   ▪ If you selected the **Remote Browser** option for downloading the XML file, the file opens automatically. You can then save the file to your computer for later use.

   Note: See the *Spectra Tape Libraries XML Command Reference* for a description of the fields in the XML file.



Figure 124 The cartridge inventory XML file opened in a web browser.

- To view the XML file in spreadsheet format, use Microsoft® Excel® 2007 or later, or use another spreadsheet program that supports the XML file format.



inventory.xlsx

	A	B	C	D	E	F	G	H	I	J
1	name	id	full	barcode	isQueued	id2	barcode3	isQueued4	full5	
2	Partition 1	4096	no			256	031321L4	no	yes	
3	Partition 1	4097	yes	039641L5	no	256	031321L4	no	yes	
4	Partition 1	4098	no			256	031321L4	no	yes	
5	Partition 1	4099	yes	000549L4	no	256	031321L4	no	yes	
6	Partition 1	4100	yes	000865L4	no	256	031321L4	no	yes	
7	Partition 1	4101	no			256	031321L4	no	yes	
8	Partition 1	4102	no			256	031321L4	no	yes	
9	Partition 1	4103	no			256	031321L4	no	yes	
10	Partition 1	4104	yes	042229L4	no	256	031321L4	no	yes	
11	Partition 1	4105	yes	000609L4	no	256	031321L4	no	yes	
12	Partition 1	4106	yes	000795L4	no	256	031321L4	no	yes	
13	Partition 1	4107	yes	000507L4	no	256	031321L4	no	yes	

Figure 125 Example of the cartridge inventory XML file opened in Excel.

- If you selected the USB option, move the USB device to a computer and open the XML file.

LOCATING A SPECIFIC CARTRIDGE

The Inventory screen provides three different methods for locating a specific cartridge in the library.

1. Log into the library.
2. Display the cartridge inventory for the desired partition location (see View the Cartridge Inventory for a Location on page 217).
3. Locate the desired cartridge using one of the following methods.

To locate using...	Do the following...
The **Source** list,	**1.** Scroll through the list until you find the barcode for the desired cartridge. **2.** Click on the barcode to select the cartridge.
The slot number,	**1.** Enter the slot number for the cartridge you want in the **View Source Slot** field. **2.** Click **Go**. The **Source** list refreshes to show the requested slot highlighted at the top of the list. **3.** Click on the cartridge to select it.
The barcode label information,	**1.** Enter the barcode label information for the cartridge you want to locate in the **Find by Barcode** field. **2.** Click **Find**. The Source inventory list refreshes to show the requested cartridge highlighted at the top of the **Source** list. **3.** Click on the barcode to select the cartridge. **Important:** Only the slots below the top one displayed in the list are searched. Scroll to the top of the source list before clicking **Find**. The search starts at the second visible slot.

Moving Cartridges Within a Partition

Overview During normal operations, you typically use your storage management software to move cartridges from one location to another within the library. However, you may occasionally need to create and process a move queue to direct the library to move cartridges manually. This can be done using the library's BlueScale interface to locate and move individual cartridges (for example, to move a cleaning cartridge stored in the storage partition to a drive if you are not using the Auto Drive Clean option) or by uploading a series of moves to a storage partition using a specially formatted ASCII text file. Use the instructions in one of the following sections to manually direct cartridge moves.

- Move Cartridges Using the BlueScale Inventory Screen
- Move Cartridges Using an ASCII Move File on page 227

User Privilege Requirements The user privilege requirements when moving cartridges in a storage partition depend on how the library is being accessed. See Specify the Partition Users on page 176 for information about assigning users to a partition.

- Any user with operator privileges who is assigned to the partition and all users with superuser or administrator privileges can move cartridges within the partition using the BlueScale interface on the operator panel.
- Only a user with superuser or administrator privileges can move cartridges within the partition using the BlueScale web interface (RLC) or upload a move queue file.

Usage Requirements Uploading a move queue file requires either a remote connection to the library using the BlueScale web interface (RLC) or a USB device connected to the LCM.

Move Cartridges Using the BlueScale Inventory Screen

The library uses a move queue to direct tape cartridge moves. The move queue lists one or more source/destination pairs, with each pair representing a single move operation.

Manually Create the Move Queue Use the following steps to create the move queue using the BlueScale Inventory screen.

1. Log into the library as a user with the required privileges (see User Privilege Requirements, above).

2. Display the cartridge inventory for the desired partition location (see View the Cartridge Inventory for a Location on page 217).

   a. From the toolbar menu, select **General** ⋯ **Inventory**.

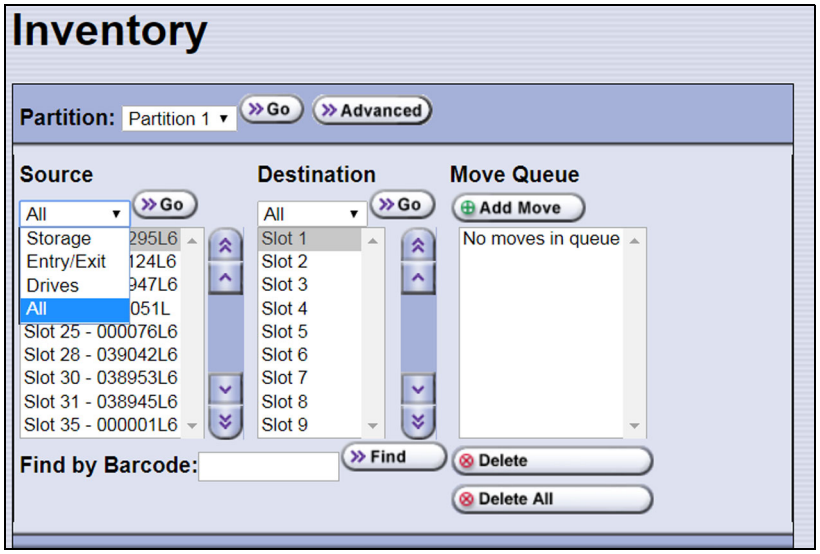


Figure 126 Moving media in the library.

3. If the tape is in a partition other than the one currently displayed, select the desired partition from the **Partition** drop-down menu, then select **Go**.

4. Use the **Source** drop-down list to select the source type for the move, then click **Go**.

   Notes:
   - Selecting a specific source type instead of using **All** displays fewer items through which you must scroll to locate the desired cartridge.
   - If you select **Entry/Exit** from the **Source** drop-down list and there are cartridges in the entry/exit port, a **Bulk Load** button displays at the bottom of the Inventory screen. Clicking **Bulk Load** automatically adds operations to the move queue for moving each cartridge in the entry/exit port to an empty slot in the storage partition.

Partition Type	Available Sources
Storage	▪ **Storage**—Lists the cartridges currently in the selected storage partition. ▪ **Entry/Exit**—Lists the cartridges currently in the E/E port. ▪ **Drives**—Lists the drives in the partition that currently contain a cartridge. ▪ **All**—Lists all of the cartridges in the partition, regardless of location.
Cleaning	▪ **Cleaning**—Lists the cleaning cartridges currently in the selected cleaning partition. ▪ **All**—Lists all of the cartridges in the partition.

The **Source** list shows the name of the location (for example, the slot number) and the barcode label information for the media in that location.

5. Select the media you want to move from the list or enter the barcode number in the **Find by Barcode:** field to locate a specific tape and click **Go** (if using the list) or **Find** (if using the Find by Barcode option).
6. Use the **Destination** drop-down list to select the type of location to which you want to move the cartridge, then click **Go**. The destination list refreshes to show all of the empty slots in the selected location.

Important You cannot use the Inventory screen to move a cleaning cartridge in a cleaning partition to a drive in a storage partition. Instead, use the **Clean** button on the Drives screen (see Manually Cleaning a Drive on page 407).

Note: The available destinations depend on the type of partition you selected.

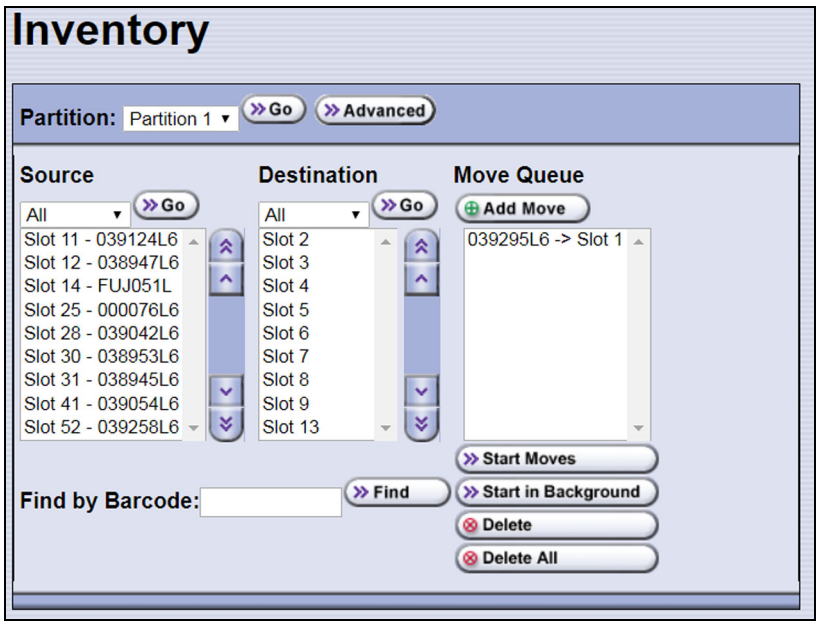


Figure 127 Moving media in the library.

Partition Type	Available Destinations
Storage	▪ **Storage** — Lists all of the empty slots in the selected storage partition. ▪ **Entry/Exit** — Lists all of the empty slots in the E/E port. ▪ **Drives** — Lists the drives in the partition that are currently empty. ▪ **All** — Lists all of the empty slots in the partition, regardless of the location. **Note:** Selecting a specific destination type instead of using **All** displays fewer items through which you must scroll to locate the desired destination slot.
Cleaning	▪ **Cleaning** — Lists all of the empty slots in the selected cleaning partition. ▪ **All** — List all available destinations in the partition, regardless of the type. **Note:** Selecting a specific destination type instead of using **All** displays fewer items through which you must scroll to locate the desired destination slot.

7. If you are moving a cartridge to a slot, locate and select the desired slot in the **Destination** list.

8. Click **Add Move**. An entry listing the move you just defined appears in the Move Queue list.

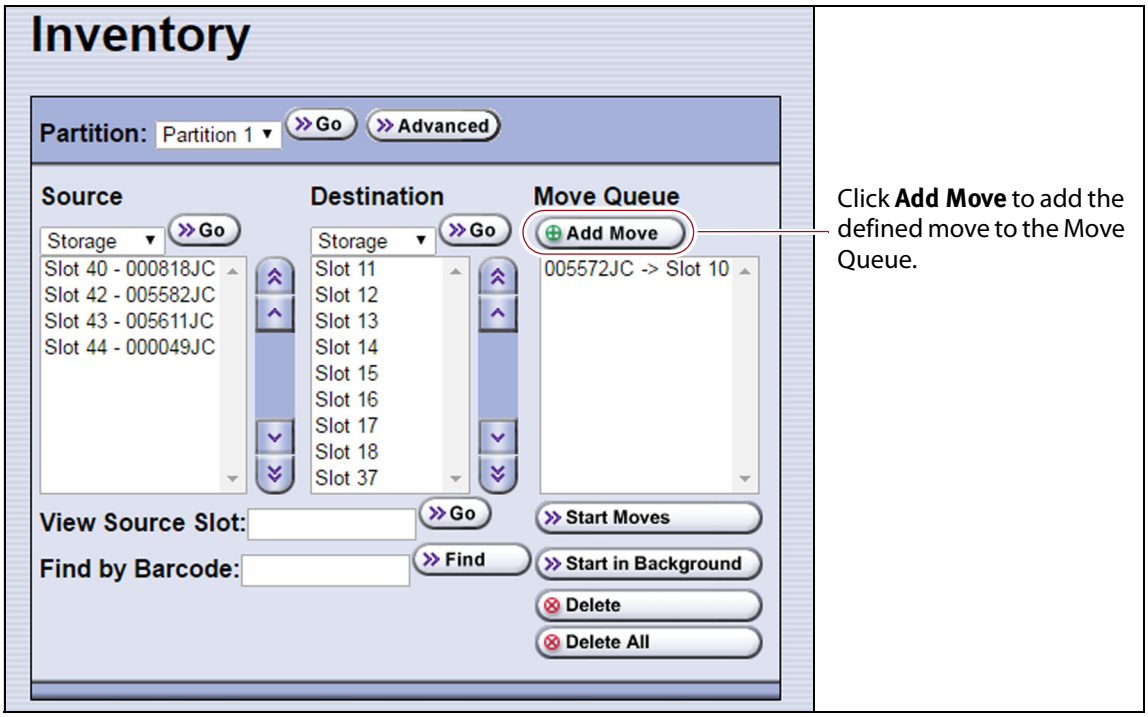


Figure 128 Add the move to the Move Queue.

9. Repeat Step 4 on page 224 through Step 8, for each additional cartridge you want to move.

   Note: If you want to remove one or more of the moves in the queue:

   - Select the move and click **Delete** to remove it from the Move Queue list.
   - Click **Delete All** to remove all of the defined moves from the Move Queue list.

Process the Move Queue Choose one of the move processing modes:

Click...	To...
Start Moves	Begin processing the moves. A progress screen tracks the progress of the move operations. ▪ Queued moves from one slot to another or to a drive are processed in the order that they are listed in the Move Queue. ▪ Queued moves from the storage partition to the E/E port are processed in barcode order, from lowest to highest. When all of the moves in the queue have been processed, the screen displays the status of each move. No other operations can be started until the moves complete.

Click...	To...
Start in Background	Begin processing the moves in the background. The front panel or RLC is available for some operations. ▪ Queued moves from one slot to another or to a drive are processed in the order that they are listed in the Move Queue. ▪ Queued moves from the storage partition to the E/E port are processed in barcode order, from lowest to highest. **Notes:** ▪ You are not able to edit the partition, import or export cartridges into the partition, or create another move queue for the partition while background moves are in progress. ▪ The library posts informational messages after every 10 moves in the move queue and when the all moves complete.

10. After you finish importing or exporting media into or out of the library, or if you use the library's user interface to move media from one location to another; use your storage management software to update the inventory it maintains. Refer to your software documentation for more information.

Move Cartridges Using an ASCII Move File

Create a Move Queue File If desired, you can create an ASCII text file that lists sources and destinations for a series of moves and upload that move queue file to the library. This option is particularly useful if you need to move a large number of cartridges.

Important The maximum number of moves that can be configured in a single move queue is 100 source/destination pairs.

Important The barcode for a cartridge can only be used as the source in the first move of that cartridge in a connected sequence of moves. The remaining moves in the sequence must specify either a slot or a drive as the source. For example, in a sequence that moves a cartridge from a storage slot to a drive and then back to the storage slot, only the move from the slot to the drive can use the barcode as the source.

Note: The option to upload a move queue file is only available for storage partitions.

Use the following instructions to create an ASCII move file.

1. Use one of the following methods to obtain an inventory listing for the partition in which you plan to move the cartridges:
   - Download the partition inventory using the **Advanced** option on the Inventory screen (see Download the Cartridge Inventory on page 219).
   - Download the partition inventory using the XML command interface. See the *Spectra Tape Libraries XML Command Reference* for a detailed description of each parameter in the downloaded inventory file.

   Note: Both methods return the same information.
2. Using an ASCII text editor, create a file containing the list of moves you want to configure.

   Each line of the move queue file must specify a source and destination separated by a delimiter. The format of each line is:

   `[source_id][source_num][delimiter][destination_id][destination_num]`

   where:

   Note: The slot numbers and drive numbers are assigned by the library.

For this variable...	The possible values are...	Description...
source_id	▪ **SLOT** — The cartridge is moved from a slot in the storage partition. ▪ **EE** — The cartridge is moved from a slot in the entry/exit port. ▪ **DRIVE** — The cartridge is moved from the drive. ▪ **BC** — The cartridge to be moved is identified by its barcode label information. **Note:** The values are not case-sensitive.	Specifies the location type for the source from which you want to move the cartridge.

For this variable...	The possible values are...	Description...
source_num	▪ A positive integer for all *source_id* values except **BC**. ▪ The human-readable barcode label character string if the *source_id* is **BC**. **Important:** If the cartridge does not have a valid barcode label, then you must specify both the element type for the *source_id* and the number of the slot in the entry/exit port or storage partition or the number of the drive where the cartridge is located for the *source_num*.	Specifically identifies the cartridge to be moved, either by the ID of the slot or drive where it is currently located or by the barcode label on the cartridge. ▪ If the *source_id* is SLOT or EE, this value is the number assigned to the slot where the cartridge is currently located. Locate the **<offset>** parameter for the desired cartridge in the downloaded inventory file and use that value as the *source_num*. ▪ If the *source_id* is DRIVE, this value is the number of the drive where the cartridge is currently located. Locate the **<offset>** parameter for the drive in the downloaded inventory file and use that value as the *source_num*. ▪ If the *source_id* is BC, this value is the human-readable barcode character string for the cartridge to be moved. Locate the **<barcode>** parameter for the desired cartridge in the downloaded inventory file and use that value as the *source_num*.
delimiter	; (semicolon) : (colon) **Note:** Either character is acceptable.	The character that separates the source from the destination.
destination_id	▪ **SLOT** — The cartridge is moved to an empty slot in the storage partition. ▪ **EE** — The cartridge is moved to an empty slot in the entry/exit port. ▪ **DRIVE** — The cartridge is moved to the specified drive. **Note:** The values are not case-sensitive.	Specifies the location type for the destination of the cartridge move.

For this variable...	The possible values are...	Description...
destination_num	A positive integer.	Specifies the ID of the location to which the cartridge is moved. ▪ An empty slot in the entry/exit port or storage partition. ▪ The number of the drive. Locate the **<offset>** parameter for the desired slot or drive in the downloaded inventory file and use the value as the *destination_num*.

Example The following lines in a move queue file specify a series of moves.

This line in the file...	Moves...
`BC000618L3;Slot3`	The cartridge with barcode label 000618L3 to slot 3 of the storage partition.
`Slot10;EE5`	The cartridge in slot 10 of the storage partition to slot 5 in the entry/exit port.
`EE8;Slot15`	The cartridge in slot 8 of the entry/exit port to slot 15 in the storage partition.
`Drive3;Slot18`	The cartridge in Drive 3 to slot 18 of the storage partition.
`BC000712L3;Drive1`	The cartridge with barcode label 000712L3 to Drive 1.

3. Examine the move queue file carefully to make sure that each line is formatted correctly and contains both a source and a destination. When the library parses the uploaded file, it rejects the file if it contains any syntax errors.
4. Save the move queue file as an ASCII text file.

   Note: If you plan to use a USB device to upload the move queue file, save the file to the root of the drive using the file name `MoveQueue.txt`.

Upload and Process a Move Queue File After you finish creating the move queue file, use the following steps to upload and process the file.

1. Log into the library as a user with superuser or administrative privileges.
2. If you saved the move queue file to a USB device, connect the drive to one of the USB ports on the LCM and allow time for the device to mount before proceeding (see Connect a USB Device to the Library on page 146).

Important The option to upload the move queue file from a USB device cannot be selected if the USB device is not connected to the LCM before you click **Advanced** on the inventory screen.

3. From the library user interface, select **General** ···⁘ **Inventory**. The Inventory screen displays showing the information for the last partition that was viewed on either the Inventory screen or the Import/Export Media screen.
4. If you want to upload the move queue to a storage partition other than the one currently displayed, select the desired partition from the **Partition** drop-down list, then click **Go**.

   Note: Using a move queue file is only supported for storage partitions.
5. Click **Advanced** to display the advanced inventory options (see Figure 122 on page 220).
6. On the Advanced Inventory screen, select the **Upload Moves** tab.

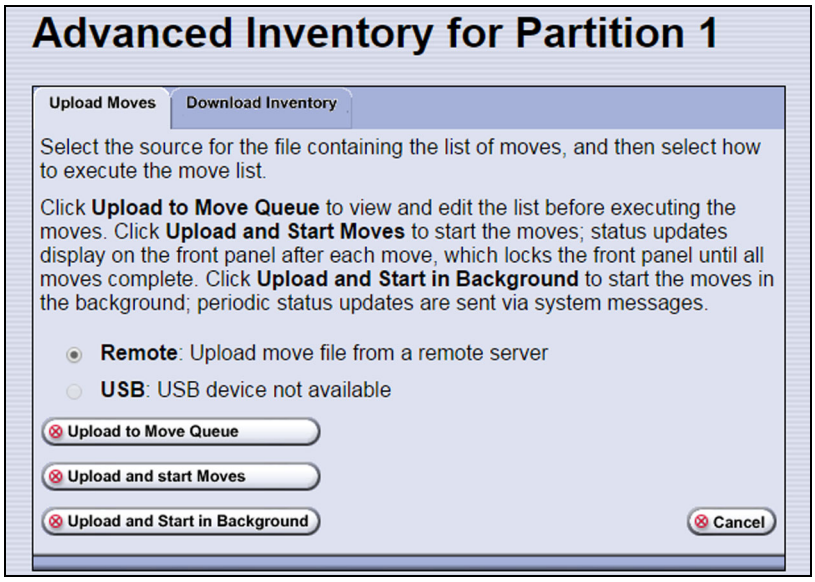


Figure 129 Select the upload options for the move queue file.

7. Select the desired options for uploading the move queue file.

Select...	To...
Remote	Upload the move queue file using the BlueScale web interface.
USB	Upload the move queue file from a USB device connected to the LCM. **Important:** The move queue file must be named MoveQueue.txt. The library does not recognize any other file name. The file must be stored in the root of the USB device.

8. Click the button that describes how you want the file processed.

Click...	To...
Upload to Move Queue	Upload the file to the library. Once uploaded, you can view the parsed move queue file in the Move Queue list on the Inventory screen to review the uploaded moves. After reviewing the Move Queue, choose one of the following: ▪ Click **Start Moves** to begin processing the moves in the order that they are listed in the queue. The front panel is locked while the library processes the moves. ▪ Click **Start in Background** to begin processing the moves without locking the front panel.
Upload and Start Moves	Upload the file to the library and begin the moves immediately. No other operations can be started until the moves complete.
Upload and Start in Background	Upload the file and start the moves in the background. The front panel or RLC is available for some operations. **Notes:** ▪ The library posts informational messages after every 10 moves in the move queue and when the all moves complete. ▪ You are not able to edit the partition, import or export cartridges into the partition, or create another move queue for the partition while background moves are in progress.

- If you selected the USB option, the library retrieves the move file from the USB device.
- If you selected the **Remote** option, the RLC Upload Files screen displays. Navigate to the location where the move queue file is stored, then click **Next** to upload the file.

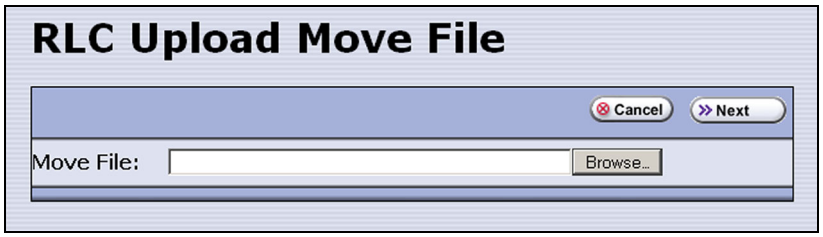


Figure 130 Browse to the location of the move queue file and select it.

9. After the move queue file is uploaded, the library parses the file to create the move queue.

   The parser ignores blank lines and case where possible. It does not determine whether the moves or the order of the moves is possible. If the parser encounters any parsing errors which are insurmountable or if the file contains syntax errors, the library rejects the move file and generates a system message indicating that the move file contained errors and listing the line numbers where the errors were detected.

   For example, if line 1 in the MoveQueue.txt file uploaded from the USB device is **BC000618L3;Slot**, the library posts the following message indicating that the line did not include a value for *destination_num*:

   ```
   ----------------------------------------

   File \USB Disk\MoveQueue.txt has invalid moves in its list

   Invalid Parse on line 1: BC000618L3;Slot

   ----------------------------------------
   ```

10. If necessary, correct any errors in the move file (see Move Cartridges Using an ASCII Move File on page 227) and then repeat Step 2 on page 230 through Step 8 on page 232.

11. The library then processes the moves based on your selection in Step 8 on page 232.

Updating the Software Media Inventory

As the library imports cartridges, it reads the barcode labels and automatically updates the physical inventory that it maintains. This process does not automatically update the media inventory maintained and used by the storage management software.

The storage management software maintains its own media inventory, which it uses when performing backup/restore operations and for media management. To avoid errors when the storage management software requests a specific cartridge, be sure to use your storage management software to update its media inventory whenever you import cartridges into or export/exchange cartridges from a storage partition as described in this chapter. Refer to your software documentation for more information.

CHAPTER 8

Configuring and Using Media Lifecycle Management

This chapter describes how to use BlueScale Media Lifecycle Management to proactively monitor and report on the health of the cartridges in your library. See MLM Best Practices on page 444 for information about using Media Lifecycle Management (MLM) effectively in your environment and ensuring that your MLM data is protected.

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BLUESCALE MEDIA LIFECYCLE MANAGEMENT

This section describes the major features of BlueScale Media Lifecycle Management (MLM). The remainder of the chapter provides detailed information about configuring and using MLM.

Important Before you can use Media Lifecycle Management, you must enable it as described in Enabling MLM and Configuring Global Settings on page 244.

Note: MLM is only supported for LTO-4 and later generation drives and compatible media.

Overview BlueScale Media Lifecycle Management (MLM) helps you manage your tape media (cartridges) by giving you tools to proactively detect potential media errors well before they happen. When used in combination with Spectra Certified MLM-enabled media, MLM lets you manage, track, and report all facets of tape usage from creation to retirement. When used with media that is not MLM-enabled, MLM tracks and reports the general health of the media.

See MLM Best Practices on page 444 for information about using Media Lifecycle Management (MLM) effectively in your environment and ensuring that your MLM data is protected.

Spectra Certified MLM-Enabled Media

Media Lifecycle Management starts with packaged, barcode labeled, Spectra Certified MLM-enabled media (LTO-3 and later generation data cartridges and LTO cleaning cartridges). Before shipment, Spectra Logic writes baseline data to the MAM (Medium Auxiliary Memory) embedded in each cartridge. Throughout its life, the cartridge MAM continually collects data to support MLM tracking and reporting. See Spectra Certified Media on page 456 for additional information.

Automatic Media Discovery

Overview The Media Auto Discovery feature is a background process that loads MLM-enabled cartridges into an LTO-4 or later generation drive, records the MLM information to the cartridge MAM, adds the cartridge to the MLM database, and returns the cartridge to its original location. The process is performed by the library independently from the storage management software. Media Auto Discovery must be enabled on the library, as described in Enabling MLM and Configuring Global Settings on page 244, before it can be used.

> **Note:** If you do not want to use automatic media discovery, you can wait until the library loads and then unloads each cartridge from an MLM-capable drive for the first time during normal operation. When the cartridge is unloaded from the drive, the library discovers it and records the MLM data to the cartridge MAM and enters the data into the MLM database.

When Media Auto Discovery is enabled, MLM provides two options for proactively discovering media in a partition:

- **Media Auto Discovery**—The default process that collects information from the cartridge MAM and adds it to the MLM database. The Media Auto Discovery process only operates on newly imported cartridges that are not already in the MLM database.

  > **Note:** Media Auto Discovery loads and reads the MAM in the tape, but does not thread the tape. The drive only reports the maximum and remaining capacity for the tape after the tape is threaded. Therefore, these statistics report as "0" until a drive reads from, or writes to, the tape.

- **PreScan**—An optional process that replaces Media Auto Discovery. If the PreScan feature is enabled in a partition, the PreScan process runs instead of the Media Auto Discovery process and operates on all of the media in the partition, regardless of whether it is already in the MLM database or not.

  In addition to adding information collected from the cartridge MAM to the MLM database, PreScan performs a basic functionality test and health check on each imported cartridge using available LTO-4 or later generation drives in the partition (see Using PreScan on page 256 for more information).

Discovery Process The discovery process can either be manually initiated by you or set to run automatically so that the library discovers the cartridges and adds their information to the MLM database shortly after a cartridge is imported into the library. The discovery process is independent of any storage management software.

The discovery process depends on whether the library is using Media Auto Discovery or PreScan. With Media Auto Discovery the library reads the barcode label on each new cartridge in the partition; with PreScan the library reads the barcode label on every cartridge in the partition. If a barcode is not already in the MLM database, the library loads the cartridge into a drive and performs either a PreScan or the basic Media Auto Discovery.

- If the cartridge is MLM-enabled, the library collects the available MLM information from the cartridge's MAM, including the born on date. If the cartridge was used previously, the library also collects media health and encryption status from the MAM. The library updates the MLM database to include the collected information and the name of the partition where it currently resides. Any updated MLM information is also written to the MAM in the cartridge.
- If the cartridge is not MLM-enabled, the library collects the cartridge barcode label information, the cartridge health information, and the name of the partition where the cartridge currently resides. It then adds this information to the MLM database.

When the discovery process is complete, the drive unloads the cartridge and the library returns the cartridge to its original location. Each subsequent load/unload updates the MLM database and the cartridge MAM, providing ongoing tracking and reporting for the cartridge.

Manual Discovery If Media Auto Discovery is not enabled or if you enabled MLM when the library already contained cartridges, you can start the media discovery process manually to add the cartridges to the MLM database (see Discover Cartridges Manually on page 254).

Note: After you enable Media Auto Discovery, importing a cartridge into a partition triggers the discovery process in that partition.

Automatic Discovery During Normal Operations Automatic media discovery cannot begin while the library is actively loading cartridges into drives. If you import cartridges during this time, the library posts a failure message stating that no drives are available.

To avoid this failure, either wait until the library is idle before importing media or start the manual discovery process for the imported media when the library is idle. See Discover Cartridges Manually on page 254 for instructions.

Media Tracking and Reporting

Overview MLM uses the information from the cartridge's MAM to maintain a database of vital information about each MLM-enabled cartridge in the library, including the drives into which it was loaded and any errors it encountered. The statistical and diagnostic information in the MLM database helps you proactively manage your tape media throughout its life. Using the information in the database, MLM can generate a variety of reports that let you monitor important health information about every MLM-enabled data cartridge and cleaning cartridge in your library. If desired, you can save the reports to a USB device or email them to a previously configured mail user. You can also download the MLM database as a comma-separated-value (CSV) file.

Notes:
- The MLM database also includes limited information about cartridges that are not MLM-enabled.
- The cartridge inventory is separate from the MLM database and only shows cartridges currently stored in the library. The cartridge inventory does not differentiate between MLM-enabled cartridges and those that are not MLM-enabled.

Discovery Requirement Until a cartridge is discovered, either through the automatic media discovery process or when it is loaded into and then unloaded from a drive for the first time, it is not included in the MLM database; nor is the capacity of a non-discovered data cartridge included on the Filled Capacity bar graph shown on the General Status screen.

Media Health Score The initial load/unload during discovery establishes an initial media health score for each cartridge and adds this information to the MLM database. This initial health score may not accurately reflect the actual health of the media. The health score stabilizes and becomes more accurate after the first four loads/unloads as current usage statistics are updated and used in the tape's health scoring.

MLM Health Reports MLM reports let you review important health information about every MLM-enabled data tape and cleaning tape in your library. You can generate comprehensive health reports for the MLM-enabled media in the whole library or in an individual partition. You can also generate more detailed reports with information about compression ratios, load counts, write errors, remaining capacity, encryption status, and more.

The MLM reports help you identify tapes with high error rates or other problems (for example, a dropped leader pin) that pose a risk to protecting your data. These tapes can then be removed before they cause data corruption or other problems. See Generate MLM Reports on page 266 for detailed information about the types of reports you can generate.

MLM Database Management After a cartridge is added to the MLM database, its MLM data remains in the database even if the cartridge is exported from the library. If the cartridge is later reimported, the MLM database is updated to reflect any new information obtained from the cartridge MAM. When a cartridge is permanently removed from service, it can be manually deleted from the database.

The MLM database is restricted to a maximum of 1,200 records when the library is using a Spectra PC as the LCM; the maximum is 70,000 records when the library is using a Spectra LS as the LCM. When this limit is reached, the record for the least recently exported cartridge, as determined by the Export Date tracked by MLM, is automatically deleted. The library does not notify you when it reaches the maximum number of records.

To ensure that you have a complete record of all the cartridges that are used in the library, regularly generate and export a Media Health report for the entire library (see Using MLM Reporting on page 266). When a cartridge is retired or permanently exported from the library, its record can be deleted from the MLM database. Records can be deleted individually or as a group (see Delete MLM Records From the Database on page 277).

If desired, the information in the MLM database can be exported to a comma-separated value (CSV) file, which can then be imported into Microsoft Excel or other software applications that support this file type (see Download the MLM Database for Analysis and Archival on page 279).

Data Cartridge Tracking

A primary function of MLM is to track the health and usage of the data cartridges that are currently in or were previously in the library.

Functional Overview Each time a Spectra Certified MLM-enabled data cartridge is loaded into a drive, MLM records over 30 data points about the cartridge. These data points include health information, the cartridge age, how many times it was loaded and into which drives, and how many errors it accumulated. It also records when the cartridge is exported from the library and by whom. Each MLM-enabled data cartridge has a unique identifier that allows each cartridge to be tracked throughout its life, even if its barcode label is damaged or removed.

Remaining Capacity Calculations In addition to media health, the library uses information in the MLM database to estimate the Remaining Capacity report for the cartridges in the selected partition. If the partition contains a mix of MLM and non-MLM-enabled data cartridges, the report only shows the estimated capacity on the MLM-enabled cartridges.

Note: Until a data cartridge is loaded into, threaded, and then unloaded from a drive for the first time, its remaining capacity is not included in the Remaining Capacity report.

Cleaning Cartridge Tracking

Functional Overview The library tracks expired cleaning cartridges in the cartridge inventory and does not attempt to use an expired cleaning cartridge. You can identify expired cartridges by examining the Inventory screen. Expired cleaning cartridges are identified by an "x" next to the slot number.

When you enable MLM and use Spectra Certified MLM-enabled LTO cleaning cartridges, MLM tracks and reports usage information for the cleaning cartridges. This information, which includes the number of cleans remaining and the cartridge health (good, near expiration, or expired), is stored in the MLM database.

When a cartridge is nearing the end of its useful life, MLM notifies you so that you can have another on hand to replace it. This early notification helps prevent failed cleanings resulting from using an expired cleaning cartridge. See Enabling MLM and Configuring Global Settings on page 244 for information about setting the threshold for generating the notification.

Expired MLM-Enabled Cleaning Cartridges Each time an MLM-enabled cleaning cartridge is used in a drive, the drive decrements the number of cleans remaining on the cartridge. When the cartridge is unloaded from the drive, MLM reads the number of cleans remaining from the cartridge MAM. When the number of cleans remaining reaches zero, the library flags the cartridge as expired and does not attempt to use the cartridge again. Because the library does not need to load a cleaning cartridge into a drive to determine that it is expired, cleaning failures due to an expired cartridge are eliminated (assuming the cleaning partition contains a good cleaning cartridge). Information about an expired cleaning cartridge remains in the MLM database even after the cartridge is exported from the library.

Expired Non-MLM Cleaning Cartridges When MLM is not enabled or if the cleaning cartridges are not MLM-enabled, the library must load the cleaning cartridge into a drive to determine whether it is expired. When an expired cleaning cartridge is loaded into a drive, it is immediately ejected; the cleaning fails. The library flags the cleaning tape as expired in the cartridge inventory and generates system messages to notify you of the expired cleaning tape and the failed drive cleaning. The library does not attempt to use the expired cartridge for subsequent cleanings.

The library does not store any information about non-MLM cleaning cartridges in the MLM database. The library retains the information about an expired cleaning cartridge for as long as it remains in the library or until the library is power-cycled. If an expired non-MLM cartridge is exported and then reimported into the library, the cartridge must be loaded into a drive in order to identify it as expired.

MLM PreScan and PostScan

Overview MLM PreScan and PostScan are configurable background processes that use an LTO-4 or later generation drive to provide two levels of verification for LTO data cartridges. See Using PreScan on page 256 and Using PostScan on page 257 for detailed information about configuring and using PreScan and PostScan.

Note: PostScan cannot be configured in the same partition as Spectra SKLM encryption key management.

Enable and Configure PreScan and PostScan Both PreScan and PostScan are enabled and configured as part of the partition creation process, as described in Enable and Configure MLM PreScan and PostScan on page 170. During configuration you set the scanning frequency and select the types of scan you want to use.

Usage Requirements Although a Global Spare drive can be shared by multiple partitions, assigning a separate Global Spare drive to each partition is recommended. If you select to perform a FullScan or a QuickScan using a Global Spare drive, each partition can then perform PostScan operations whenever the prerequisites are met, without waiting for PostScan in another partition to complete.

Refer to the following sections for additional information about using the PreScan and PostScan features:

This section...	Provides...
Creating a Cleaning Partition on page 154	Information about using a cleaning partition when a Global Spare drive is used to perform FullScan operations.
Assign Global Spare Drives on page 162	Information about configuring a Global Spare drive. A Global Spare drive must be configured for the partition before the FullScan option can be used.
Using PreScan on page 256	Usage requirements for PreScan.
Using PostScan on page 257	Detailed information about how the QuickScan and FullScan options in the PostScan feature operate. This section also provides instructions for manually adding a tape to the PostScan queue and pausing the currently running PostScan process.

PreScan and PostScan System Messages Both PreScan and PostScan generate system messages as possible error conditions are detected (for example, a broken leader or a media error). The messages indicate that the error condition was detected by the PreScan or PostScan process and not during normal operation.

Interaction with Move Requests If a host requests a move while a cartridge is being scanned using one of the partition drives (PreScan or QuickScan), the move is delayed until the scan completes and the cartridge is returned to its slot.

Background Operations To protect you against making changes that could negatively impact the library's operation, the BlueScale software automatically prevents you from performing certain operations while the library is performing background operations, including Media Auto Discovery, PreScan, or PostScan.

- You cannot import or export cartridges while the library is running a Media Auto Discovery or PreScan operation, nor can you use the BlueScale user interface to move cartridges from one location to another in the library.

  If you cannot wait for the Media Auto Discovery operation to complete, you can stop PreScan and then manually start it at another time (see Stop the Discovery Process on page 256).

- You cannot perform any of the following operations while either a FullScan or a QuickScan that uses Global Spare drives is running in a partition.

  - Import cartridges into or export cartridges from the library
  - Use the BlueScale user interface to move a cartridge from one location to another
  - Use the Global Spare drive being used by PostScan to replace a malfunctioning drive in the partition
  - Change the library configuration settings
  - Create or modify partitions
  - Update BlueScale software or drive firmware

  If you need to perform any of these operations or if you need to reset the library, you can pause the PostScan process for one hour (see Pause the PostScan Process on page 265). The library returns any cartridges currently being scanned to their original locations. After an hour passes, the library checks the prerequisites for starting PostScan (see Prerequisites for Starting a PostScan Operation on page 258) and when met, restarts the PostScan operation on the tape that was being verified at the time of the interruption.

Additional MLM Features

In addition to the features described in the previous sections, MLM provides the following features (listed in alphabetical order):

Broadcast Capacity The Broadcast Capacity option changes the capacity displayed on the General Status screen to show broadcast-centric hours of programming used and hours of programming remaining instead of raw capacity (see Configure How Storage Capacity Displays on page 247).

Database Management Management tools let you manually delete one or more tape records from the MLM database when the tape is retired or permanently exported from the library. You can also download the MLM database as a comma-separated-value (CSV) file and open the file in any software application that supports this type of file (for example, spreadsheet software).

Filled Capacity Information In addition to tracking media health and generating reports, MLM displays a Filled Capacity bar graph on the General Status screen. This graph shows the remaining uncompressed storage capacity for the MLM-enabled media in the entire library or in a specific partition. Click on the Filled Capacity bar graph to view the Media Lifecycle Management Report screen (Figure 145 on page 268).

Note: Until a data cartridge is loaded into, threaded, and then unloaded from a drive for the first time, its data capacity is not included on the Filled Capacity bar graph shown on the General Status screen.

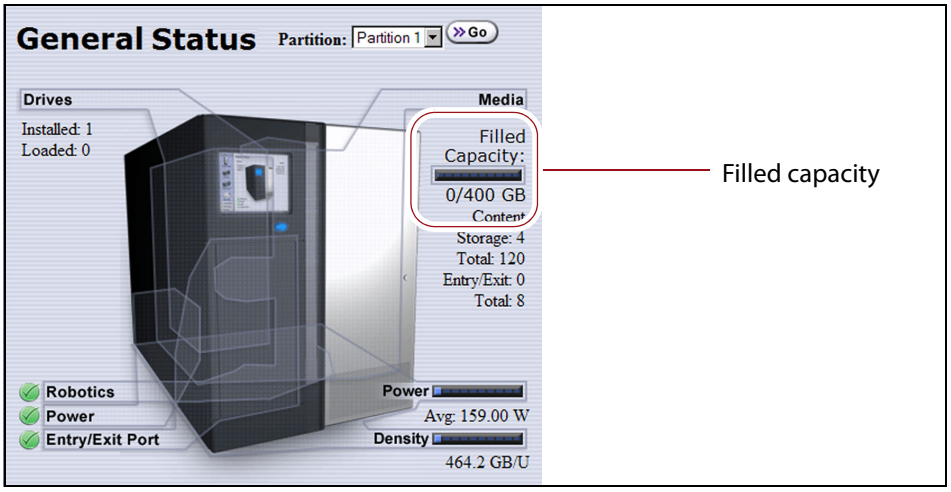


Figure 131 The General Status screen shows the storage capacity usage for the selected partition.

Media Alert The Media Alert feature generates a system message when a tape's health is identified as poor (red) during five consecutive loads. This message is only generated once per tape. A separate system message is generated whenever a tape experiences a hard error.

Tracking Non-MLM-Enabled Media MLM tracks the basic health information for LTO data cartridges that are not MLM-enabled. This basic health information is based on tape log data retrieved from an MLM-capable LTO drive (LTO-4 or later generation) when the cartridge is ejected. The data pertinent to media health is stored in the MLM database and used to determine the media health status (Usable or Impaired) included in Media Lifecycle Management reports.

ENABLING MLM AND CONFIGURING GLOBAL SETTINGS

Overview This section describes enabling MLM on the library and configuring the global MLM features. The global features are optional and operate for every partition that is configured to use PreScan and PostScan (see Enable and Configure MLM PreScan and PostScan on page 170).

Notes:
- MLM is enabled by default. If you do not want to use MLM, you must disable it.
- Disabling MLM also disables DLM.

Important

Before disabling (or re-enabling) Media Lifecycle Management, make sure that none of the drives in the library contain a cartridge. Use your application software to unload cartridges from the drives and return them to the slots in the library.

User Privilege Requirements Only a user with superuser or administrator privileges can enable MLM and configure the global MLM features.

Enable MLM and Configure Settings

Use the following steps to enable MLM and Media Auto Discovery and configure the global settings for MLM. These settings affect all partitions in the library.

Note: Enabling MLM automatically enables Drive Lifecycle Management (DLM) as well. See Chapter 9 – Using Drive Lifecycle Management, beginning on page 280 for information about DLM.

1. Log into the library as a user with superuser or administrator privileges.

2. From the toolbar menu, select **Configuration ···› Media Lifecycle Management**. The Media Lifecycle Management Settings screen displays.

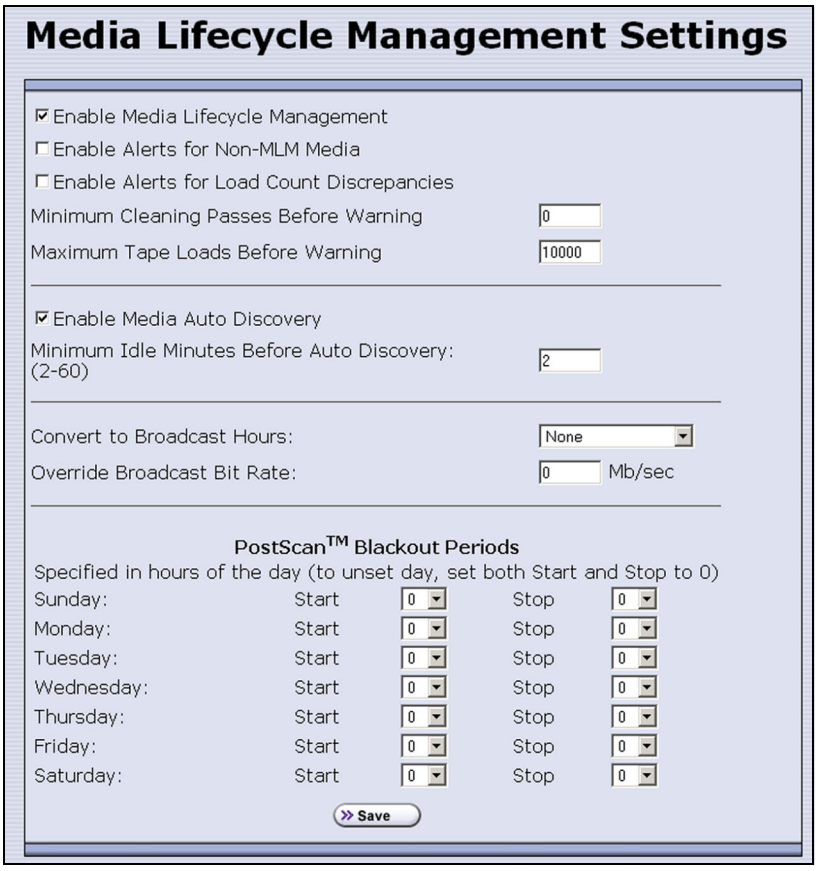


Figure 132 Use the Media Lifecycle Management Settings screen to enable MLM and configure the global settings.

3. Select the MLM features you want to use.

Select this option...	To...	Default Setting
Enable Media Lifecycle Management	Enable the Media Lifecycle Management (MLM) features in the library. MLM is enabled by default. Enabling Media Lifecycle Management also enables Drive Lifecycle Management (DLM), which is described in Chapter 9 – Using Drive Lifecycle Management, beginning on page 280.	Selected (Enabled)
Enable Alerts for Non-Certified Media	Configure MLM to generate an alert message when a cartridge that is not MLM-enabled is loaded into a drive. **Note:** Enabling this alert is only recommended if all of the media typically used in the library is MLM-enabled.	Cleared (Disabled)
Enable Alerts for Load Count Discrepancies	Configure MLM to generate an alert message when the load count for the cartridge stored in the MLM database differs from the load count stored on the cartridge's MAM.	Cleared (Disabled)

Select this option...	To...	Default Setting
Minimum Cleaning Passes Before Warning	Set the threshold for the minimum number of cleaning passes remaining on a cleaning cartridge. When a cleaning cartridge reaches this threshold, a warning message is generated showing that the cleaning cartridge is nearly expired. The warning message is generated every time the cleaning tape is used while the number of cleanings remaining is at or below the threshold value.	Zero (0)
Maximum Tape Loads Before Warning	Set the number of times a tape can be loaded into a drive before a load count warning message is generated. When the number of tape loads reaches the specified threshold, a warning message is generated. Subsequent loads do not generate additional messages. Generate a Load Count Media Lifecycle Report to determine the current usage status of the media in your library (see Using MLM Reporting on page 266 for detailed information). **Note:** If you began using MLM-enabled cartridges before you enabled MLM, some of your media may already exceed the thresholds you set.	10,000 loads
Enable Media Auto Discovery	Enable the Media Auto Discovery feature. Media Auto Discovery must be enabled before the library proactively discovers newly imported LTO cartridges and add them to the MLM database. If you enable PreScan for the partition, the Media Auto Discovery process is replaced by the more in depth PreScan process for that partition (see Enable and Configure MLM PreScan and PostScan on page 170). **Requirements** ▪ Media Lifecycle Management must be enabled. ▪ All cartridges must have barcode labels. **Notes:** ▪ The Media Auto Discovery process identifies MLM-enabled cartridges as well as those that are not MLM-enabled. ▪ The Media Auto Discovery process may be affected by your storage management software. In addition, software that polls the drives on a regular basis is affected by the discovery process. If you encounter interactions with your storage management software, you can choose to either stop the storage management software from accessing the library before starting the discovery process or you can choose not to use Media Auto Discovery. ▪ If you do not enable Media Auto Discovery, you can start the discovery process for a specific partition manually. See Discover Cartridges Manually on page 254 for instructions. —OR— You can let the library discover cartridges and add them to the MLM database the first time they are loaded and unloaded from an MLM-enabled drive during normal operations.	Cleared (Disabled)
Minimum Idle Minutes Before Auto Discovery	Set the number of minutes that the library needs to be idle before the Media Auto Discovery process begins.	5 minutes

Select this option...	To...	Default Setting
Convert to Broadcast Hours	Display the MLM capacity using a broadcast-centric method based on hours of content used and total hours of content available instead of raw capacity for all MLM-enabled cartridges. See Configure How Storage Capacity Displays on page 247 for detailed information.	None (Disabled)
PostScan Blackout Periods	Configure time periods during which the automatic PostScan process does not operate. See Configure PostScan Blackout Periods on page 249 for detailed information.	Zero (0) (Disabled)

4. Click **Save** to enable the selected MLM features.

Configure How Storage Capacity Displays

By default, the General Status screen shows the raw storage capacity for all MLM-enabled cartridges in the selected partition. If desired, you can configure the library to use a broadcast-centric method for displaying the storage capacity in terms of hours of content used and total hours of content available.

1. Log into the library as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Configuration ···⁘ Media Lifecycle Management**. The Media Lifecycle Management Settings screen displays (see Figure 132 on page 245).

3. Select the method for converting to broadcast capacity from the **Convert to Broadcast Hours** drop-down list.

   Note: To return to displaying raw capacity, select **None**.

Important If you select **None** in the **Convert to Broadcast Hours** field, leave the **Override Broadcast Bit Rate** value set to 0.

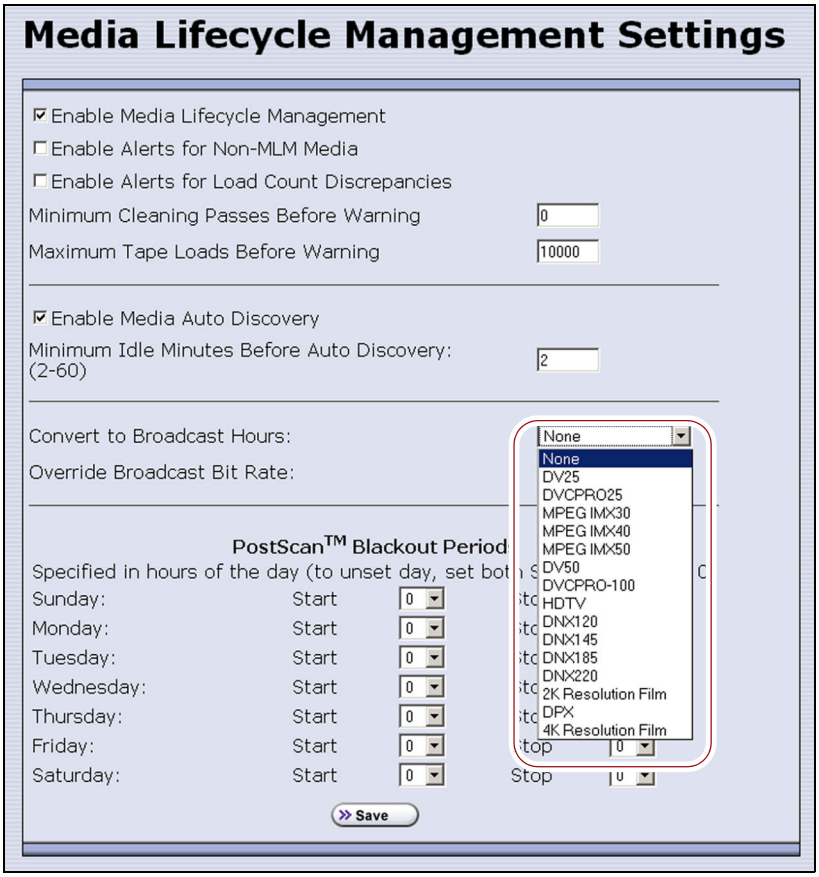


Figure 133 Select the conversion settings on the Convert to Broadcast Hours drop-down list.

4. The choice that you make in the Broadcast Hours field automatically selects a default **Override Broadcast Bit Rate**. If necessary, change the **Override Broadcast Bit Rate** as required for your environment. The default value for the broadcast bit rate depends on the Broadcast Hours conversion you selected.

5. Click **Save**. The Filled Capacity bar graph on the General Status screen changes to reflect hours of content based on the settings for Convert to Broadcast Hours.

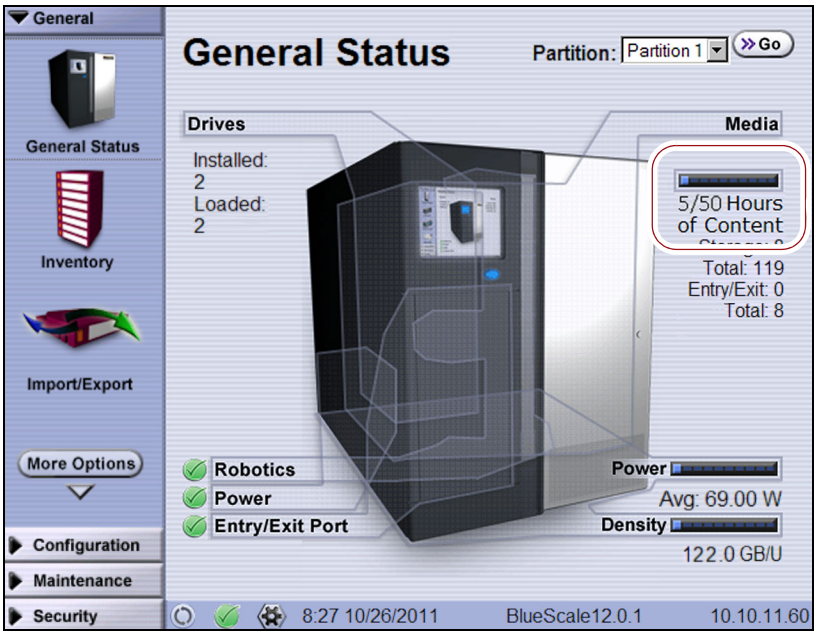


Figure 134 The General Status screen changes to show capacity as Hours of Content.

Configure PostScan Blackout Periods

If desired, you can configure blackout periods during which the automatic PostScan process does not operate. Configuring blackout periods ensures that during your backup window, all of the cartridges in the partition are immediately available and ensures that a Global Spare drive is available if needed.

Important

When configuring blackout periods, keep the following information in mind:

- The blackout periods you configure apply to all of the partitions in the library.
- If PostScan is actively verifying a tape at the time the blackout period starts, it completes the current scan. No additional tapes are scanned until the blackout period expires.

1. Log into the library as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Configuration ···⁘ Media Lifecycle Management**. The Media Lifecycle Management Settings screen displays.

3. In the PostScan Blackout Periods pane, use the **Start** and **Stop** drop-down lists to set the start and end times for the blackout period for each day of the week.

   Notes:
   - Times are based on a 24-hour clock, where 0 is midnight.
   - To disable the blackout period for a specific day, set both **Start** and **Stop** to 0.
   - By default, the blackout periods are all set to 0 (disabled). The PostScan process runs whenever there are tapes in the PostScan queue and a Global Spare drive is available.

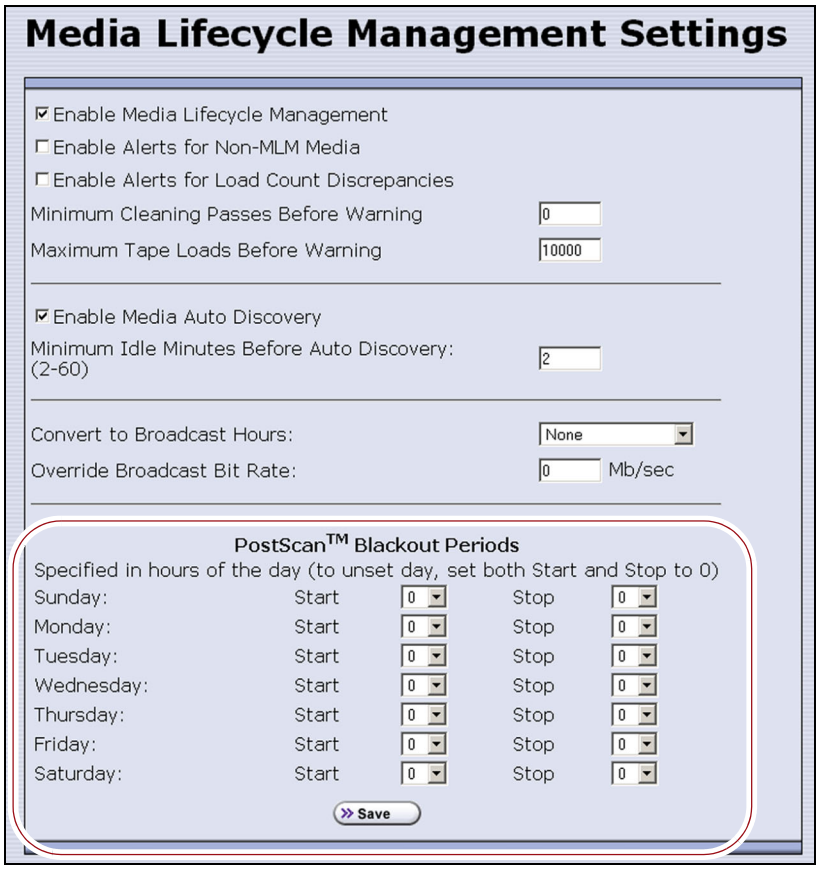


Figure 135 Select the desired blackout periods for PostScan.

4. Click **Save**.
5. The blackout periods you set take effect when you enable PostScan for individual partitions by configuring one or more PostScan triggers (see Enable and Configure MLM PreScan and PostScan on page 170).

USING MEDIA LIFECYCLE MANAGEMENT

Overview After you enable MLM and configure the global settings (see Enabling MLM and Configuring Global Settings on page 244), you are ready to begin using MLM to track and monitor the LTO media in the library.

Note: If you want to use the PreScan and PostScan options, you must enable and configure these options for each partition (see Enable and Configure MLM PreScan and PostScan on page 170).

User Privilege Requirements See Specify the Partition Users on page 176 for information about assigning users to a partition.

- Only a user with superuser or administrator privileges can manually start and stop media discovery (using either Media Auto Discovery or PreScan), manually start and pause PostScan operations, and manage the MLM and DLM databases.
- Any user with operator privileges who is assigned to the partition and all users with superuser or administrator privileges can generate and save MLM reports.

Add Cartridges to the MLM Database

The cartridges used in the library are not added to the MLM database until they are discovered. The process you use to discover cartridges and add them to the MLM database depends on when you loaded the cartridges into the library.

Important If a cartridge is write-protected when it is inserted into a drive, the library cannot update the MLM information on the cartridge's MAM.

Notes:
- Media Auto Discovery cannot begin while the library is actively loading media into drives. If you import media during this time, the library posts a failure message stating that no drives are available. Either wait until the library is idle before importing media or start the discovery process for imported media manually when the library is idle.
- If you import cartridges into the library with MLM disabled, those cartridges are not automatically discovered and added to the MLM database. After you enable MLM, you must use the manual discovery process to add the cartridges to the MLM database (see Discover Cartridges Manually on page 254).

The following table provides information about different possible scenarios for adding cartridges to the MLM database.

If you...	Do this to add the cartridges to the MLM database...
Recently purchased your library and are importing cartridges into the library for the first time,	**1.** Make sure that MLM is enabled (see Enabling MLM and Configuring Global Settings on page 244). **2.** If desired, enable PreScan (see Using PreScan on page 256). **3.** Import media into the partitions to trigger the automatic discovery process. **Important:** Discovery cannot begin while the hosts are actively loading cartridges into and unloading cartridges from drives. If you import cartridges during this time, the library posts a failure message stating that no drives are available. Either wait until the library is idle before importing cartridges or manually start the discovery process when the library is idle.
Have an existing library that does not have the most current version of BlueScale installed and: ▪ you began using MLM-enabled Spectra Certified LTO media when it became available but before BlueScale10.4 introduced the MLM functionality in the fall of 2008, —OR— ▪ you began using a mixture of MLM-enabled and non-MLM-enabled Spectra Certified LTO media before the MLM functionality was introduced in BlueScale10.4,	**1.** Update the library to the most current BlueScale software. See Updating the BlueScale Software and Library Firmware on page 382 for instructions. **2.** Enable MLM for the library (see Enabling MLM and Configuring Global Settings on page 244). **3.** If desired, enable PreScan (see Using PreScan on page 256). **4.** Discover the cartridges in the library using one of the following methods: ▪ Import new cartridges into the partition to trigger the automatic discovery process. If you do not have PreScan enabled, the discovery process only checks cartridges that are not already in the MLM database. If PreScan is enabled, all of the cartridges in the partition are processed, regardless of whether or not they are already in the MLM database. **Important:** Discovery cannot begin while the hosts are actively loading cartridges into and unloading cartridges from drives. If you import cartridges during this time, the library posts a failure message stating that no drives are available. Either wait until the library is idle before importing cartridges or manually start the discovery process when the library is idle. ▪ If you do not want to wait until you import new cartridges to have the cartridges already in the library added to the MLM database, manually start the discovery process (see Discover Cartridges Manually on page 254). ▪ Use your storage management software to load each cartridge into an LTO-4 or later generation drive and then unload it. ▪ Let the library update the MLM database as part of normal operation. The information for each cartridge is added to the MLM database the first time the cartridge is loaded into and then unloaded from an LTO-4 or later generation drive. **5.** When the initial discovery process is complete, disable the alert about non-MLM-enabled media, if desired.

If you...	Do this to add the cartridges to the MLM database...
Have an existing library with the most current version of BlueScale installed. Cartridges are already imported into the library, but you just recently enabled MLM,	**1.** If you want to detect any non-MLM-enabled cartridges being imported, temporarily enable the alert on the Media Lifecycle Management Settings screen (see Enable Alerts for Non-Certified Media on page 245). The alert is disabled by default. **2.** If desired, enable PreScan (see Using PreScan on page 256). **3.** Discover the cartridges in the library using one of the following methods: ▪ Import new cartridges into the partition to trigger the automatic discovery process. If you do not have PreScan enabled, the discovery process only checks cartridges that are not already in the MLM database. If PreScan is enabled, all of the cartridges in the partition are processed, regardless of whether or not they are already in the MLM database. **Important:** The automatic discovery process cannot begin while the library is actively loading cartridges into drives. If you import cartridges during this time, the library posts a failure message stating that no drives are available. Either wait until the library is idle before importing cartridges or manually start the discovery process when the library is idle after you import the cartridges. ▪ If you do not want to wait until you import new cartridges to have the cartridges already in the library added to the MLM database, manually start the discovery process (see Discover Cartridges Manually on page 254). ▪ Use your storage management software to load each cartridge into an LTO-4 or later generation drive and then unload it. ▪ Let the library update the MLM database as part of normal operation. The information for each cartridge is added to the MLM database the first time the cartridge is loaded into and then unloaded from an LTO-4 or later generation drive. **4.** When the initial discovery process is complete, disable the alert about non-MLM-enabled media, if desired. **5.** To routinely verify the readability of the cartridges, configure PostScan for each partition in the library (see Using PostScan on page 257).

Discover Cartridges Manually

1. Make sure that Media Lifecycle Management is enabled before you start the discovery process (see Enabling MLM and Configuring Global Settings on page 244).
2. From the toolbar menu, select **Maintenance ⋯ MLM**. The Media Lifecycle Management Tools screen displays.
3. Click **Discover Media** to start the manual discovery process.

   Note: If all of the media in the library was previously discovered, the **Discover Media** button is grayed out. You do not need to perform a manual media discovery.

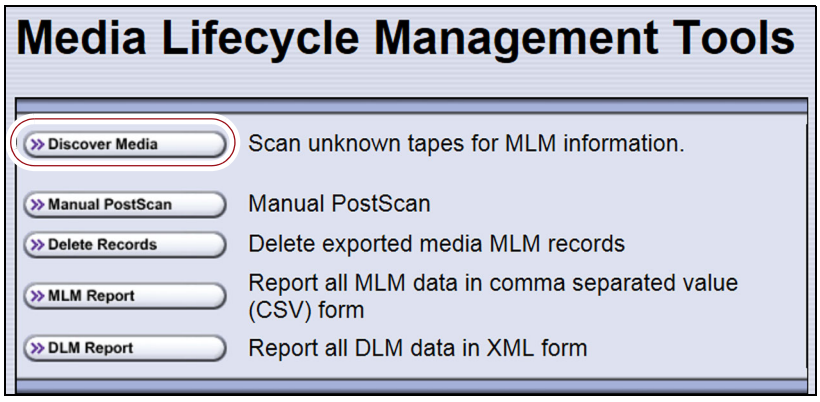


Figure 136 Click **Discover Media** on the MLM Tools screen to begin configuring a manual media discovery process.

4. Select the partition containing the cartridges you want to add to the MLM database, then click **Next**.

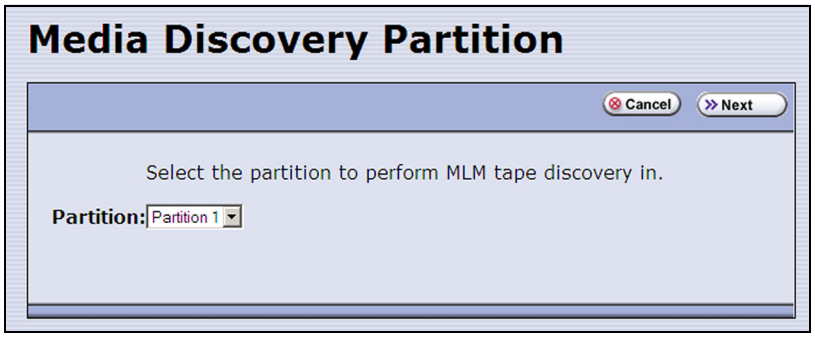


Figure 137 Select the partition containing the cartridges you want to add to the MLM database.

5. Click **OK** on the Start Media Discovery screen to begin the discovery process.

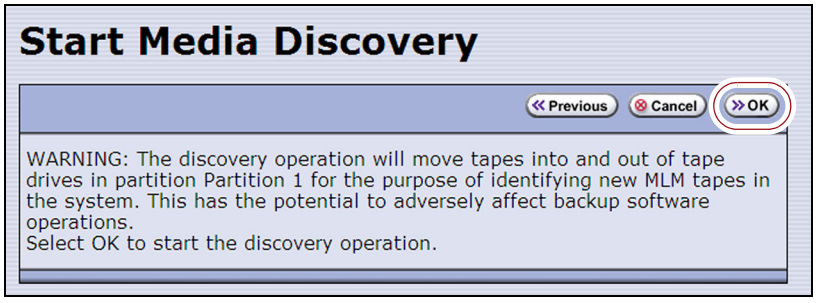


Figure 138 Click **OK** on Start Media Discovery screen to start media discovery.

6. When the Media Discovery Start Results screen displays, click **OK** to confirm that the process started and return to the Media Lifecycle Tools screen.

   The discovery process continues in the background while the library continues to operate.

   Note: See Background Operations on page 242 for information about operations that cannot be performed while the discovery process is running.



Figure 139 The Media Discovery Start Results screen displays when the discovery process starts.

Stop the Discovery Process

If for some reason you need to interrupt the discovery process before it is complete, click **Stop Discovery** on the Media Lifecycle Management Tools screen. The library completes any Media Auto Discovery or PreScan operations that are in progress and returns the cartridges to their slots.

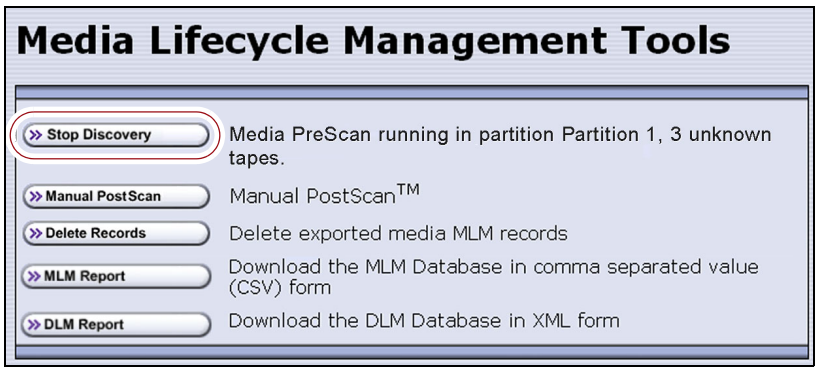


Figure 140 Click **Stop Discovery** to stop the discovery process.

To resume the discovery process, repeat the steps in Discover Cartridges Manually on page 254 or wait until you import additional cartridges into the partition to trigger the discovery process automatically.

USING PRESCAN

Overview The MLM PreScan feature is a background process that replaces the default Media Auto Discovery process in partitions where it is enabled; unlike Media Auto Discovery it does not operate globally. PreScan is enabled when you configure the partition (see Enable and Configure MLM PreScan and PostScan on page 170).

PreScan provides verification of data cartridges by performing a basic functionality test and health check on each imported cartridge using available LTO-4 or later generation drives in the partition. As a part of the PreScan process, any cartridges that are not already in the MLM database are added to the MLM database.

During the PreScan process, the library automatically inserts each cartridge into an available LTO-4 or later generation drive assigned to the partition. The drive loads the cartridge and checks it to determine whether it has any of the following characteristics:

- Non-MLM-enabled
- Broken or dislodged leader
- Red media health
- Write protected
- Encrypted tape with a moniker not currently stored in the library

When the PreScan process is complete, the library stores the tape health information for the cartridge in the MLM database. It also writes the MLM data to the cartridge MAM. When the drive ejects the cartridge, the library returns it to its original slot.

Requirements for Use When using PreScan, make sure that you consider the following requirements:

Consideration	Requirement
Drive Firmware	▪ LTO-4: requires 94D0 or later firmware. ▪ LTO-5: requires B170 or later firmware. ▪ LTO-6 and later: supported with any firmware.
Updating MLM Data on MAM	Updating the cartridge MAM requires the cartridge to be write-enabled. **Important:** If a cartridge is write-protected when it is inserted into a drive, the information about the cartridge is added to the MLM database, but the library cannot update the MLM information on the cartridge's MAM.
Drive Availability	The media discovery process loads the cartridges in the partition into the drives assigned to that partition. While in use for PreScan, host moves to the drives being used are delayed until the PreScan operation completes. Spectra Logic highly recommends that you perform the manual media discovery process when your storage management software is not accessing the library and the library is idle.
Auto Drive Clean Restrictions	Auto drive clean operations do not start while PreScan is running on any partition that is associated with the cleaning partition. If a drive requires cleaning, wait until the PreScan operation is complete and then manually clean the drive.
Cleaning Partitions	The PreScan feature cannot be enabled for a cleaning partition and does not affect the operation of cleaning cartridges.

USING POSTSCAN

This section provides detailed information about how PostScan operates, as well as prerequisites for using PostScan and performing manual PostScan operations.

PostScan is enabled and configured for each individual partition. PostScan does not operate until the PostScan option is selected and one or more triggers are specified for the partition (see Enable and Configure MLM PreScan and PostScan on page 170).

Note: PostScan cannot be configured in the same partition as Spectra SKLM encryption key management.

Operational Overview

PostScan—either FullScan or QuickScan—performs a readability verification test to verify data integrity for all of the cartridges in the MLM database. FullScan uses an LTO-4 or later generation Global Spare drive assigned to the partition and QuickScan uses an LTO-5 or later generation drive in the partition or Global Spare drive assigned to the partition to check each LTO cartridge in the partition for media errors that can impact the ability to restore the data.

The PostScan process is performed by the library independent of the storage management software normally used to read and write data to the tape. You can choose to perform PostScan either automatically or manually. For automatic scans you can set the scanning frequency and select options to determine the type of scan performed.

Using FullScan on tapes that are written using variable block sizes is not recommended.

Prerequisites for Starting a PostScan Operation

When an MLM-enabled cartridge meets the PostScan trigger criteria configured for the partition, the cartridge is added to the PostScan queue. The queue is processed in a first-in-first-out (FIFO) basis.

Note: The automatic PostScan triggers only apply to MLM-enabled LTO cartridges. LTO cartridges that are not MLM-enabled must be manually added to the PostScan queue (see Request a Manual PostScan on page 262).

Before beginning the PostScan process, the library verifies that the following prerequisites are met:

- The system is idle for the period of time specified for the partition (see Enable and Configure MLM PreScan and PostScan on page 170).
- The library is not currently in a PostScan blackout period (see Configure PostScan Blackout Periods on page 249).
- If **Full Scan** is enabled, an LTO-4 or later generation Global Spare drive assigned to the partition is available.

  —OR—

  If **QuickScan** is enabled, an LTO-5 or later generation drive in the same partition as the cartridge that met the PostScan trigger criteria is available.

  —OR—

  If **QuickScan with Spare Drives** is enabled, an LTO-5 or later generation Global Spare drive assigned to the partition is available.

Cartridge Scanning

If the PostScan prerequisites are met, the library inserts the first cartridge in the PostScan queue into an available drive. The cartridges in the PostScan queue are processed on a first-in-first-out (FIFO) basis. Depending on the PostScan option selected for the partition, the drive loads the cartridge and begins one of the following operations to check for media errors.

Notes:
- PostScan reads the data on the tape but does not process this data into a usable form. It simply verifies that it can read the data from the tape.
- See Enable and Configure MLM PreScan and PostScan on page 170 for additional information about the differences between the FullScan and QuickScan processes.

This PostScan option...	Uses...
FullScan	A Global Spare drive assigned to the partition. FullScan verifies all of the data on the tape, from the beginning of the tape (BOT) to the end of the recorded data (EOD) or the physical end of the tape, whichever comes first. **Notes:** ▪ If the partition uses LTO-4 drives, FullScan is the only available option. ▪ A Global Spare drive must be assigned to the partition. ▪ The cartridge does not appear on the BlueScale inventory screens while it is being scanned. If the cartridge is requested by the storage management software it is immediately ejected from the drive that is performing the verification and moved to the location requested by the storage management software. A system message is posted to indicate that the FullScan operation was interrupted. The cartridge is returned to the top of the PostScan queue and is the first one processed after it is returned to its slot. ▪ The Global Spare drive cannot be activated while FullScan is running. You must first pause the PostScan process (see Pause the PostScan Process on page 265). The library immediately aborts the FullScan currently in progress and returns the cartridge to its original location. You can then activate the Global Spare drive (see Use the Global Spare Drive on page 349). The aborted FullScan process resumes when the Global Spare drive is again available. ▪ The time to complete a FullScan depends on the type and amount of data on the tape and whether it was written using fixed- or variable-length blocks. **Note:** Using FullScan on tapes that are written using variable-length block sizes is not recommended.

This PostScan option...	Uses...
QuickScan	One of the LTO-5 or later generation drives in the partition. QuickScan verifies all of the data on a single wrap, from the beginning of the tape (BOT) to the end of the wrap or the end of recorded data (EOD), whichever comes first. **Notes:** ▪ If a Global Spare drive is not assigned to the partition, a QuickScan using one of the partition's drives is the only option available. ▪ If possible, the library avoids using the drive in which the cartridge was most recently unloaded to perform the QuickScan. ▪ A QuickScan using a partition's drive is limited to three minutes. If the QuickScan exceeds this time limit, the operation is aborted and the cartridge is returned to its slot. The library posts a message stating that the QuickScan failed. Use FullScan to verify the cartridge. ▪ While QuickScan is running, all moves in the partition are delayed until the scan is complete.
QuickScan using a Global Spare	An LTO-5 or later generation Global Spare drive. QuickScan verifies all of the data on a single wrap, from the beginning of the tape (BOT) to the end of the wrap or the end of recorded data (EOD), whichever comes first. **Notes:** ▪ A Global Spare drive must be assigned to the partition. ▪ The cartridge does not appear on the BlueScale inventory screens while it is being scanned. If the cartridge is requested by the storage management software it is immediately ejected from the drive that is performing the verification and moved to the location requested by the storage management software. A system message is posted to indicate that the QuickScan operation was interrupted. The cartridge is returned to the top of the PostScan queue and is the first one processed after it is returned to its slot. ▪ The Global Spare drive cannot be activated while a QuickScan using Global Spares is running. You must first pause the PostScan process (see Pause the PostScan Process on page 265). The library immediately aborts the QuickScan currently in progress and returns the cartridge to its original location. You can then activate the Global Spare drive (see Use the Global Spare Drive on page 349). The aborted QuickScan process resumes when the Global Spare drive is again available. ▪ A QuickScan using a Global Spare drive is limited to ten minutes. If the QuickScan exceeds this time limit, the operation is aborted and the cartridge is returned to its slot. The library posts a message stating that the QuickScan failed. Use FullScan to verify the cartridge.

Updating the MLM Database

When the PostScan process on a cartridge is complete, the library writes the scan date and a pass/fail test result to the cartridge MAM and updates the MLM database with the scan date, the pass/fail test result, and when (or if) the next scan should occur. The drive then unloads the cartridge and the library returns it to its original slot. The library then posts a system message showing that the cartridge was scanned. If the QuickScan used a partition drive, the library reports that the unload move for the backup operation that preceded the QuickScan is complete.

Global Spare Drive Cleaning

After a cartridge is unloaded from a Global Spare drive following a PostScan verification, the library checks to see if the drive requires cleaning. If cleaning is required and a cleaning partition is associated with the storage partition to which the Global Spare is assigned, the drive is cleaned before the next cartridge is processed.

Note: If a cleaning partition is not present, periodically check the Drive Details screen for each drive to determine whether cleaning is required. If cleaning is required, follow the instructions provided in Manually Cleaning a Drive on page 407.

Address Requirements for Use

As you configure and use PostScan, keep the following information in mind:

Consideration	Description
Drive Firmware	▪ LTO-4: requires 94D0 or later firmware. ▪ LTO-5: requires B170 or later firmware. ▪ LTO-6 and later: supported with any firmware.
Updating MLM Data on MAM	Updating the cartridge MAM requires the cartridge to be write-enabled. **Important:** If a cartridge is write-protected when it is inserted into a drive, the information about the cartridge is added to the MLM database, but the library cannot update the MLM information on the cartridge's MAM.
Drive Support for PostScan	▪ LTO-4: Only the FullScan option is available when using LTO-4 drives. ▪ LTO-5 or later generations: FullScan, QuickScan, and QuickScan using Global Spare are available when using LTO-5 or later generation drives. **Note:** While a drive is in use for QuickScan operations, it is unavailable to the storage management software.
Background Operations	To protect you from making changes that could negatively impact the library's operation, the BlueScale software automatically prevents you from performing certain operations while either a FullScan or a QuickScan that uses Global Spare drives is running. However, you can pause the FullScan or QuickScan operation if you cannot wait for it to complete. See Background Operations on page 242 for detailed information.

Consideration	Description
Storage Management Software Configuration	When using automatic PostScan to check your cartridges, configure your storage management software to allow at least 15 minutes for a requested move to complete. If a cartridge is in the process of being scanned when it is requested for a backup or restore operation, it must be unloaded from the Global spare and moved to another drive before the move request is reported as complete.
Global Spare Drives	Both FullScan and QuickScan using Global Spare require a Global Spare drive. Although a Global Spare drive can be shared by multiple partitions, assigning a separate Global Spare drive to each partition is recommended. Each partition can then perform PostScan whenever the prerequisites are met, without waiting for PostScan in another partition to complete.
Blackout Periods	Because the storage management software can potentially request a tape that is currently undergoing verification, you can configure blackout periods during which the PostScan operation is suspended. Configuring blackout periods ensures that PostScan does not operate during your normal backup window. The blackout periods apply to all of the storage partitions in the library. See Configure PostScan Blackout Periods on page 249 for instructions.
Cleaning Partitions	The PostScan feature cannot be enabled for a cleaning partition and does not affect cleaning tapes.

Enable PostScan

PostScan is enabled by selecting one or more trigger criteria when you configure a partition (see Enable and Configure MLM PreScan and PostScan on page 170). The available PostScan options depend on whether the partition uses LTO-4 or later generation drives and whether or not a Global Spare drive is assigned to the partition.

Important

PostScan is enabled and configured for each individual partition. PostScan does not operate until the PostScan option is selected and one or more triggers are specified for the partition.

Request a Manual PostScan

The automatic PostScan triggers only add MLM-enabled LTO data cartridges to the PostScan queue. However, cartridges can also be added to the PostScan queue manually. This is especially useful if your library contains LTO cartridges that are not MLM-enabled. You can also use the manual PostScan process to verify a suspect MLM-enabled cartridge even if it was previously scanned.

Cartridges that are manually added to the PostScan queue are processed before cartridges that were added as a result of the trigger criteria for the partition. They are processed using the PostScan option that was specified for the partition.

Use the following steps to manually start the PostScan process.

1. Enable Media Lifecycle Management if it is not already enabled (see Enabling MLM and Configuring Global Settings on page 244).
2. From the toolbar menu, select **Maintenance** ···⁘ **MLM**. The Media Lifecycle Management Tools screen displays.

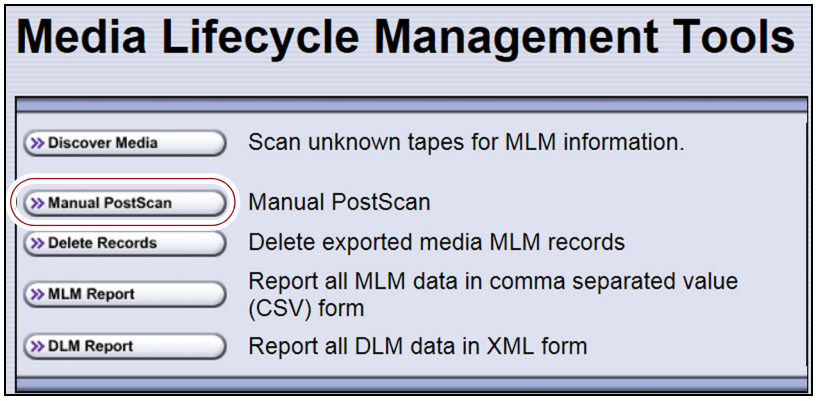


Figure 141 Click **Manual PostScan** on the MLM Tools screen.

3. Click **Manual PostScan**. The MLM Manual PostScan screen displays showing the information for the partition that was selected the last time the screen was viewed.

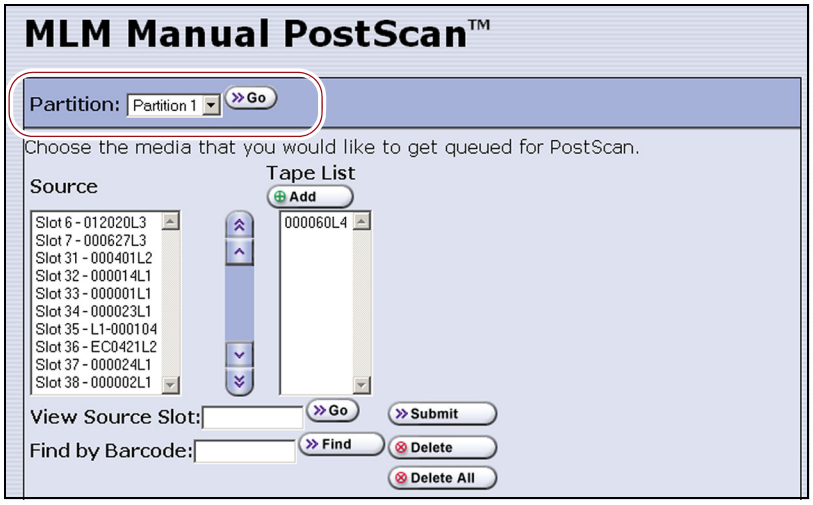


Figure 142 Use the MLM PostScan screen to select the cartridges to add to the PostScan queue.

4. If the media is in a partition other than the one currently displayed, select the desired partition from the **Partition** drop-down list, then click **Go**.

   The **Source** list refreshes to display a list of the cartridges in the requested partition. The list shows the name of the location (for example, the slot number) and the barcode label information for the cartridge in that location.

5. Select the cartridge that you want to check for media errors. You can select the cartridge either from the **Source** list, by entering its barcode, or by entering the slot number where it is located.

To select a cartridge using the...	Follow these steps...
Source list	Scroll through the list of available media and select the desired cartridge.
Slot number	**1.** Enter the slot number for the cartridge you want in the **View Source Slot** field. **2.** Click **Go**. The **Source** list refreshes to show the requested cartridge highlighted at the top of the list. **3.** Click the cartridge to select it.
Barcode label information	**1.** Enter the barcode label information for the cartridge you want to locate in the **Find by Barcode** field. **2.** Click **Find**. The **Source** list refreshes to show the requested cartridge highlighted at the top of the list. **3.** Click the cartridge to select it. **Important:** Only the slots below the top one displayed in the list are searched. Scroll to the top of the source list before clicking **Find**. The search starts at the second visible slot.

6. Click **Add** to add the selected cartridge to the **Tape List**.
7. Repeat Step 4 though Step 6 to add additional tapes to the **Tape List**.

   Note: If you want to remove one or more cartridges from the **Tape List**:

   - Select the cartridge and click **Delete** to remove it from the list.
   - Click **Delete All** to remove all of the cartridges from the list.

8. Click **Submit** to add the cartridges in the **Tape List** to the PostScan queue.

Pause the PostScan Process

If you need to perform any of the operations listed in Background Operations on page 242 or if you need to reset the library, you can pause the PostScan process. The library returns any cartridges currently being scanned to their original locations.

Important Pausing PostScan affects all partitions that are configured to use PostScan.

1. From the toolbar menu, select **Maintenance ⋯⁘ MLM.** The Media Lifecycle Management Tools screen displays.

   Note: The **Pause PostScan** button is only present if the PostScan process is running.

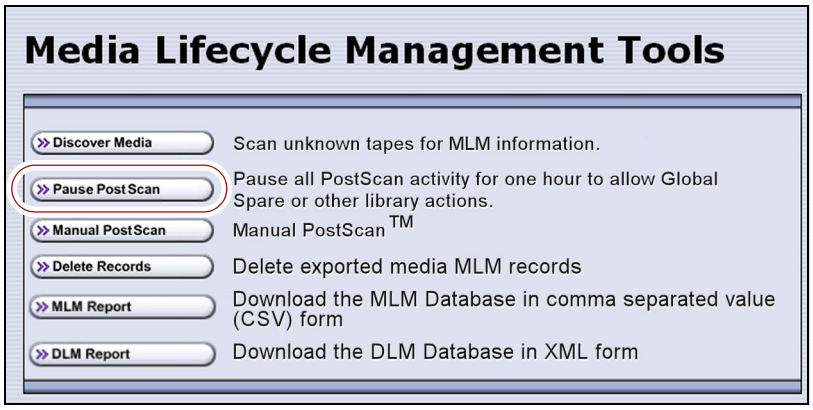


Figure 143 Click **Pause PostScan** on the MLM Tools screen to interrupt the PostScan process.

2. Click **Pause PostScan** to pause the PostScan operation for one hour so that you can use the Global Spare or perform other library operations.

   After an hour passes, the library restarts the PostScan operation on the tape that was being verified at the time of the interruption, provided the PostScan prerequisites are met. See Prerequisites for Starting a PostScan Operation on page 258 for more information.

USING MLM REPORTING

After the LTO cartridges in your library are added to the MLM database, you are ready to make use of this powerful tool to manage, track, and report all facets of tape usage from creation to retirement.

Generate MLM Reports

1. Log into the library.
2. From the toolbar menu, select **General ···⁘ Media Lifecycle Management**. The Media Lifecycle Management Report screen displays.

   Note: You can also click on the Filled Capacity bar graph on the General Status screen (Figure 131 on page 243).

3. Select either **Total Library** or a specific partition from the **Partition** drop-down list, and then click **Go**.

   Note: By default, the Media Lifecycle Management Report screen shows a Media Health report for all Spectra Certified MLM-enabled cartridges in the entire library.

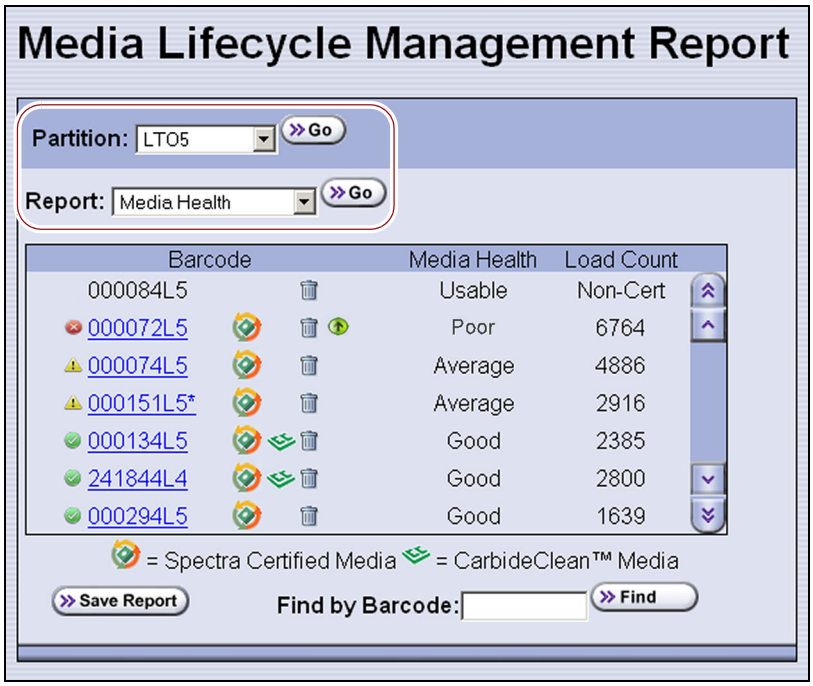


Figure 144 Select the partition for which you want to display the media health report.

4. Select the type of report you want from the **Report** drop-down list.

   Note: Information about MLM-enabled cleaning cartridges only appears in the Exported Media, Cleans Remaining, and Born on Date reports.

This report...	Shows...
Media Health	▪ The barcode label information, the overall health (media health), and the load count (the number of times the cartridge was loaded into a drive) for each MLM-enabled cartridges in the selected location. ▪ The barcode label information for each non-MLM-enabled cartridge and whether the cartridge appears to be usable or impaired.
Remaining Capacity	The remaining capacity and maximum capacity for each MLM-enabled data cartridge. The capacity reflects the native capacity of the cartridge, not the compressed capacity. **Notes:** ▪ Until a data cartridge is loaded into, threaded, and then unloaded from a drive for the first time, its remaining capacity and maximum capacity report as "0". ▪ The remaining capacity and maximum capacity for a cartridge are displayed as GB or TB. ▪ This report is not available for non-MLM-enabled cartridges.
Load Count	The load count for each MLM-enabled data cartridge in the selected location and the born on date (the date on which Spectra Logic enabled the cartridge to support MLM tracking and reporting). **Note:** This report is not available for non-MLM-enabled cartridges.
Write Errors	The number of soft errors and the load count for each MLM-enabled data cartridge. **Note:** This report is not available for non-MLM-enabled cartridges.
Cleans Remaining	The number of cleanings remaining and the born on date for each MLM-enabled cleaning cartridges. **Note:** This report is not available for non-MLM-enabled cartridges.
Born on Date	The date that the MLM-enabled cartridge (both data and cleaning) was created and certified by Spectra Logic and the load count for each cartridge. **Note:** This report is not available for non-MLM-enabled cartridges.
Exported Media	A list of all the MLM-enabled cartridges (both data and cleaning) that were exported from the library, sorted by the export time (oldest first). The report also shows the user name of the person who exported the media. **Note:** This report is not available for non-MLM-enabled cartridges.
Last Write Time **Last Read Time**	Shows the time and date for the most recent write and read operations for each MLM-enabled data cartridge. **Note:** This report is not available for non-MLM-enabled cartridges.

5. Click **Go**. The Media Lifecycle Management Report screen refreshes to display the selected report with a list of the barcode labels for all media in the selected location. A media health icon indicates the overall health of each MLM-enabled cartridge as of the last time it was loaded into a drive.

   Note: Health icons are not used with LTO media that is not MLM-enabled Spectra Certified media.

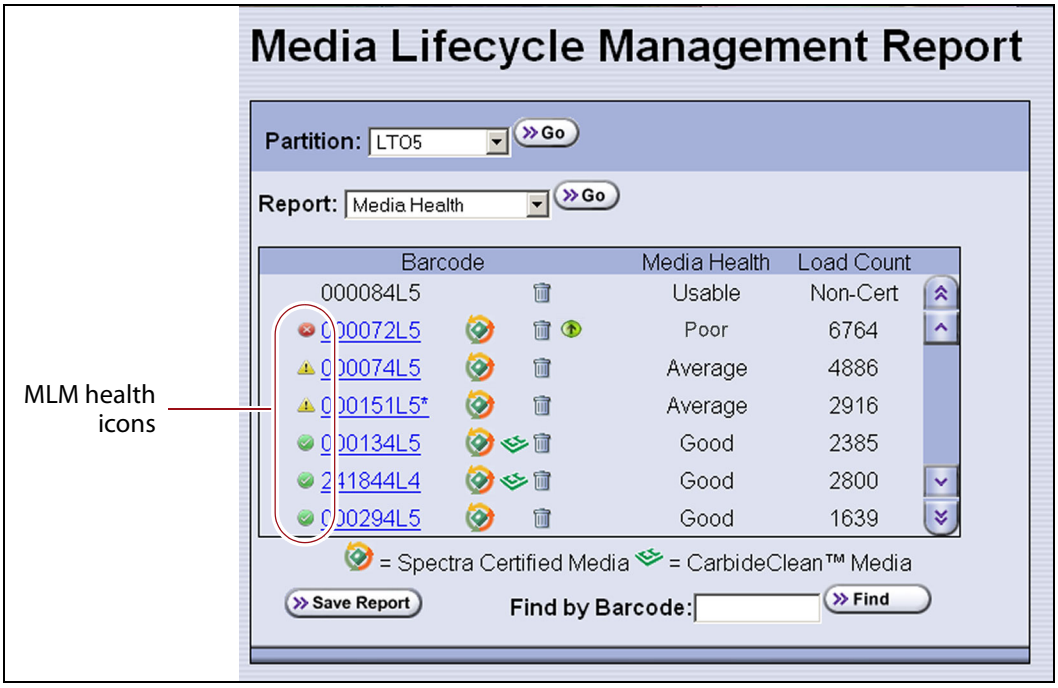


Figure 145 Use the health icons on the Media Lifecycle Management Report screen to quickly assess media health.

The following table describes the meaning of each media health icon. Select the barcode next to the icon to view detailed information about that specific piece of media.

Icon	Health score	Meaning
	100 – 80	The media health is **Good**. ▪ **Data cartridge:** The media is in good condition and operating properly. The cartridge can be used for writing new data and reading previously written data. ▪ **Cleaning cartridge:** More than ten cleaning cycles remain on the cartridge.
	79 – 50	The media health is **Average.** ▪ **Data cartridge:** When the Health graph on the Details screen for the cartridge falls below a health score of 80, the media health icon changes from green to yellow (generally due to normal aging). For maximum reliability, only use the cartridge for restores. ▪ **Cleaning cartridge:** The cleaning cartridge is near expiration. From one to ten cleaning cycles remain.

Icon	Health score	Meaning
	49 – 0	The media health is **Poor**. ▪ **Data cartridge:** When the Health graph on the Details screen for the cartridge falls below a health score of 50, the media health icon changes to red. The combination of media errors, tape age, and usage indicates that the media reached the end of its useful life for reliable data backups and restores and should be retired. If you are experiencing an unexpected number of cartridges with poor media health, you may want to investigate further: ▪ Review the media health data for each cartridge to see if it has a high error rate. A high error rate can indicate either that the media health is poor and the cartridge should be retired or that the cartridge was written to by a drive that is having trouble. ▪ If multiple cartridges with high error rates were written to by the same drive, the drive may be the source of the errors. Clean the drive or, if necessary, replace it. **Notes:** ▪ If the source of the high error rate is a drive, the media health icon for the affected cartridges should return to either green or yellow after approximately three load/read or write/unload cycles in a known good drive. ▪ If your cartridge has a high error rate that cannot be attributed to a faulty drive, environmental factors, or the end of the cartridge's normal working life contact Spectra Logic Technical Support for troubleshooting assistance (see Contacting Spectra Logic on page 7). ▪ **Cleaning cartridge:** The cleaning cartridge is expired. No more cleaning cycles remain. Replace the cleaning cartridge.
		The media health is **Unknown.** The status of the media cannot be determined.

6. If you want to view detailed information about a specific cartridge, use one of the following methods to locate the cartridge.

To find a cartridge using the...	Follow these steps...
Cartridge list	Scroll through the list of cartridges on the Media Lifecycle Management Report screen to locate the desired cartridge.
Barcode label information	1. Enter the barcode label information for the cartridge you want to locate in the **Find by Barcode** field. 2. Click **Find**. The list of cartridges refreshes to show the requested cartridge highlighted at the top of the list. **Important:** Only the slots below the top one displayed in the list are searched. Scroll to the top of the source list before clicking **Find**. The search starts at the second visible slot.

7. Click the barcode in the Media Lifecycle Management Report screen to view detailed information about the cartridge. The Details screen for the selected cartridge displays.

   Notes:
   - Media health is based on the MLM-tracked history of the cartridge. The health indicated by the Health graph on the Details screen may fluctuate until the cartridge is loaded six times.
   - When using CarbideClean media, the Details screen includes additional information related to the CarbideClean process. This information is not present for MLM media that did not undergo the CarbideClean process.

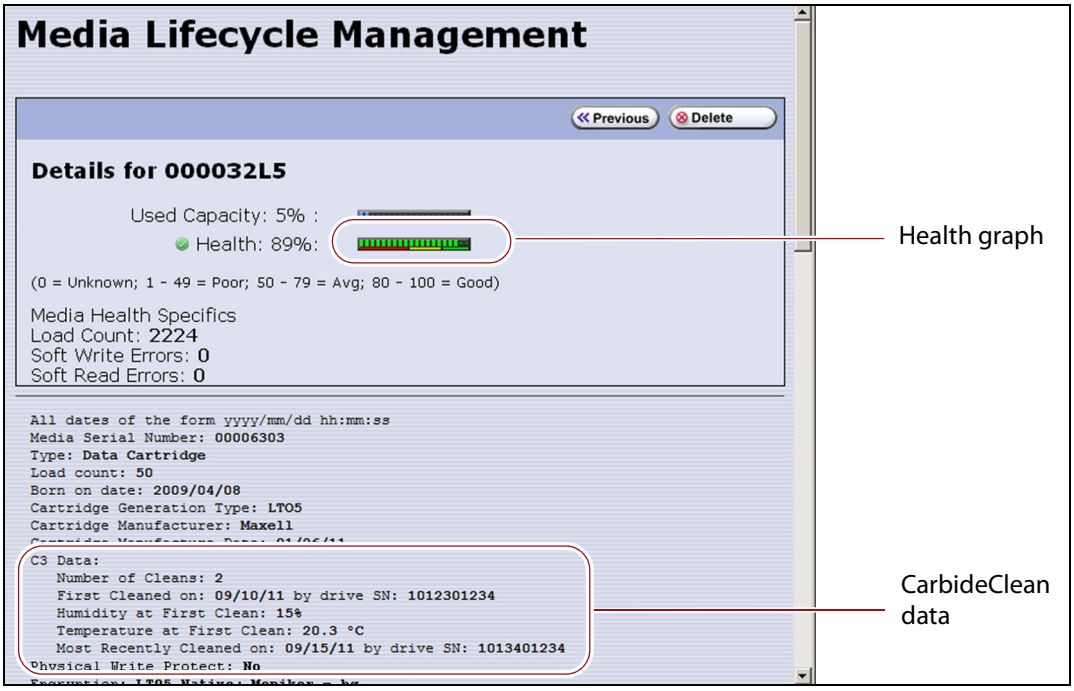


Figure 146 The detailed MLM report for the selected media.

8. Click **Previous** to return to the main Media Lifecycle Management Report screen (Figure 145 on page 268).

Save an MLM Report

You can choose to save a copy of the MLM report, which is a comma-separated text file (*.rpt), to a USB device, mail the saved report to previously configured email recipient, or both. If desired, you can zip the file before saving it.

Note: You can also download the MLM database as a comma-separated-value (CSV) file (see Download the MLM Database for Analysis and Archival on page 279).

1. Generate the desired report as described in Generate MLM Reports on page 266.
2. If you want to save the MLM report to a USB device, connect the device to the LCM's USB port and allow time for the device to mount before continuing.

   Note: The option to save the report to a USB device is only available if you connect a USB device to the LCM's USB port before you click **Save Report** on the Media Lifecycle Management Report screen.

3. Click **Save Report** to display the Save Media Lifecycle Management Report screen.

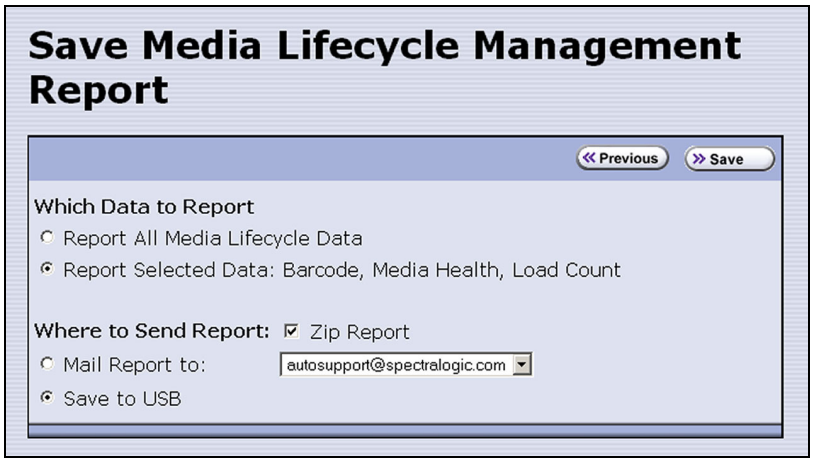


Figure 147 Select the desired options on the Save Media Lifecycle Management Report screen.

4. Select the data to include in the saved report and how you want the report saved.

   Note: If you want to email the report, the intended recipient must be a previously configured mail user (see Configure Mail Users on page 99).

This option...	Saves...
Report All Media Lifecycle Data	A report containing all of the available detailed MLM data for MLM-enabled media in the selected location (a specific partition or the total library). **Note:** Depending on the number of cartridges in the selected location, this report can be quite large.
Report Selected Data	Only the fields displayed in the report that you selected on the Media Lifecycle Management Report screen (Figure 145 on page 268). **Note:** The headings in the saved report reflect the fields displayed in the report you selected in the Media Lifecycle Management Report screen.
Zip Report	The report as a zip file which is compatible with standard file compression software. Zipping the report is especially useful when emailing the Report All Media Lifecycle Data report. **Note:** If you unzip the report using the standard format used by most file-zipping applications, the application creates the following directory structure: *\hard disk\lc\reports.
Mail Report to	The report and attaches it to an email sent to a previously configured mail user. Use the drop-down list to select the recipient for the report file. **Note:** Do not use the default *autosupport@spectralogic.com* email user. Spectra Logic does not save emailed MLM report files unless they are specifically requested for troubleshooting.
Save to USB	Save the report to the USB device. **Note:** The USB option is only available if you connected a USB device to the LCM's USB port before you clicked **Save Report** on the Media Lifecycle Management Report screen.

5. Click **Save** to send the report to the selected destination. Click **Previous** to return to the Media Lifecycle Management Report screen without sending the report.

Override a Poor Cartridge Health Report

Under certain circumstances you may need to override the health of an MLM-enabled cartridge that is reported as poor (a red health icon appears next to the cartridge barcode). When the cartridge health is poor, a green arrow button appears, that can be used to override the reported health.

During the override process, the library progressively eliminates any recent hard errors from the tape health calculation. If the health is still red, all hard errors are eliminated from the tape health calculation. The library continues to use this adjusted tape health until the cartridge health returns to either Good or Average as part of the normal health monitoring.

Important Do not reset the cartridge health unless you believe that the reported poor health is due to drive problems and not the cartridge or you are specifically directed to do so by Spectra Logic Technical Support.

Use the following steps to reset the health of a single cartridge.

1. Display the Media Lifecycle Reports screen as described in Generate MLM Reports on page 266.
2. Locate the barcode of the cartridge for which you need to reset the health (see Step 7 on page 270).
3. Click the green arrow button for the cartridge. The library adjusts parameters used to calculate the tape health until the reported health is Average.

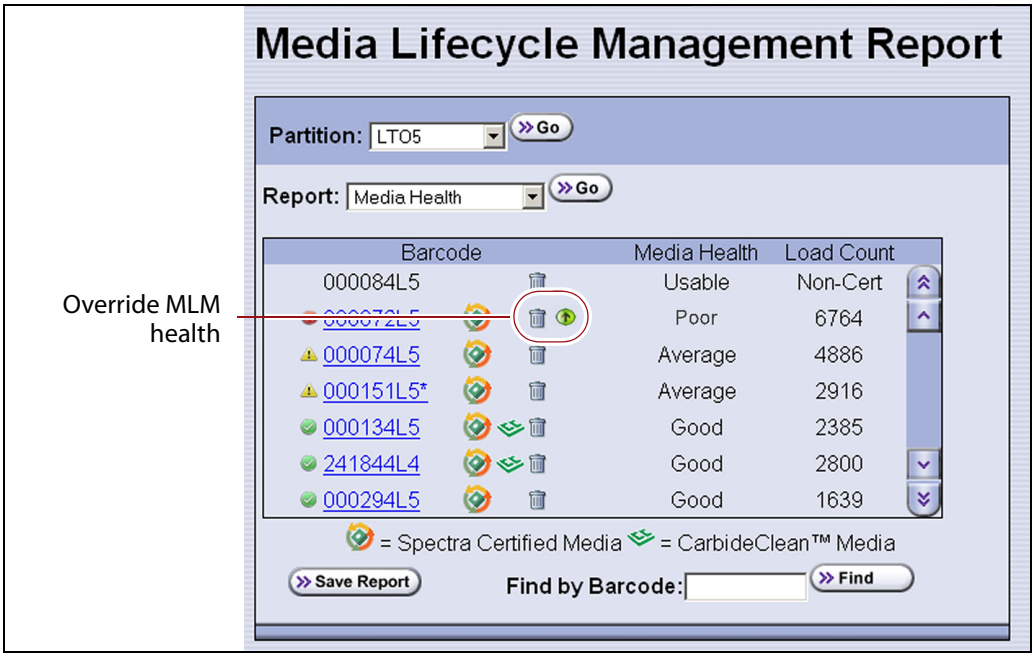


Figure 148 Select the green override button to reset the reported health for an MLM-enabled LTO cartridge.

4. Attempt to resolve the issues that were causing the media health to be reported as poor.

MANAGING THE MLM DATABASE

The MLM database contains the usage history, health, and the verification data for all of the MLM-enabled cartridges in your library. It also contains the Drive Lifecycle Management data for all of the drives in your library (see Monitoring Drive Health Using DLM on page 281).

Deciding when and how often you back up the MLM database depends on many factors, including how often tapes are loaded into a drive.

- If all of the tapes are loaded into drives frequently, the MLM database can be rebuilt relatively quickly. The database can be backed up less frequently.
- If many of the tapes remain in the library without being loaded into a drive for a long period of time, or if tapes are exported and stay outside of the library for a long period of time, rebuilding the MLM database can take a long time. Back up the MLM database more frequently.

Back Up the MLM and DLM Databases

Based on your environment, determine how frequently backups are needed, then use the following steps to create a backup. You can select to save the backup to a USB device or send it as an email attachment to a previously configured mail recipient.

1. Use your storage management software to stop all backup or restore operations on the library.

Important Backing up the MLM and DLM databases requires the library to be idle.

2. Log into the library as a user with superuser or administrator privileges.
3. From the toolbar menu, select **Maintenance** ···⁘ **Tools**. The Maintenance Tools screen displays.
4. Select **Utilities**. The Utilities screen displays.
5. Click **Show Advanced**. The Advanced Utilities Confirmation screen displays.
6. Click **Next**. The Utilities screen refreshes to show the advanced Utilities screen.

7. Scroll down and select **Save MLM Database**. The screen refreshes to show the details for the utility.

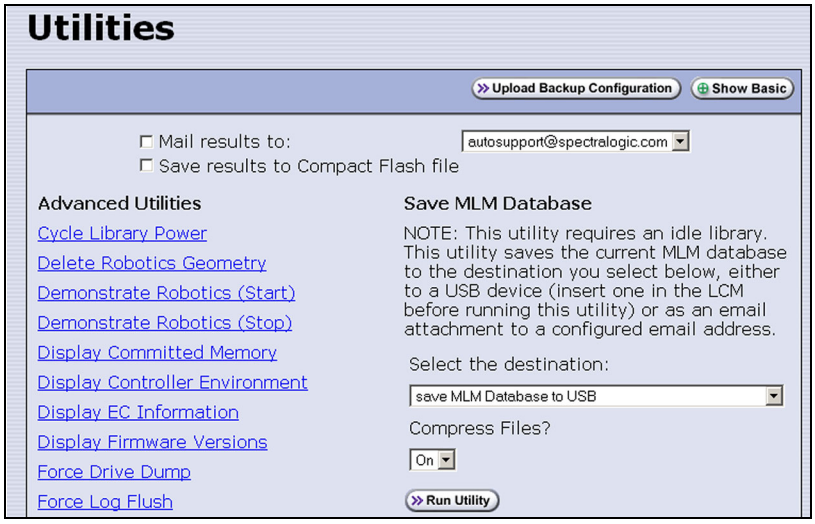


Figure 149 Select the Save MLM Database utility.

8. Use the **Select the Destination** drop-down list to select the destination for the saved file.

Notes:
- To send the file to someone who is not already listed as a library mail user, you must first configure that person as an email recipient as described in Configure Mail Users on page 99.
- The check box options at the top of the screen only relate to the system messages indicating that the utility completed successfully (or failed). They do not relate to the MLM database file itself.

Select this option...	To...
Save MLM Database to USB	Backup the MLM database to a USB device.
Mail MLM Database to...	Send the MLM database file as an email attachment to the specified mail recipient. **Note:** Do not use the default *autosupport@spectralogic.com* email recipient. Spectra Logic does not save emailed files unless they are specifically requested for troubleshooting.

9. If you want to compress the file to make it smaller, select **On** in the **Compress Files?** drop-down list.
10. If you want to save the MLM database to a USB device, connect the drive to the LCM's USB port and allow time for the device to mount before continuing.
11. Click **Run Utility**.

    After a brief delay, the Utility Results screen displays, showing that the database file was either saved or sent.

Verify the Database Backup File

After backing up the MLM database, use one of the procedures in the following table to confirm that the backup file was generated.

If the backup was...	Follow these steps...
Saved to a USB Device	**1.** Plug the USB device into a PC. The PC does not need to be connected to the library. **2.** Examine the list of files on the USB device and locate the SavedMLMDB folder. **3.** Open the folder to verify that it contains the following file, where *<date-time>* is the time stamp for when the backup was created: ▪ **Spectra PC** — `cminfo_<date-time>.dat` ▪ **Spectra LS** — `xmlinfo_<date-time>.db` —OR— ▪ **Zipped file** — `cminfo_<date-time>.zdt` (The zip filename is the same for both the Spectra PC and the Spectra LS.) **4.** Verify that the file is more than 0 bytes in size. **5.** If a file with the correct filename format is present and is more than 0 bytes in size, the database backup was successful and the file is usable. Store the USB device in a safe location. **6.** If the MLM database file is not present or if it is 0 bytes in size, repeat the backup process (Back Up the MLM and DLM Databases on page 274) using a different USB device.
Sent as an Email Attachment	**1.** Open the email attachment and verify that: ▪ The attachment contains a zip file called `cminfo_<date-time>.zdt` —AND— ▪ The file is more than 0 bytes in size. **2.** If the zip file is present and is more than 0 bytes in size, the backup was successful and is usable. Save the email attachment to a safe location from which you can copy it to a USB device, if needed. **3.** If the zip file is not present or if it is 0 bytes in size, repeat the backup process (Back Up the MLM and DLM Databases on page 274) to generate the email again.

Delete MLM Records From the Database

When the maximum number of records for the MLM database is reached, the record for the least recently exported cartridge, as determined by the Export Date tracked by MLM, is automatically deleted. The library does not notify you when it reaches the maximum number of records.

When a tape is retired or permanently exported from the library, you can manually delete its record from the MLM database. Records can be deleted individually or as a group.

Delete an Individual Record

If you only need to delete one or two cartridges from the MLM database, you can use the Media Lifecycle Report screen to delete individual records.

1. Log into the library as a user with superuser or administrator privileges.
2. Display the Media Lifecycle Reports screen as described in Generate MLM Reports on page 266.
3. Locate the barcode of the cartridge you want to remove from the MLM database (see Step 7 on page 270).

   Note: An asterisk (*) next to the barcode indicates that the cartridge was exported from the library.
4. Click the trash can icon next to the barcode to delete the record.

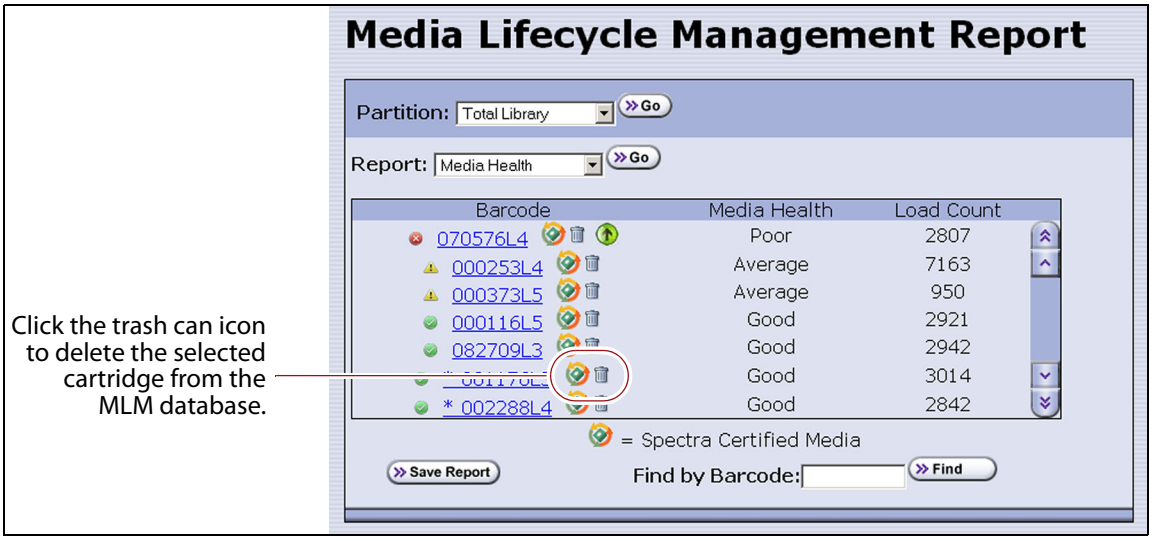


Figure 150 Use the trash can icon to delete individual records from the MLM database.

5. Respond to the confirmation message to delete the record.

Delete Multiple Records

1. Log into the library as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Maintenance ⋯ MLM.** The Media Lifecycle Management Tools screen displays.

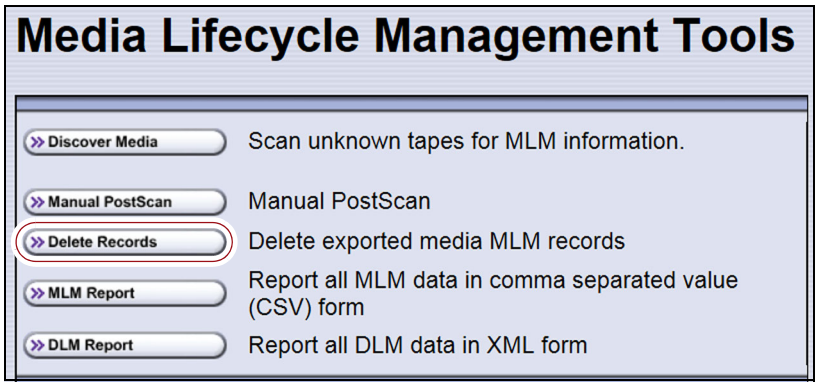


Figure 151 Click **Delete Records** on the MLM Tools screen to begin removing records from the MLM database.

3. Click **Delete Records**. The Delete MLM Records screen displays.

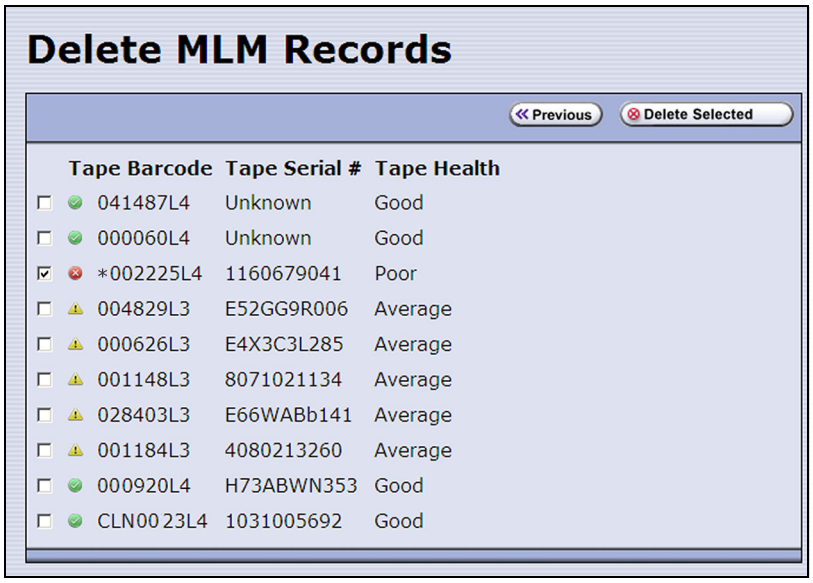


Figure 152 Select the cartridges to remove from the MLM database on the Delete MLM Records screen.

4. Select the cartridge records you want to delete from the MLM database.

   Note: An asterisk (*) indicates that the cartridge was exported from the library.

5. Click **Delete Selected** to remove the selected records from the MLM database.

Download the MLM Database for Analysis and Archival

If desired, you can download the MLM database as a comma-separated-value (CSV) file for analysis and archival. You can then open the file in any software application that supports this type of file (for example, spreadsheet software) and view the information it contains.

Important The MLM information contained in the CSV file cannot be used to restore the MLM database. Always maintain a current backup of the MLM database as described in Back Up the MLM and DLM Databases on page 274.

Note: The **MLM Report** button is only available when you access the library using the BlueScale web interface (RLC). It is not available from the operator panel.

1. Log into the library as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Maintenance ···⁘ MLM.** The Media Lifecycle Management Tools screen displays.

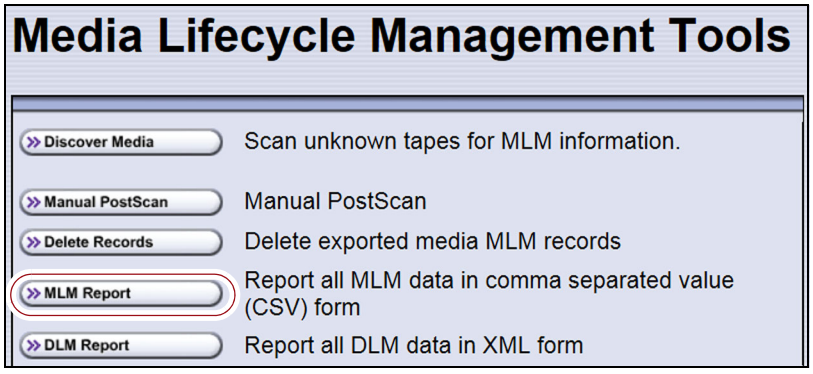
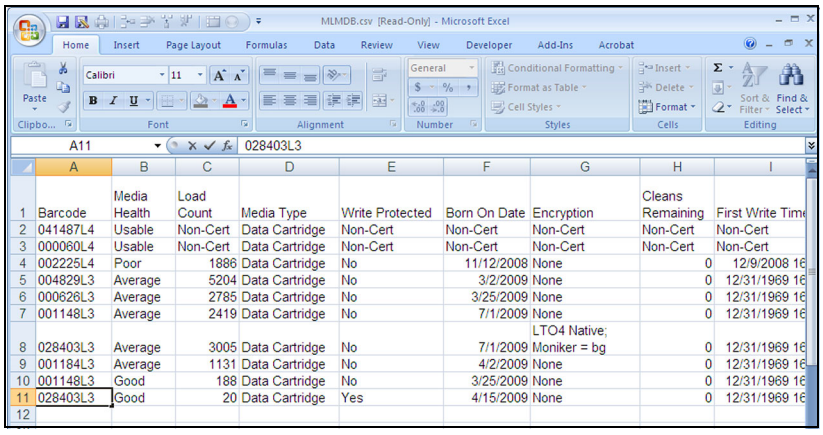


Figure 153 Click **MLM Report** on the MLM Tools screen.

3. Click **MLM Report**.
4. To view the information stored in the MLM database, open the CSV file using a software program that supports this file type.



	A	B	C	D	E	F	G	H	I
1	Barcode	Media Health	Load Count	Media Type	Write Protected	Born On Date	Encryption	Cleans Remaining	First Write Time
2	041487L4	Usable	Non-Cert	Data Cartridge	Non-Cert	Non-Cert	Non-Cert	Non-Cert	Non-Cert
3	000060L4	Usable	Non-Cert	Data Cartridge	Non-Cert	Non-Cert	Non-Cert	Non-Cert	Non-Cert
4	002225L4	Poor	1886	Data Cartridge	No	11/12/2008	None	0	12/9/2008 16
5	004829L3	Average	5204	Data Cartridge	No	3/2/2009	None	0	12/31/1969 16
6	000626L3	Average	2785	Data Cartridge	No	3/25/2009	None	0	12/31/1969 16
7	001148L3	Average	2419	Data Cartridge	No	7/1/2009	None	0	12/31/1969 16
8	028403L3	Average	3005	Data Cartridge	No	7/1/2009	LTO4 Native; Moniker = bg	0	12/31/1969 16
9	001184L3	Average	1131	Data Cartridge	No	4/2/2009	None	0	12/31/1969 16
10	001148L3	Good	188	Data Cartridge	No	3/25/2009	None	0	12/31/1969 16
11	028403L3	Good	20	Data Cartridge	Yes	4/15/2009	None	0	12/31/1969 16
12									

Figure 154 An example of the downloaded MLM database file (opened in Microsoft Excel).

CHAPTER 9

Using Drive Lifecycle Management

This chapter describes how to use BlueScale Drive Lifecycle Management to proactively monitor the health of the LTO drives in your library.

Topic	
BlueScale Drive Lifecycle Management	this page
Monitoring Drive Health Using DLM	page 281
Using the Drive Health Icons	page 283
Viewing and Saving a Detailed Drive Health Report	page 284
Downloading the DLM Database	page 287

BLUESCALE DRIVE LIFECYCLE MANAGEMENT

Overview BlueScale Drive Lifecycle Management (DLM) works in conjunction with Media Lifecycle Management (MLM) to help you identify drives that experience a high number of errors or other problems during operation.

Important The BlueScale Drive Lifecycle Management feature is only supported for LTO drives.

Each time a cartridge is unloaded from a drive, the library collects the media health data from the drive. This data includes read/write errors, tape alerts, and flags generated during the time the most current cartridge was loaded in the drive. It also includes the current value for the drive's single character display (SCD) and any errors detected at the time the cartridge is unloaded. All of this data, plus the MLM data for the 50 most recently loaded cartridges, is stored in the DLM database. This data is used to generate an overall drive health status for the library, as well as health reports for each individual drive.

Enabling DLM DLM is automatically enabled when MLM is enabled and cannot be used without MLM. See Chapter 8 – Configuring and Using Media Lifecycle Management, beginning on page 234 for detailed information about enabling and using MLM.

Drive Health Reports A health icon next to each drive indicates the overall health of the drive. Detailed reports provide information about the cartridges that were loaded into the drive and any errors reported. The DLM database containing the health information for every drive in the library is backed up whenever the MLM database is backed up. The reports can also be saved and exported as XML files.

Drive Testing If a drive is experiencing problems, the DLM drive test wizard lets you test the basic functionality of the drive. This test, when used in conjunction with other DLM data and MLM data, can help you determine whether a drive or the media is the source of the errors you are investigating.

User Privilege Requirements Only a user with superuser or administrator privileges can access and use the DLM features.

MONITORING DRIVE HEALTH USING DLM

When DLM is enabled, the Drives icon in the Configuration toolbar changes to the DLM icon. Selecting DLM from the toolbar displays the Drives screen, which uses health icons to provide at-a-glance information about the health of each drive in the library. From the Drives screen you can access detailed drive health reports for each drive in the library, as well as drive management tools.

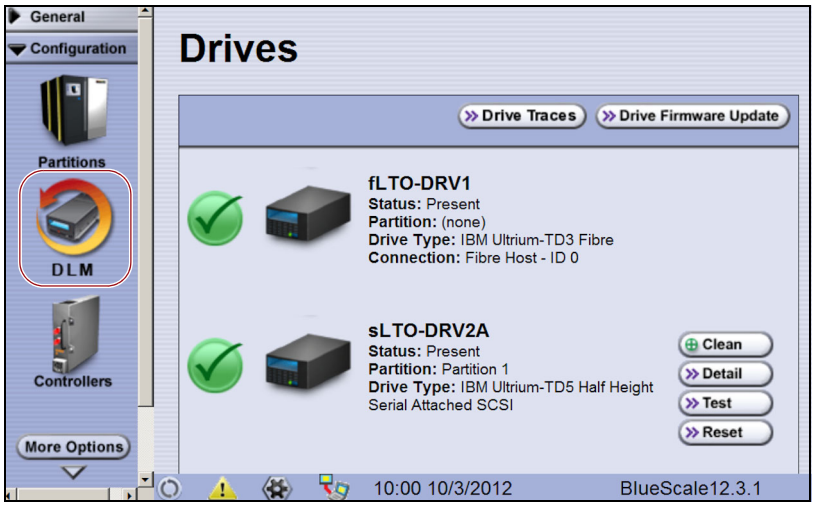


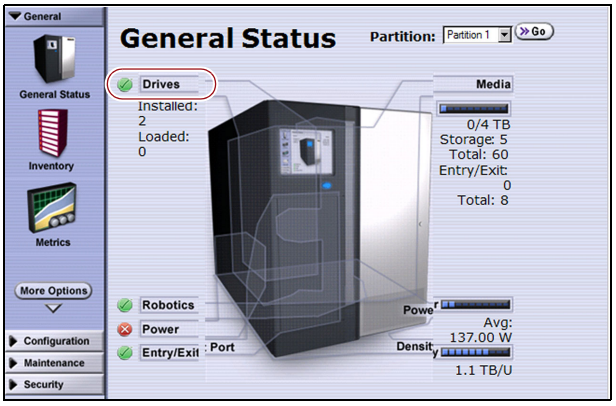
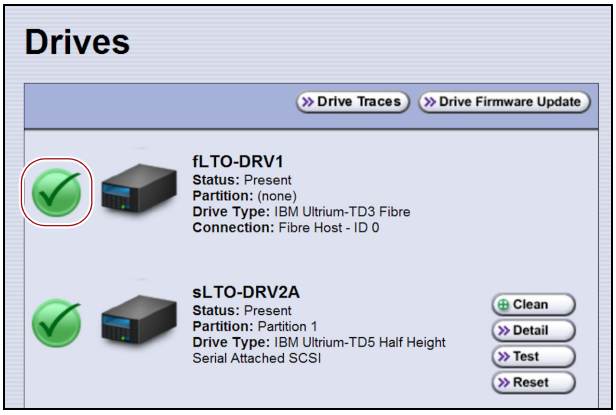
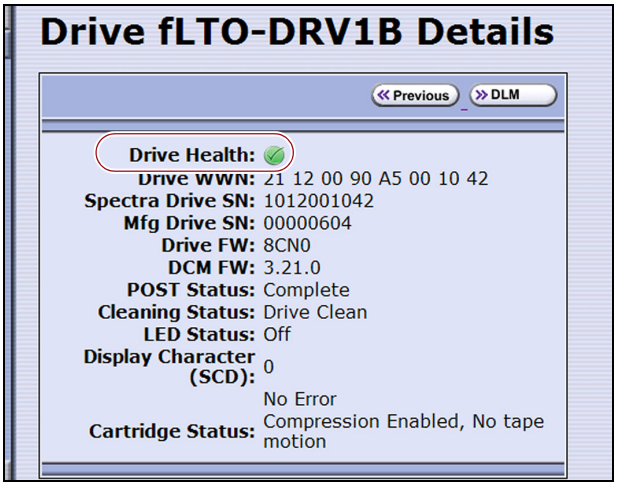
Figure 155 The Configuration DLM (enabled) Drive icon.

Each button on the Drives screen lets you perform additional operations.

This button...	Lets you...
Drive Traces	Collect drive traces for LTO-5 and later generation drives (see Use the Drive Traces Button on page 353).
Update All DLM Data	Refresh the DLM data for all of the drives in the library. **Note:** The **Update All DLM Data** button only displayed if Drive Lifecycle Monitoring is enabled (see Enabling MLM and Configuring Global Settings on page 244).
Drive Performance Monitoring	Display the drive performance statistics screen (see View Drive Performance Statistics on page 137). **Note:** The **Drive Performance Monitoring** button only displayed if Drive Performance Monitoring is enabled (see Enable Drive Performance Monitoring on page 91).
Drive Firmware Update	Use one or more firmware update (code load) tapes stored in the entry/exit port to update the firmware for selected drives (see Updating Drive Firmware on page 409). **Note:** This button is replaced by **Staged Drive Firmware Update** if a drive firmware update is staged to one or more drives.
Staged Drive Firmware Update	Apply an update that is already staged to the drive (see Apply the Update on page 424) using one of the following methods: ▪ Autostaging (see Modify Auto Download Options on page 121) ▪ Manual staging (see Update through Package Update on page 417). **Note:** This button only displays if a drive update is staged to the drives.
Remove **Replace** **Add**	Remove or replace a drive that is already in the library. If a DBA has an empty drive bay, the **Add** button powers on a newly installed drive and initializes it in the library (see Adding or Replacing a Drive on page 433). **Notes:** ▪ These buttons only display on the front panel. ▪ The **Add** button only displays if a DBA location does not contain a drive.
Clean	Clean the drive using a cleaning tape in an associated cleaning partition. See Manually Cleaning a Drive on page 407. **Note:** The **Clean** button only displays if the partition to which the drive is assigned has an associated cleaning partition.
Detail	View detailed information about the selected drive (see Viewing and Saving a Detailed Drive Health Report on page 284).
Test	Use the DLM Drive Test wizard to test a drive (see Using DLM to Test an LTO Drive on page 373). **Note:** The **Test** button is not available for TS11*xx* technology drives.
Reset	Reset the drive, which power cycles the drive, runs the internal drive diagnostics, and reinitializes it in the library (see Resetting a Drive on page 347).

Using the Drive Health Icons

The drive health icons provide at-a-glance health status for the drives in the library. The icons appear on the following screens, as well as in the drive health reports (see Viewing and Saving a Detailed Drive Health Report on page 284).

The health icon on this screen...	Indicates...
General Status 	The overall drive health for the selected partition. **Note:** The drive health icon on the General Status screen reflects the lowest health score for the drives in the partition being viewed.
Drives 	The overall health of each individual drive in the library.
Drive Details 	The health of the selected drive.

The drive health icon state is based on data collected for the drive when the last cartridge was loaded in the drive. This data consists of the code presented on the drive's SCD, as well as tape alerts, and errors detected at the time the tape is unloaded. See Interpreting the SCD Codes on page 362 for detailed information about the SCD codes for LTO drives. The following table describes the drive health status icons.

Note: Not all SCD codes have an associated DLM icon.

Icon	Meaning
	The drive health is **Good**. The drive is operating normally.
	The drive requires **Attention**. Use the SCD code information on the Drive Details screen to determine the type of action required.
	The drive health is **Poor**. The drive experienced an unrecoverable error or problem. Use the SCD code information on the Drive Details screen to determine the type of action required.
	The drive health is **Unknown.** The status of the drive cannot be determined.

Viewing and Saving a Detailed Drive Health Report

1. Log into the library as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Configuration** ···⁘ **DLM** to display the Drives screen.

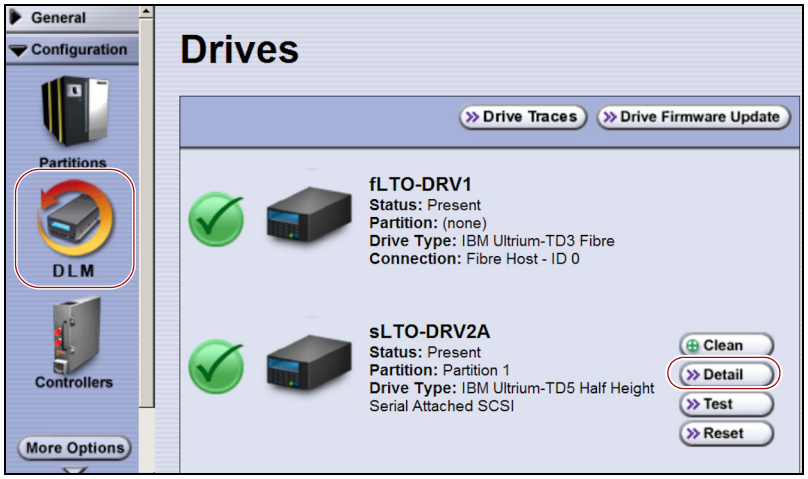


Figure 156 Select **Detail** to view information about a drive.

3. Click **Detail** next to the drive for which you want to view more information. The Drive Details screen displays.

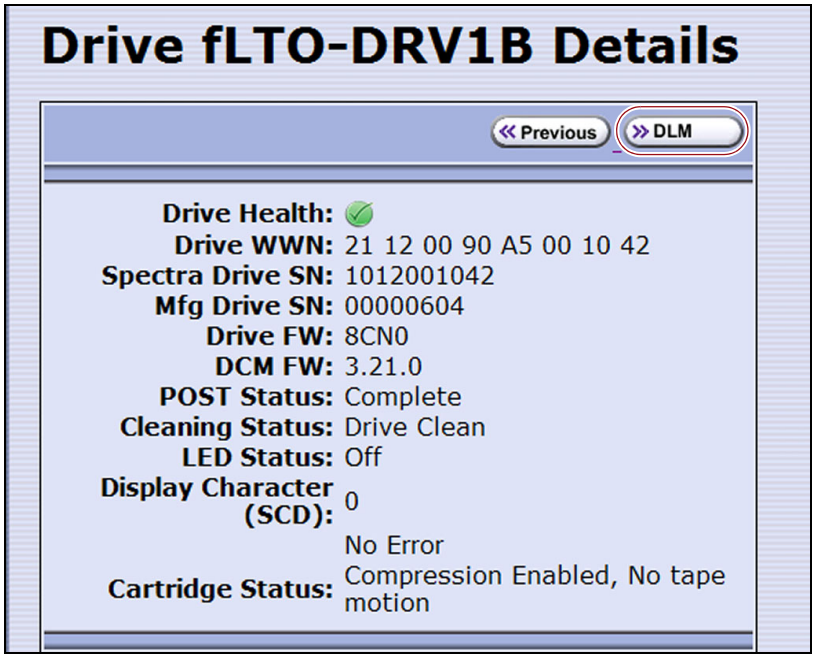
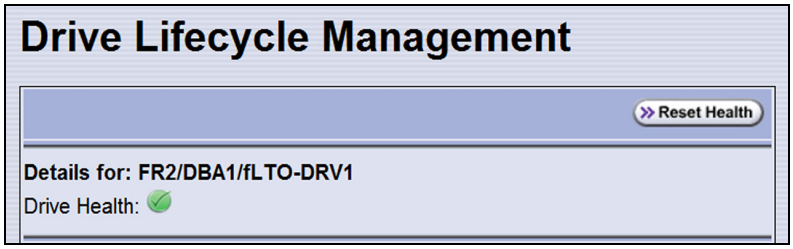


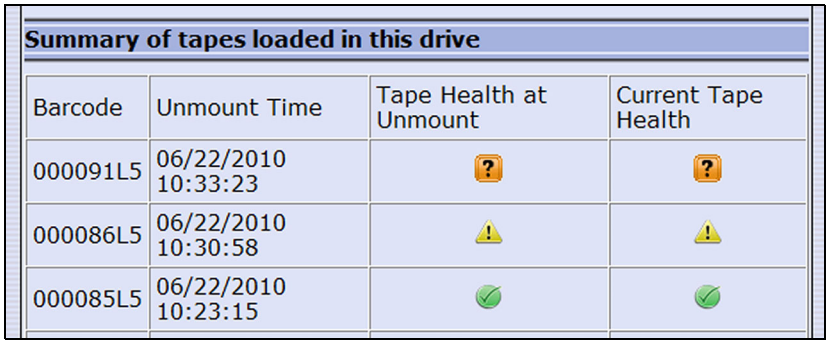
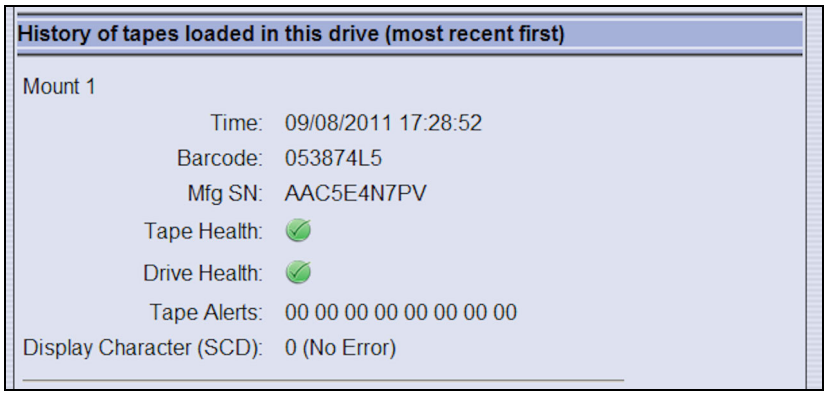
Figure 157 The Drive Details screen shows detailed information about the selected drive.

4. Click **DLM** on the Drive Details screen to view a detailed Drive Lifecycle Management report.

   Note: The **DLM** button on the Drive Details is not present if MLM and DLM are not enabled (see Enable and Configure MLM PreScan and PostScan on page 170).

   The Drive Lifecycle Management Report screen is divided into four panes, which are described in the following table.

This pane...	Shows...
Drive health overview	The drive identifier and any status information. The drive health icon indicates the drive's overall health at the time the screen was displayed.  **Figure 158** Check the drive health icon for the overall health of the drive.

This pane...	Shows...
Summary of tapes	The barcode label information and health information for the last 10 cartridges loaded into the drive. The health icon indicates the cartridge health at the time the cartridge was unloaded from the drive (Tape Health at Unmount) and the current health status stored in the MLM database (Current Tape Health). Refer to the health status icon table on page 268 in Configuring and Using Media Lifecycle Management for descriptions of the icons related to media health. **Note:** Depending on the drive's history, this pane may not have any entries.  **Figure 159** The Summary of tapes pane shows the barcode label information and health information for the last 50 cartridges loaded into the drive.
History of tapes	Detailed information about the last 50 cartridges loaded into the drive as well as any Tape Alerts and SCD codes posted by the drive while the tape was loaded in the drive.  **Figure 160** The History of tapes pane shows detailed information about each of the individual tapes. **Notes:** ▪ Depending on the usage history for the drive, this pane may not have any entries. ▪ For detailed information about Tape Alerts, log on to the portal (see Accessing the Technical Support Portal on page 435), open the Knowledge Base, and search for KBA-01769, *What do the tape alert flags in the DLM pages mean?*. Refer to the tape drive documentation for additional information (see LTO Ultrium Tape Drives on page 20).

5. To save the information on the Drive Lifecycle Management report, use the Save MLM Database utility as described in Back Up the MLM and DLM Databases on page 274.
6. If you correct a condition that changed the drive's health to yellow or red, click **Reset Health** to reset the drive health to Good (Green). Click **Continue** to complete the reset health process.

Notes:
- If the condition was not truly corrected, the next tape load sets the drive health back to the previous indication.
- Resetting the drive health deletes the drive's Summary of Tapes and History of Tapes data.

DOWNLOADING THE DLM DATABASE

If desired, you can open and save the DLM database as an XML file. This file contains the same information that appears on the Drive Lifecycle Management screen (see Step 4 on page 285).

Important The DLM database information in the XML file cannot be used to restore the DLM database. The information required to restore the DLM database is backed up with the MLM database. See Back Up the MLM and DLM Databases on page 274 for information about backing up the MLM database.

Note: **DLM Report** is only available when you access the library using the BlueScale web interface (RLC). It is not available from the operator panel.

1. Log into the BlueScale web interface (RLC) as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Maintenance ⋯⁘ MLM.** The Media Lifecycle Management Tools screen displays.

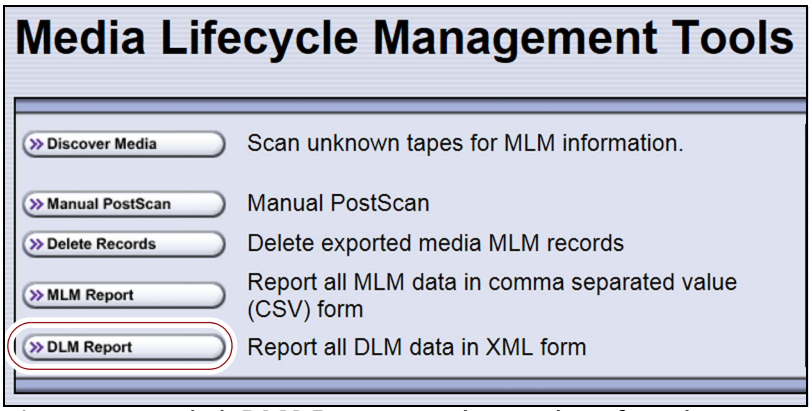


Figure 161 Click **DLM Report** on the Media Lifecycle Management Tools screen to export the DLM database as an XML file.

3. Click **DLM Report**. The XML file opens in the application associated with that file type on the computer accessing the library's BlueScale web interface.

   Note: Typically, the application associated with XML files is a web browser. Depending on the browser, the file may open in a new browser window.



Figure 162 The DLM database XML file opened in a web browser.

4. Use the **File ⋯⁘ Save** option in the application that opened the XML file to save it to a known location on your computer.
5. You can open the saved XML file using Microsoft Excel 2007 or later, or use another program that supports the XML file format.

CHAPTER 10

Configuring and Using AutoSupport

This chapter describes how to configure and use AutoSupport with your library. All AutoSupport functionality is included with your library purchase.

Topic	
AutoSupport Overview	page 290
Configuring AutoSupport	page 292
Configure Mail Recipients	page 292
Configure AutoSupport Profiles	page 293
Configure Alarms	page 297
Configure Log Set Forwarding	page 298
Using AutoSupport	page 299
Create New Support Tickets	page 299
Update Existing Support Tickets	page 304

AUTOSUPPORT OVERVIEW

AutoSupport configures the library to automatically notify support personnel or others with messages when specific events occur. It can also be used to open or update a support ticket and send it to a specified recipient or to Spectra Logic Technical Support. AutoSupport can be used without configuring the library with email access by saving the ASL sets generated by AutoSupport to a USB device and then manually sending an email containing the stored information to Spectra Logic Technical Support.

Note: AutoSupport Log (ASL) information is only for troubleshooting purposes. This log information is separate from the data path and contains no customer data.

Send Log Sets

This feature lets you manually generate a standard AutoSupport Log (ASL) set (file) and email it to a pre-configured recipient or save it to a USB device. You can use the Send Log Sets option to open or update a support ticket and send it to a specified recipient or to Spectra Logic Technical Support. The ASL included in the support ticket includes the following types of information:

- Library message logs
- Library Control Module (LCM) logs
- LCM configuration (including the current physical configuration)
- A simplified report of the MLM and DLM databases
- EC data from all components
- BlueScale version
- Contact information for data center staff
- Other library information specified in the AutoSupport user profile

Log Forwarding

This feature configures the library to send monthly ASL files to preconfigured recipients (see Configure Log Set Forwarding on page 298).

Critical Alarms

When you enable critical alarms, the library automatically generates an ASL file whenever any of the events in the following table occurs. If you configured one of your AutoSupport profiles as the AutoSend Profile, the library automatically sends the ASL file to the mail recipients in the AutoSend profile.

Note: If you select *autosupport@spectralogic.com* as a mail recipient in the AutoSend profile, the library also sends the ASL file and a ticket request to Spectra Logic Technical Support.

For this event...	An AutoSupport ticket request is generated...
Motion Restart	Whenever motion restarts. Each motion restart is treated as a separate event and results in generation and submission of an AutoSupport ticket request.
Front Panel Opened or Removed	If the library front panel is opened three times within thirty minutes. Only one AutoSupport ticket request is generated for each 30-minute time period.
Power Supply Failure	When a power supply fails. Each power supply is evaluated separately. Only one AutoSupport ticket request per power supply is generated for each 24-hour time period, even if the power supply fails and then resumes operation repeatedly. If two power supplies fail during the same 24-hour time period, two separate AutoSupport ticket requests are generated, one per failed power supply.
QIP Failure	Whenever the library detects that an F-QIP is no longer present. Only F-QIPs that are configured as part of a partition generate an AutoSupport ticket request. The following problems can generate an F-QIP failure event: ▪ Failure of the F-QIP software or hardware. ▪ Loss of communication between the library and the F-QIP. ▪ Removal of an F-QIP from the library without using the BlueScale Controller Remove or Controller Replace operation. AutoSupport ticket requests are not generated if the F-QIP is removed following a Controller Remove or a Controller Replace operation. Each F-QIP is evaluated separately. Only one AutoSupport ticket request per F-QIP is generated for each 24-hour time period, even if the F-QIP fails and then resumes operation repeatedly. If two F-QIPs fail during the same 24-hour time period, two separate AutoSupport ticket requests are generated, one per failed F-QIP.
Drive Failure	When the library detects a drive failure that results in the percentage of failed drives in a partition meeting or exceeding the specified threshold. The following drive problems can generate a drive failure event: ▪ Failure of the drive software or hardware ▪ Loss of communication between the library and the drive ▪ Removal of a drive from the library without using the BlueScale Drive Remove or Drive Replace operation. AutoSupport ticket requests are not generated if the drive is removed following a Drive Remove or a Drive Replace operation.
Library Controller Fails to Initialize	If the library controller (LC) fails to properly initialize.

CONFIGURING AUTOSUPPORT

If you have any questions about configuring AutoSupport, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).

Note: To simplify entering the information required to configure and use AutoSupport, use the BlueScale web interface (RLC) or a keyboard attached to the LCM.

Network and Support Contract Requirements Before you configure AutoSupport, Spectra Logic recommends connecting the library to an email gateway. You need to do the following:

- Connect a Ethernet cable to the Ethernet connector on the LCM (see Figure 6 on page 32).
- Obtain the library's IP address, subnet, and gateway address (see Configure Network Settings on page 96).
- Obtain the AutoSupport Customer/Contract Number for the library from Spectra Logic.

User Privilege Requirements Only a user with superuser or administrator privileges can configure the AutoSupport features.

Configure Mail Recipients

If not already completed, configure one or more mail recipients who should receive AutoSupport information (see Configure Mail Users on page 99). At a minimum, configure Spectra Logic Technical Support (*autosupport@spectralogic.com*) as a mail recipient if you want to automatically send AutoSupport ticket requests to Spectra Logic Technical Support. If desired, you can configure additional recipients.

Notes:
- The default *autosupport@spectralogic.com* mail recipient can be used for any ASL or HHM files that are generated by the library. This includes those generated manually, or automatically in response to critical events or log forwarding.
- Do not configure the *autosupport@spectralogic.com* mail recipient to receive messages that result from configuration changes or system messages generated by the library.
- AutoSupport can be used without email access by saving the information generated by AutoSupport to a USB device and then manually sending the stored information to Spectra Logic Technical Support.

Configure AutoSupport Profiles

Use the following steps to create or modify a profile for each person assigned to work with Spectra Logic Technical Support to troubleshoot problems with the library or drives.

1. Log into the library as a user with superuser or administrator privileges.
2. If not already completed, configure the mail recipients who should receive AutoSupport information (see Configure Mail Recipients on page 292).
3. From the toolbar menu, select **Maintenance** ⋯⁘ **AutoSupport**. The AutoSupport screen displays.

   Notes:
   - If you did not configure an AutoSupport profile, the **Send Log Set** button is grayed out.
   - If you did not configure a profile for AutoSend, the **Configure Alarms** button is grayed out.

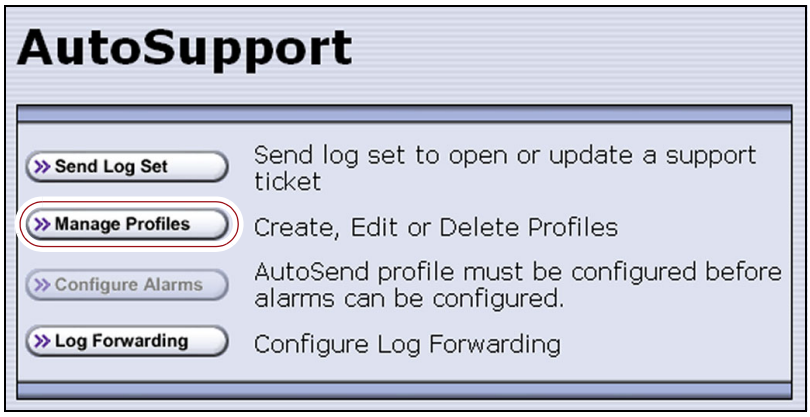


Figure 163 Click **Manage Profiles** to create or edit an AutoSupport profile.

4. Click **Manage Profiles**. The AutoSupport Profiles screen displays.



Figure 164 Use the AutoSupport Profiles screen to manage profiles.

Create or Modify a Profile

1. Click **New Profile** to create a new profile or click **Edit Profile** to modify an existing profile. The Company Information screen displays.

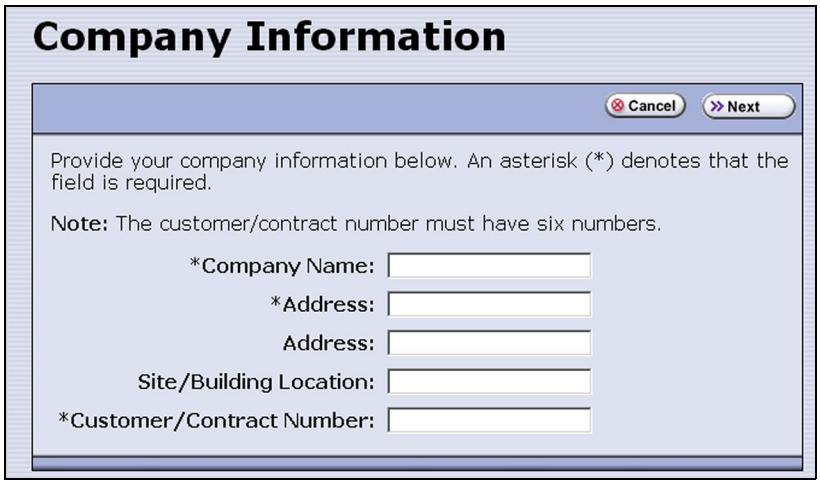


Figure 165 Enter required information for your company.

   - Complete the information in this screen. The information marked with an asterisk (*) is required.

     Note: Make sure to fill in *all* of the required fields in each of the following screens. You cannot advance to the next screen if required information is missing.

   - The **Customer/Contract Number** is no longer used. Enter any six alpha-numeric characters.

2. Click **Next**. The Contact Information screen displays.

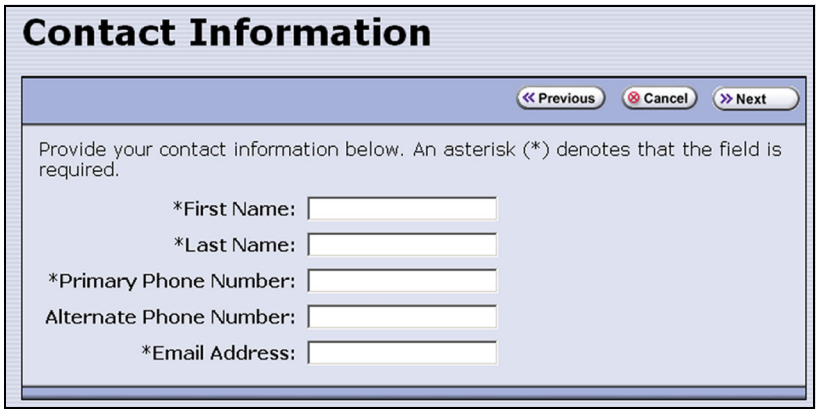


Figure 166 Enter the required information for the contact person.

3. Enter the information for your contact person in the fields provided. This information determines how Spectra Logic contacts this person.

4. Click **Next**. The System and Mail Information screen appears.

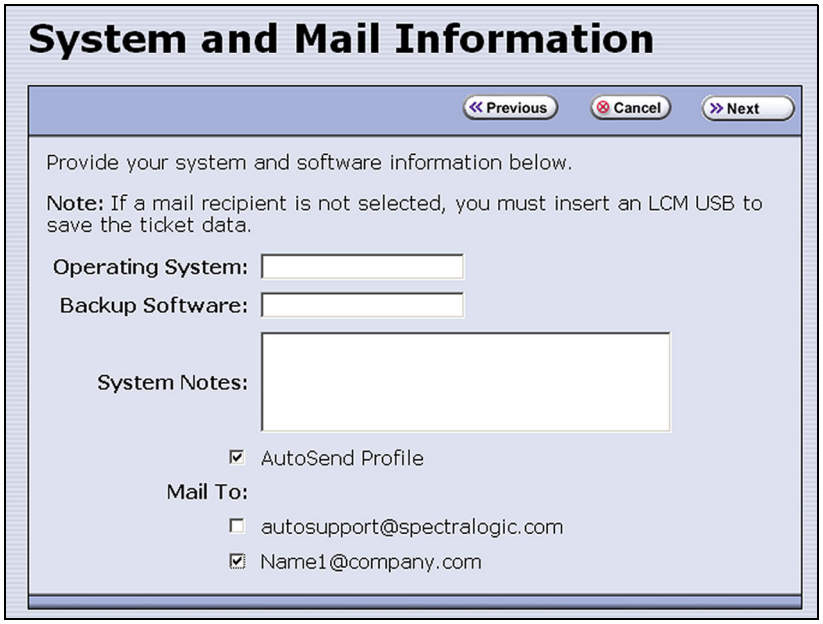


Figure 167 Enter Information about your operating environment.

- Enter information about your library's operating environment and storage management software in the fields provided.
- Select **AutoSend Profile** to use the current profile as the recipient for critical alarm log sets automatically sent by the library.

  Note: Only one profile can be configured as the AutoSend profile.
- Select the mail recipient(s) from the **Mail To** choices presented. Only mail recipients that were previously configured are listed (see Configure Mail Users on page 99).

  Note: You must select *autosupport@spectralogic.com* as one of the recipients if you want the library to send an AutoSupport ticket request to Spectra Logic Technical Support.

5. Click **Next**. The Save Profile screen displays. Verify that all of the information shown is correct.

   If any information needs to be changed, click **Previous** to display the screen in which the changes need to be made.



Figure 168 Review the profile information.

6. When all of the information is correct, click **Save**.
7. The AutoSupport Profiles screen redisplays, listing the newly completed profile.



Figure 169 All of the AutoSupport profiles are listed on the AutoSupport Profiles screen.

8. Repeat Step 1 on page 294 through Step 6 if you want to create additional profiles.

   Note: When you create multiple profiles, they are listed in the order in which they are created, not in alphanumeric order.

9. Click **Previous** to return to the main AutoSupport screen.

   If one of the profiles is configured as an AutoSend recipient, the **Configure Alarms** button is active (see Figure 163 on page 293).

Delete an AutoSupport Profile

Use the following steps to delete an existing profile.

1. Log into the library as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Maintenance ⋯ AutoSupport**. The AutoSupport screen displays (see Figure 163 on page 293).
3. Click **Manage Profiles**. The AutoSupport Profiles screen displays (see Figure 169 on page 296).
4. Click **Remove** next to the contact you want to delete. The Remove Profiles screen displays, asking you to confirm the deletion.
5. Click **Remove**. The AutoSupport profiles screen redisplays with the updated list of profiles.
6. Click **Previous** to return to the main AutoSupport screen.

Configure Alarms

Use the steps in this section if you want the library to automatically generate an ASL file in the event that any of the critical events listed under Critical Alarms on page 291 occurs.

1. If you did not already do so, configure one AutoSupport profile as the AutoSend recipient (see Step 4 on page 295).
2. Click **Configure Alarms** from the AutoSupport screen. The AutoSupport Critical Event Configuration screen displays.

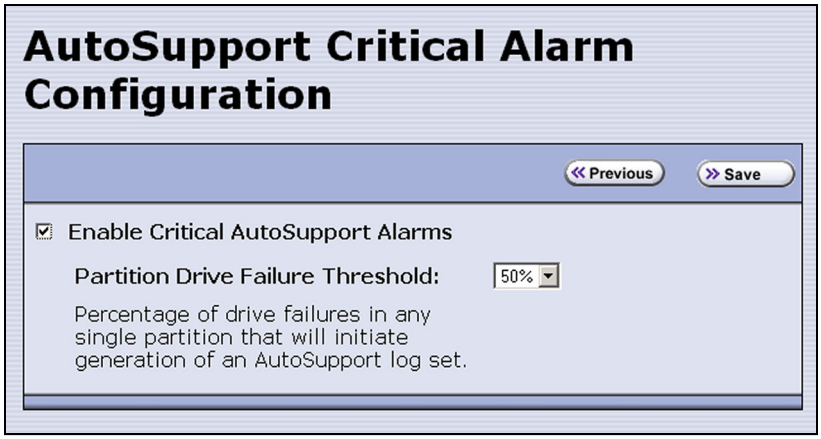


Figure 170 The AutoSupport Critical Event Configuration screen.

3. Select **Enable Critical AutoSupport Alarms** When enabled, the library generates an ASL file whenever one of the critical events listed under Critical Alarms on page 291 occurs. Any ASL file that is generated as a result of a critical event is automatically sent to all of the recipients selected in the AutoSend profile.

   Note: The *autosupport@spectralogic.com* address must be selected as a mail recipient in the AutoSend profile if you want the library to send critical event ASL files to Spectra Logic Technical Support.

4. If desired, select a value for the **Partition Drive Failure Threshold** from the drop-down list. This is the only configurable critical event.

   You can specify the threshold for the number of failed drives in a partition that causes an AutoSupport ticket request to be generated. The threshold is a percentage of drives assigned to the partition. You can select 25% or 50%; the default is 50%. The threshold applies to all partitions in the library.

5. Click **Save** to save your changes or click **Previous** to return to the main AutoSupport screen without saving your changes.

   After your changes are saved, the AutoSupport Critical Event Configuration screen redisplays with a confirmation message.

6. Click **Previous** to return to the main AutoSupport screen.

Configure Log Set Forwarding

Log forwarding is enabled by default from the factory. This is a monthly log set that is forwarded to Spectra Logic for data collection. No action is taken by Spectra Logic Technical Support for a particular library when the log set is received, but the data is parsed and stored in our database to better understand our field population and how the library is used and how it can be improved.

1. Click **Log Forwarding** from the main AutoSupport screen. The Configure Log Forwarding screen displays.

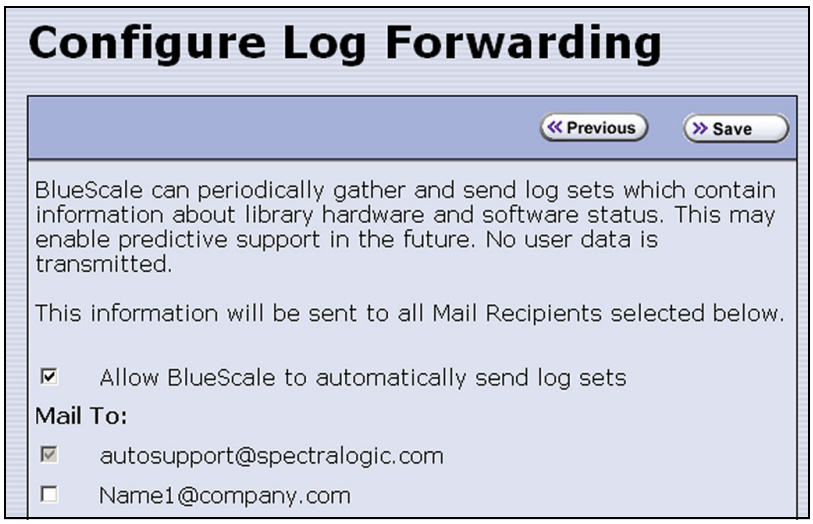


Figure 171 The Configure Log Forwarding screen.

2. Select the forwarding options you want to use.
   - **Allow BlueScale to automatically send log sets** is selected by default. Clear the check box if you do not want the library to automatically generate and submit monthly Auto Support Log sets to one or more preconfigured recipients.
   - The *autosupport@spectralogic.com* mail recipient is automatically selected. All ASL files generated by the library are automatically sent to Spectra Logic Technical Support.
   - Select any additional mail recipient(s) from the **Mail To** choices presented. Only mail recipients that were previously configured are listed (see Configure Mail Users on page 99).
3. Click **Save**.

   After your changes are saved, the Configure Log Forwarding screen redisplays with a confirmation message.
4. Click **Previous** to return to the main AutoSupport screen.

USING AUTOSUPPORT

This section describes how to use the AutoSupport feature to create or update support tickets.

User Privilege Requirements Only a user with superuser or administrator privileges can open and modify support tickets using AutoSupport.

Create New Support Tickets

Follow these steps to open a new ticket with Spectra Logic Technical Support:

Notes:
- If *autosupport@spectralogic.com* is included in the **Mail To:** field for the autosupport profile used to submit a ticket, then Spectra Logic immediately sends a confirmation email to the email address listed in the autosupport profile used to submit the ticket, and a support person contacts the person submitting the ticket during normal service contract hours.
- If it is during your service contract hours and the problems requires immediate attention, call Spectra Logic Technical Support after submitting the AutoSupport ticket (see Contacting Spectra Logic on page 7).
- Go to Spectra Logic's website at: support.spectralogic.com/services-and-contracts/support-offerings/ for information about the warranty and service options for your library.

1. Log into the library as a user with superuser or administrator privileges.

2. From the toolbar menu, select **Maintenance ⋯ AutoSupport**. The main AutoSupport screen displays.

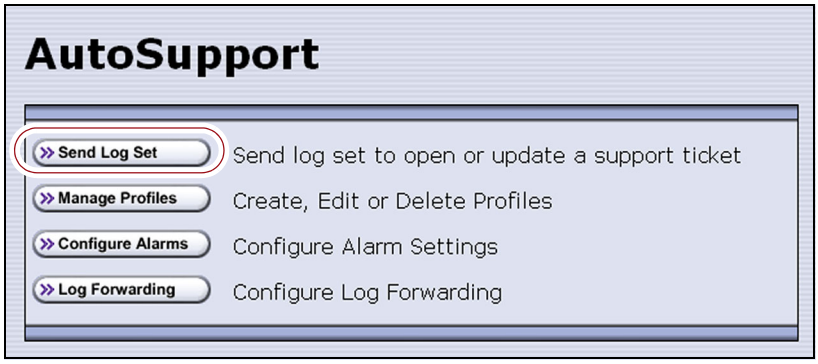


Figure 172 The main AutoSupport screen.

3. If you want to save the AutoSupport ticket information to a USB device, insert the device into the LCM's USB port before proceeding (see Figure 6 on page 32).

   Note: The option to save the ticket to a USB is only available if you plug a USB device into the LCM before you click **Send Log Set**.

4. Click **Send Log Set**. The Select Profile To Send Log set screen displays.

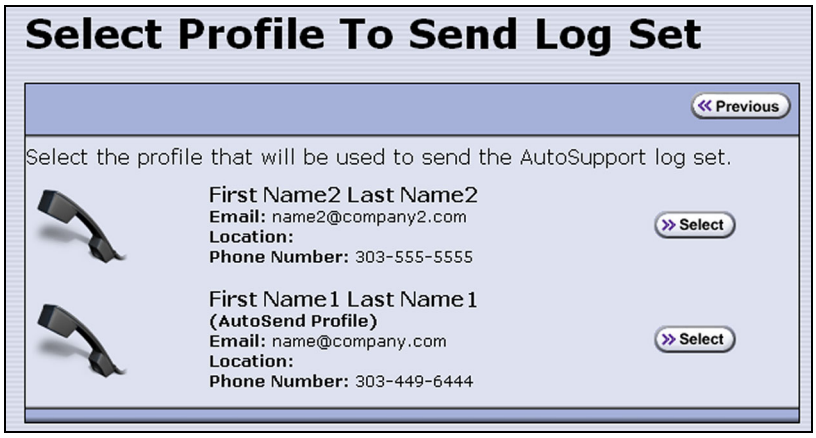


Figure 173 AutoSupport Profiles screen.

5. Click **Select** next to the profile for the main contact person for the issue. The Select Ticket Type screen displays.

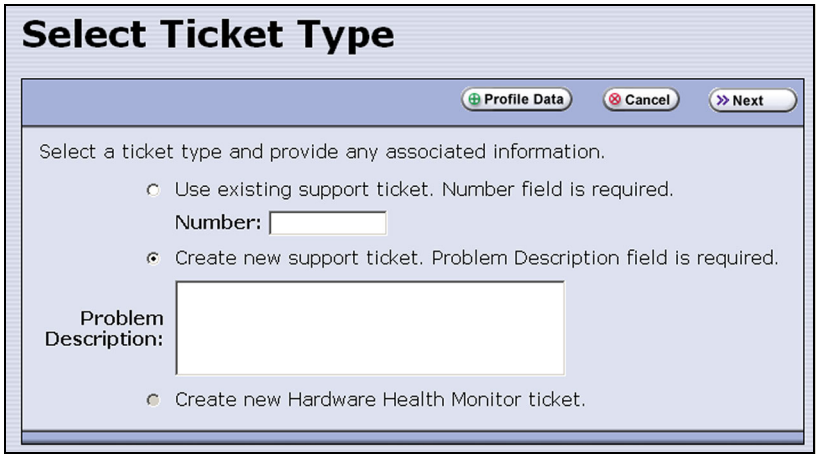


Figure 174 The Select Ticket Type screen.

- If you are sending additional information about an existing support ticket, select **Use existing support ticket** and enter the ticket number in the **Number** field. See Update Existing Support Tickets on page 304 for additional information.
- If this is a new ticket, select **Create new support ticket**. This option is selected by default.

Note: The **Create a new Hardware Health Monitor ticket** option is not available when you use the **Send Log Set** option to send an AutoSupport ticket. This option is only used to send HHM data in response to a maintenance notification (see Respond to HHM Notifications on page 318).

6. If you do not need to make any changes to the contact person's information for this support ticket, proceed to Step 8.

   - If you need to *temporarily* change the contact person's information for this ticket, click **Profile Data**. The Profile Summary screen displays.

     Make any necessary changes in the Profile Summary screen, then click **Use Settings**. The Select Ticket Type screen redisplays.

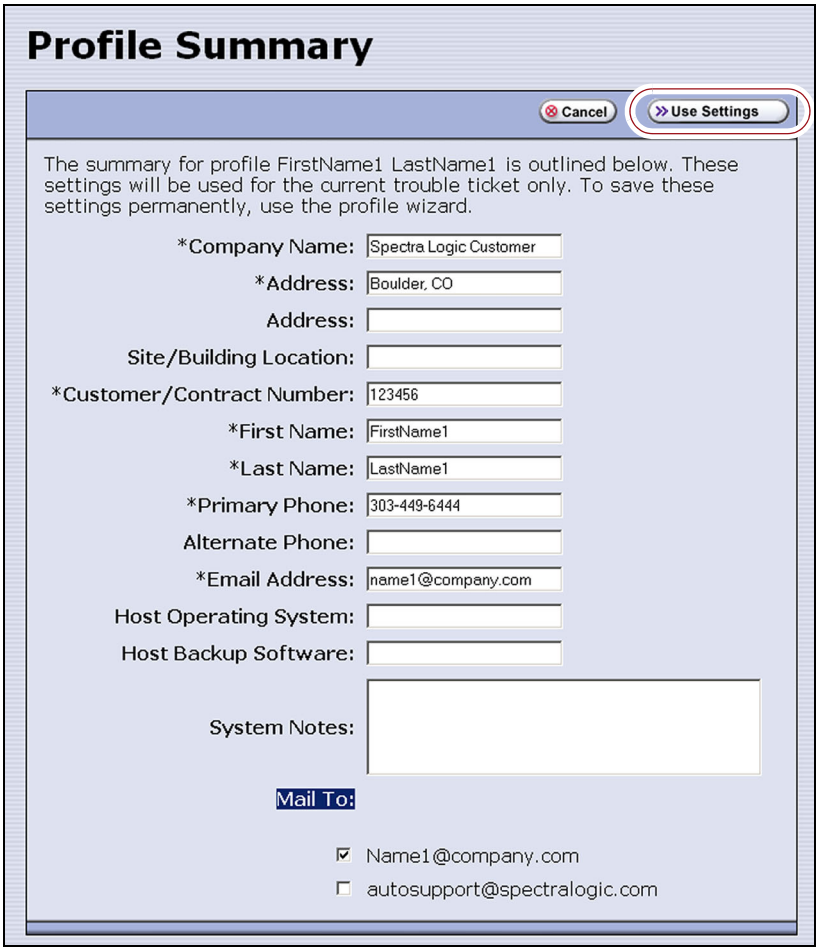


Figure 175 The Profile Summary screen.

   - Click **Cancel** to return to the Select Ticket Type screen without making any changes to the contact person's information.

7. In the Select Ticket Type screen (Figure 174 on page 301), type a detailed description of the issue in the **Problem Description** field, including what happened just before the failure occurred.

   Note: Supplying a detailed problem description helps support personnel to address the issue more quickly and efficiently.

8. Click **Next**. The Confirm and Submit Ticket screen displays.

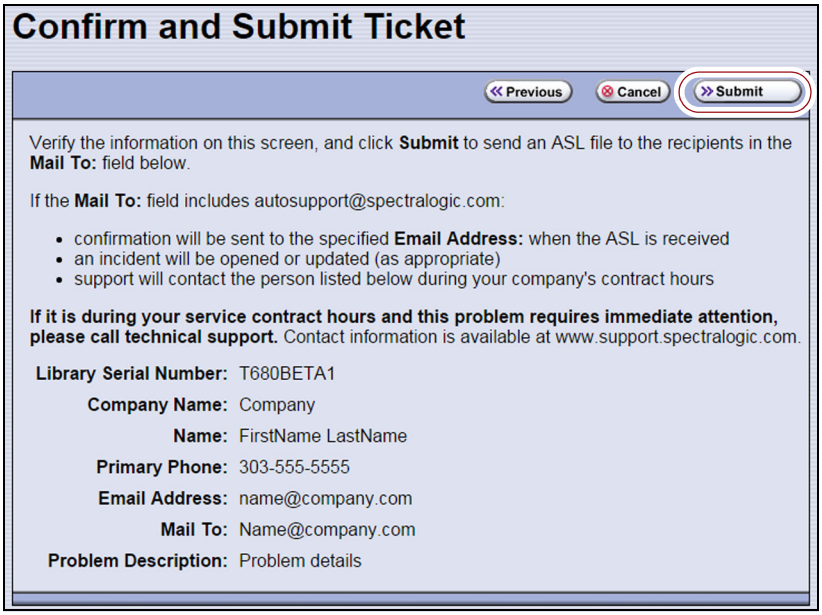


Figure 176 The Confirm and Submit Ticket screen.

9. Verify that all information is correct.

If...	Then...
The library is not connected to a network with an SMTP server,	Select the check box at the top of the screen (shown in Figure 176 on page 303) to save the ticket information to a USB device *instead* of emailing it from the library. **Notes:** ▪ The USB option is only available if you plugged a USB device into a USB port on the LCM before you clicked **Send Log Set** to begin the ticket process. ▪ After saving the ticket information to the USB device, you can upload it to the Technical Support portal (see Accessing the Technical Support Portal on page 435).
All of the information is correct,	Select **Submit**. A progress screen indicates that the ticket request (with log information) is being sent. When completed, the AutoSupport Profiles screen displays. When Spectra Logic receives the request, a ticket is opened and an email response is sent to the user with a ticket number.
You need to change the problem description,	**1.** Click **Previous** to return to the Select Ticket Type screen. **2.** Modify the problem description as required. **3.** Click **Next** to return to the Confirm and Submit Ticket screen.

If...	Then...
You need to change the contact person's information,	**1.** Click **Previous** to return to the Select Ticket Type screen. **2.** Click **Profile Data** from the Select Ticket Type screen to display the Profile Summary screen. **3.** Make any necessary changes in the Profile Summary screen. **4.** Click **Use Settings**. The Select Ticket Type screen reappears **5.** Retype the problem description. **6.** Click **Next** to return to the Confirm and Submit Ticket screen.

Update Existing Support Tickets

Follow these steps to update a ticket that you already opened with Spectra Logic Technical Support. Updating a ticket is particularly useful for mailing new logs to Technical Support.

Note: You must have the reference number for the existing ticket—which you receive when you open the ticket—and the information you are sending must be related to *that* ticket.

If you have a new issue with your library, open a new ticket to address that issue separately.

1. If you plan to save the ticket information to a USB device, insert the device into the USB ports on the LCM (see Figure 6 on page 32) and allow time for the device to mount.
2. Follow the instructions in steps 1 through 5 in Create New Support Tickets on page 299 to reach the Select Ticket Type screen (see Figure 174 on page 301).
3. If you do not need to make any changes to the contact person's information for this ticket, proceed to Step 8.
   - If you need to *temporarily* change any of the contact person's information, click **Profile Data**. The Profile Summary screen displays (see Figure 175 on page 302).
   - Make any necessary changes in the Profile Summary screen, then click **Use Settings**. The Select Ticket Type screen redisplays.
4. Select **Use existing support ticket**.
5. Type the six-digit ticket number in the Number field. You received this number when you originally opened the ticket.
6. Add any updated information in the **Problem Description** field.
7. Click **Next**. The Confirm and Submit Ticket screen displays (see Figure 176 on page 303).

8. Verify that all information is correct.

   If all of the information is correct, proceed to Step 10.

   If something needs to be changed, click **Previous** and make the necessary changes.

9. To save the ticket information to a USB device *instead* of emailing from the library, select the check box at the top of the screen (shown in Figure 176 on page 303).

   Note: The USB option is only available if you plugged a USB device into a USB port on the LCM before you clicked **Send Log Set** to begin updating the ticket.

10. Click **Submit**.

    A progress screen indicates that the ticket request (with log information) is being sent. When completed, the AutoSupport Profiles screen displays.

    When Spectra Logic receives the request, a ticket is opened and an email response is sent to the user with a ticket number.

CHAPTER 11

Library Troubleshooting

This chapter describes troubleshooting steps you can take, as appropriate, to help resolve problems you might encounter while operating the library. Try these troubleshooting procedures *before* you open a support ticket with Spectra Logic Technical Support. If you are unable to resolve the problem yourself, open a support ticket (see Opening a Support Ticket on page 437).

Note: The library must be under warranty or have a valid service contract in order to qualify for support (see Service Contract Extension on page 458 to learn about service contracts).

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Troubleshooting Library Problems

If you have a problem with your library, use the information in this section to obtain help with resolving the problem.

Check...	To...
Error Sense Codes	Look up the definition of an error sense code referenced in a system message using the *Spectra Tape Libraries SCSI Developer Guide*.
Library BlueScale Versions	Confirm that your library is at the latest released version of the BlueScale software (see Check the Library BlueScale Software Version on page 383). Some problems with library components may be fixed by updating component firmware if the library is using a downlevel version of BlueScale.
System Messages	Review any System Messages that are posted by the library (see Check and Respond to Messages on page 134) and take any action described in the message(s).
Technical Support Portal	Find information about the most current version of BlueScale software and additional service and support tools. You can access the Technical Support portal at support.spectralogic.com. **Note:** Accessing many of the tools available on the Technical Support portal requires creating a user account. See Accessing the Technical Support Portal on page 435 for instructions. ▪ Check the options under the **Documentation** and **Knowledge Base** menus for additional troubleshooting information. ▪ Check the **Service & Contracts** menu to view information about the warranty and service options available for your library as well as the Spectra Certified Media warranty.

Troubleshooting Library Initialization Issues

This section provides information about potential library initialization issues that you may experience.

Issue	Resolution
Library hangs while gathering initialization tasks	The library gathers tasks at the beginning of the library initialization process, and displays this as its first task on the Library Initialization screen. If the library is unable to gather the required initialization tasks within a few minutes of powering on, contact Spectra Logic technical support for assistance.
Library hangs during initialization	If the library cannot complete the initialization process, it generates system messages and enter maintenance mode. Contact Spectra Logic technical support for assistance (see Contacting Spectra Logic on page 7). Do not power off the library.

TROUBLESHOOTING BLUESCALE USER INTERFACE ISSUES

This section provides information about potential issues that you may experience while using the library's BlueScale user interface, either from the operator panel or through the web interface (RLC).

Issue	Description and/or Resolution
An "x" appears next to a barcode on the Inventory screen.	The cleaning cartridge is expired. Export the expired cartridge or exchange it for a new one (see Export Specific Cartridges from the Library on page 210).
BlueScale screens exhibit display problems.	Occasionally, the BlueScale interface may exhibit display problems (for example, one screen displays on top of another or there are multiple toolbars), either in the operator panel user interface or through the web interface. Use the refresh button ( ) on the status bar to refresh the screen. If you have a keyboard connected to the LCM or if you are accessing the library through the BlueScale web interface, do not use the keyboard to refresh the screen (for example, by pressing **F5**). Doing so may cause unpredictable results.
Cannot access the library using the BlueScale web interface (RLC).	▪ Make sure that the library is connected to the network via an Ethernet cable connected to the LCM. ▪ Make sure that the web server port is correctly configured for your environment (see Web Server Port on page 91). ▪ Make sure that an IP address is configured for the library (see Configure Network Settings on page 96). ▪ If SSL is enabled for the library, make sure that you enter the IP address using the form: **`https://[library IP address]`**. See Connecting to the library remotely using the BlueScale web interface on page 73 for additional information. ▪ Reset the LCM to make sure that the Ethernet port is not hung (see Reset the LCM on page 329).

Cannot change a configuration setting.	Before attempting to change configuration settings:
	▪ **Recommended.** Make sure that the drives in the partition are empty.
	▪ Make sure that the host is not communicating with the library.
	▪ Make sure that no background processes are running (for example, Media Auto Discovery, PreScan, or PostScan). If a background process is running, the library displays a message indicating what it is.
	  ▪ If the background process is Media Auto Discovery, PreScan, or PostScan and you cannot wait for the process to complete, you can stop or pause the operation (Stop the Discovery Process on page 256 and Pause the PostScan Process on page 265).
	  ▪ For all other background processes, wait until the process is completed and then retry the import or export operation.

Issue	Description and/or Resolution
Cannot create a new storage partition.	Make sure that you have: ▪ An active SLS key to support multiple partitions entered in the Option Enablement panel of the System Settings screen (see Standard and upgraded options for the library on page 86). ▪ Unassigned licensed slots available for use in the new partition. If necessary, modify an existing partition to make slots available (see Modifying an Existing Partition on page 194), or license additional slots with a CoD capacity key (see Capacity On Demand (CoD) on page 460). ▪ No partitions already configured for Standard Entry/Exit mode. You need to edit the existing partition to change the Entry/Exit mode before you can create a cleaning or storage partition. ▪ One or more drives available for use in the new partition. If necessary, modify an existing partition to make one or more drives available or install additional drives. ▪ Fewer than six storage partitions configured or fewer than six LTO-5 or later generation drives used to provide the robotic control path in partitions. ▪ No background processes running (for example, Media Auto Discovery, PreScan, or PostScan). If a background process is running, the library displays a message indicating what it is. ▪ If the background process is Media Auto Discovery, PreScan, or PostScan and you cannot wait for the process to complete, you can stop or pause the operation (Stop the Discovery Process on page 256 and Pause the PostScan Process on page 265). ▪ For all other background processes, wait until the process is completed and then retry the import or export operation.
Cannot import or export cartridges.	Make sure that no background processes are running (for example, Media Auto Discovery, PreScan, or PostScan). If a background process is running, the library displays a message indicating what it is. ▪ If the background process is Media Auto Discovery, PreScan, or PostScan and you cannot wait for the process to complete, you can stop or pause the operation (Stop the Discovery Process on page 256 and Pause the PostScan Process on page 265). ▪ For all other background processes, wait until the process is completed and then retry the import or export operation.
Cannot log into the library.	Log into the library using the default superuser (**su**). See Configuring Library Users on page 80 for a list of the default user names and passwords.
Forgot the user names or passwords.	

Issue	Description and/or Resolution

Cannot use a Global Spare drive to replace a malfunctioning drive in the partition.	▪ Make sure that a Global Spare drive is assigned to the partition (see Assign Global Spare Drives on page 162).
	▪ Make sure that no background processes are running (for example, Media Auto Discovery, PreScan, or PostScan). If a background process is running, the library displays a message indicating what it is.
	  ▪ If the background process is Media Auto Discovery, PreScan, or PostScan and you cannot wait for the process to complete, you can stop or pause the operation (Stop the Discovery Process on page 256 and Pause the PostScan Process on page 265).
	  ▪ For all other background processes, wait until the process is completed and then retry the import or export operation.

Operator panel touch screen displays broken graphics or an error message.	**1.** Display the soft keyboard (see Figure 32 on page 74).
	2. Change the keyboard to display the number keypad.
	3. Depending on what is displayed on the screen, press and hold the specified number key for 10 seconds:
	  ▪ **1**—Refresh the library's built-in web browser. Use this option if you see a message such as "Page cannot be displayed" or if graphics on the screen (for example, health icons) are not loading properly.
	  ▪ **2**—Restarts the library's built-in web browser.
	  ▪ **3**—Restarts the library's web server and the built-in web browser. Use this option if you see a message such as "Page not found."

System message states that the BlueScale Software Support key expired.	A valid BlueScale Software Support key is required before you can update BlueScale. Renew the key as described in Renewing the BlueScale Software Support Key on page 380
System message states that the library booted to the redundant partition.	The library uses a secondary mirror of the operating system if it is unable to successfully start from the primary copy. Contact Spectra Logic Technical Support for assistance (see Contacting Spectra Logic on page 7).
Touch screen buttons and text fields are out of alignment.	Recalibrate the touch screen (see Calibrating the Touch Screen on page 401).
USB device does not appear as a "save to" option.	▪ Make sure that you plug the USB device into the LCM and allow time for the device to mount before you select the option that saves data to the USB device. ▪ The library only recognizes FAT-formatted, not NTFS-formatted, USB devices. Try using a different USB device. ▪ Reset the LCM to make sure that the USB port is not hung (see Reset the LCM on page 329).

CHECKING THE SCSI BUS TERMINATION AND CONNECTIVITY

Check the SCSI Termination

If you experience sporadic errors and are using direct-attached SCSI tape drives, make sure that the SCSI bus connected to each tape drive is properly terminated at both ends.

- **LTO-3**: If one of the LTO-3 tape drives in the library terminates the SCSI bus, you must install a wide Ultra 3 Active SCSI terminator on the tape drive's SCSI connector.
- **LTO-4**: Connect a wide Ultra 3 Active SCSI terminator to the second SCSI connector on the tape drive (do not daisy-chain LTO-4 SCSI tape drives).
- Also reference Check the SCSI and SAS Connectivity below for information about cable restrictions and guidelines.

If the SCSI bus is not properly terminated you may experience one or more of the following failure symptoms:

- Read/Write failures
- Bus hangs
- Connectivity issues—tape drive is not seen on bus or drops off bus
- Command failures—commands to a tape drive may fail while commands to other devices on the bus may work properly

Check the SCSI and SAS Connectivity

Keep these guidelines in mind as you plan your SCSI connections:

- **Do not exceed SCSI bus length restrictions**. The maximum allowable length of an LVD SCSI bus is 39 feet (12 meters).

  LTO-3:

  - A maximum of two LTO-3 SCSI tape drives can be daisy-chained on a single SCSI bus.
  - When daisy-chaining LTO-3 tape drives, use a cable length of at least 12 inches that does not require making tight bends in the cable.

  LTO-4:

  - Spectra Logic does not support daisy-chaining LTO-4 drives.

General:

- Keep in mind that each daisy-chained tape drive increases the total length of the SCSI bus.
- Connecting multiple devices on a single SCSI bus can impact the performance of all devices on the bus. The data transmission rate to any drive on the bus is limited to the maximum transfer rate of the SCSI bus.
- Spectra Logic does not recommend, and does not support, daisy-chaining other SCSI devices on the same SCSI bus as the drives in the library.

Note: Although a maximum of 15 devices can be connected to a single wide LVD SCSI bus, attaching more than two devices to a single SCSI bus can potentially have a negative impact on the performance of all devices on the bus.

Follow These SAS Guidelines

Keep these guidelines in mind as you plan your SAS connections:

- Do not exceed bus length restrictions. The maximum allowable length of a SAS bus is 13 feet (4 meters).
- The LTO-5 or later generation SAS tape drives cannot be daisy-chained.
- Use a standard 6 GB SAS HBA.
- Do not use a SCSI RAID controller with the library or tape drives.

Troubleshooting MLM Issues

This section provides information about potential issues that you may experience while using MLM.

Issue	Cause	Resolution
An asterisk (*) appears next to the barcode on the MLM Details screen or an MLM report.	The cartridge was exported from the library.	If you do not intend to reimport the cartridge, you can delete it from the MLM database (see Delete MLM Records From the Database on page 277).
The library does not proactively discover new cartridges when they are imported.	The discovery process (Media Auto Discovery or PreScan) cannot begin while the hosts are actively loading cartridges into or unloading cartridges from the drives. If you import cartridges during this time, the library posts a failure message stating that no drives are available to perform the discovery process.	Either wait until the library is idle before beginning the import or manually start the discovery process for imported cartridges when the library is idle. See Discover Cartridges Manually on page 254 for instructions.

Issue	Cause	Resolution
The media health reported by MLM for LTO-4 media changed after it was loaded into an LTO-5 or LTO-6 drive.	The algorithm used to determine MLM media health in LTO-5 and later generation drives differs from the algorithm used for LTO-4 drives. For BlueScale software versions earlier than BlueScale12.0.7, when LTO-4 media is used in both LTO-4 and LTO-5 or LTO-6 drives, the media health reported by MLM is inconsistent between the two drive generations. Beginning with BlueScale12.0.7, after an LTO-4 cartridge is loaded into an LTO-5 or later generation drive, the library adjusts the algorithm used to calculate the media health score whenever the cartridge is subsequently loaded into an LTO-4 drive. This adjustment ensures that the reported media health is consistent, regardless of whether the LTO-4 cartridge is used in an LTO-4 or an LTO-5 or later generation drive.	As a best practice for your LTO-4 media, Spectra Logic recommends that you configure LTO-4 and LTO-5 or later generation drives in separate partitions and that you do not routinely share LTO-4 media between LTO-4 and LTO-5 or later generation drives.
LTFS-formatted LTO-5 data cartridges are treated as non-MLM cartridges.	LTO-5 drives using firmware version B6W1 or later automatically move the MLM data on the cartridge MAM the first time a cartridge is loaded and then unloaded from the drive. From that point forward, the MLM data is maintained in the new location. ▪ If the cartridge is formatted to LTFS before the MLM data is moved, the MLM data is lost. ▪ If a properly prepared and LTFS-formatted cartridge is loaded into an LTO-5 drive that is not using firmware version B6W1 or later, the drive cannot locate or update the MLM data on the cartridge.	▪ If you plan to reformat your LTO-5 data cartridges to use LTFS, load and then unload each cartridge into an LTO-5 drive that is using firmware version B6W1 or later before you reformat the cartridges. ▪ To ensure full MLM tracking of your LTFS-formatted LTO-5 data cartridges, make sure all LTO-5 drives in the library are updated to firmware version B6W1 or later.

TROUBLESHOOTING ENCRYPTION ISSUES

The information in this section may help resolve encryption-related problems.

Issue	Cause	Resolution
Library can not access the Spectra SKLM server.	The Spectra SKLM server's operating system firewall does not allow the library to access the server.	If you are setting up Spectra SKLM on a Windows server, create a firewall rule on the server to allow the library to access the server. Use the port setting that was assigned to the server during the BlueScale (library) portion of the Spectra SKLM server configuration. The default port setting is 3801. See "Configure the Spectra SKLM Server" in the *Spectra Encryption User Guide* to determine your port setting.
System message states that "Load attempted while encryption is enabled, but no moniker or key list was sent to the DCM."	If a cartridge is left in a drive after the library loses power or you reset or power-cycle the library, the drive is not able to receive encryption monikers. This can also occur if a tape is left in a drive while the drive is reset or reseated.	Use the following steps to re-enable the encryption process: **1.** Move the cartridge out of the drive and return it to its storage location (see Moving Cartridges Within a Partition on page 223). **2.** Reset the drive (see Resetting a Drive on page 347).

Issue	Cause	Resolution
System message states that a tape drive requires a specific moniker.	The cartridge was encrypted using an encryption key that is not currently available on the library. Or, if you are using BlueScale Professional Edition, the required encryption key is available, but was not selected as one of the partition's decryption keys.	Depending on which BlueScale Encryption edition you are using, use the following steps to enable the cartridge to be read: **BlueScale Standard Edition** **1.** Log into the library as a superuser. **2.** Log into the encryption feature. **3.** Export and then delete the encryption key currently listed on the Encryption Configuration screen (see "Deleting an Encryption Key from the Library" in the *Spectra Encryption User Guide*). **4.** Import the required encryption key (see "Import the Required Key into the Library" in the *Spectra Encryption User Guide*). **5.** Select **Configuration ···⁘ Partitions.** **6.** Click **Edit** next to the partition containing the cartridge. **7.** Navigate through the BlueScale partition wizard to the Encryption screen. **8.** Select the encryption key to be associated with the partition. **9.** Click Next to proceed to the Summary screen of the Partition Wizard, and click **Save**. **BlueScale Professional Edition** **1.** Log into the library as a superuser. **2.** Log into the encryption feature. **3.** Make sure the encryption key is listed on the Encryption Configuration screen. If it is not listed, add the key to the library (see "Import the Required Key into the Library" in the *Spectra Encryption User Guide*). **4.** Select **Configuration ···⁘ Partitions.** **5.** Click **Edit** next to the partition containing the cartridge. **6.** Navigate through the BlueScale partition wizard to the Encryption screen. **7.** Select the required encryption key as either the primary encryption key or as a decryption key. **8.** Click Next to proceed to the Summary screen of the Partition Wizard, and click **Save**. **Note:** A maximum of eight decryption keys can be assigned to one partition.

Resolving Operational Issues

This section provides information about potential issues you may encounter while operating the library.

Issue	Cause	Resolution
Cartridge left in a tape drive after a library power-cycle or reset.	If the library loses power during backup operations or you reset or power-cycle the library without first unloading all of the drives, cartridges may remain in the drives.	**CAUTION:** When the Unload Drives utility runs, cartridges are unloaded from all drives in the selected partition(s), even if they are active. This could cause backups to fail. Do not use the Unload Drives utility when backup or restore operations are actively running. **1.** Select **Maintenance** ⋯⁘ **Tools** ⋯⁘ **Utilities**. The Utilities screen displays. **2.** Click **Show Advanced**. The Advanced Utilities Confirmation screen displays. **3.** Click **Next**. The Utilities screen refreshes to show the advanced utilities. **4.** Scroll down and select **Unload Drives**. **5.** From the **Select the partition or library** drop-down list, select a partition or **Total Library**. **6.** Click **Run Utility**. **7.** A progress screen displays, all drives assigned to partitions in the library or the selected partition are unloaded, and the cartridges are returned to their original slots or the first available slot if the original slot is not available. When the operation is complete, a Utility Results screen displays. **Note:** This utility does not unload cartridges from Global Spare tape drives being used for PostScan. If there is a cartridge left in a Global Spare tape drive, see Cartridge left in a Global Spare tape drive after a library power-cycle or reset. on page 317.

Issue	Cause	Resolution
Cartridge left in a Global Spare tape drive after a library power-cycle or reset.	If the library loses power or if you reset or power-cycle the library while the PostScan process is running, the cartridge being scanned remains in the drive. The library generates a message to notify you that the Global Spare contains a cartridge after it completes its initialization process.	**CAUTION:** Make sure the drive you are sparing is not actively running a backup or restore operation. This could cause backups to fail. Use the following steps to return the cartridge to its storage location: **1.** Examine the partition inventories to determine in which partition the cartridge belongs (see Viewing and Downloading the Cartridge Inventory on page 216). **2.** Substitute the Global Spare tape drive containing the cartridge for another drive in the same partition (see Use the Global Spare Drive on page 349). **3.** Move the cartridge out of the drive and return it to its storage location (see Moving Cartridges Within a Partition on page 223). **4.** Return the drive back to Global Spare status (see Undo the Global Spare Drive on page 352).
Element addresses change after installing additional drives.	Installing additional drives or removing drives may cause the library to reassign element addresses.	To avoid errors after adding a new drive, make sure that you reconfigure the element addresses your storage management software uses to access drives when you install a new drive (refer to your software documentation for instructions).
Cartridge is in the E/E port after a power failure.	If the library loses power while a cartridge is in the E/E port, the library only identifies the cartridge's presence in the E/E port the next time media is imported or exported.	To recover the cartridge, use the Import/Export Media screen to initiate an import or export operation (see Chapter 7 – Media Management, beginning on page 201 for instructions).
Cartridge is left in robotics assembly following a move.	The library was unable to insert the cartridge into its slot and no empty slots are available. The library posts a system message and halts.	Contact Spectra Logic Technical Support for assistance (see Contacting Spectra Logic on page 7).
System message indicates that the robotics are blocked.	A blockage is preventing the library from moving the robotics.	Use the steps in Accessing the Library Interior and Troubleshooting Blockages on page 344 to troubleshoot the problem.

USING BLUESCALE HARDWARE HEALTH MONITORING

Overview BlueScale Hardware Health Monitoring (HHM) tracks maintenance thresholds for key library components. When the library or one of its components reaches its maintenance threshold the HHM icon appears on the status bar. As with the system message icon, the color of the icon indicates the urgency of the notification.

When the HHM icon appears on the status bar, you can click on the icon to view information about the notification and send a Hardware Health Monitor ticket to a contact person within your organization or to Spectra Logic Technical Support so they can review the logs and determine if any maintenance tasks are needed.

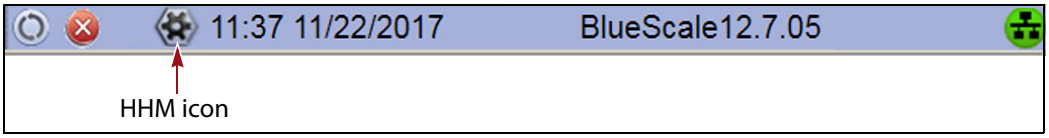


Figure 177 The HHM icon is located on the status bar.

- To send an AutoSupport log to a contact person, see Respond to HHM Notifications, beginning on this page.
- To view a report showing the current HHM data, see View Hardware Health Monitoring (HHM) Data on page 322.

User Privilege Requirements Only a user with superuser or administrator privileges can respond to HHM notifications by creating an AutoSupport ticket and viewing HHM data.

Respond to HHM Notifications

Use the following steps to send the Hardware Health Monitoring notification and AutoSupport Log (ASL) file to the contact person in a predefined AutoSupport profile. You can also choose to send the ASL files to Spectra Logic Technical Support so they can review the logs and determine if any maintenance tasks are needed to prevent future problems.

Note: AutoSupport Log (ASL) information is only for troubleshooting purposes. This log information is separate from the data path and contains no customer data.

1. Log into the library as a user with superuser or administrator privileges.

2. If not already completed, configure the mail recipients who should receive AutoSupport information. Also configure one or more AutoSupport profiles.
   - **Mail recipients** — See Configure Mail Users on page 99. At a minimum, configure Spectra Logic Technical Support as a mail recipient if you want the library to email AutoSupport ticket requests to Spectra Logic.
   - **AutoSupport profiles** — See Configure AutoSupport Profiles on page 293. You can configure one of the mail recipients to receive critical alarm log sets automatically sent by the library.
3. Click the HHM icon on the status bar (see Figure 177 on page 318). The Hardware Health Monitoring screen displays.

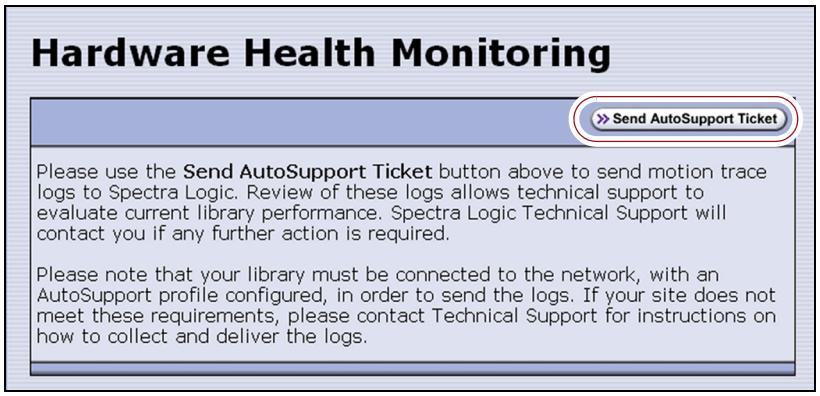


Figure 178 The Hardware Health Monitoring screen provides information about responding to the HHM notification.

4. If you want to save the AutoSupport ticket information to a USB device, insert the USB device into a USB port on the LCM (see Using a USB Device on page 145) and allow time for the device to mount.

   Note: The option to save the ticket to USB is only available if you plug a USB device into the LCM **before** you click **Send AutoSupport Ticket**.
5. Click **Send AutoSupport Ticket**. The main AutoSupport screen displays.

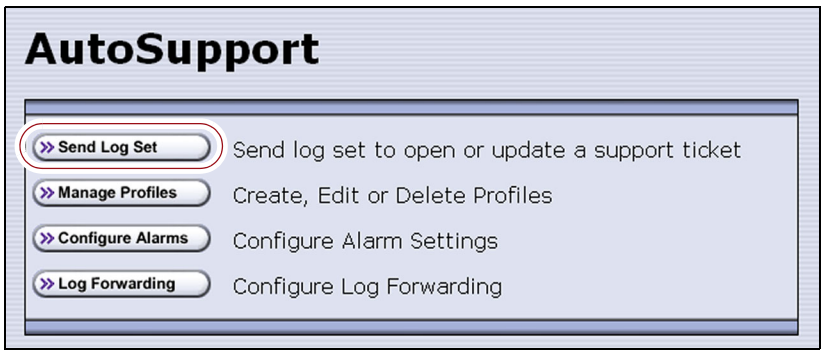


Figure 179 Click **Send Log Set** to open a support ticket.

6. Click **Send Log Set**. The Select Profile to Send Log Set screen displays.

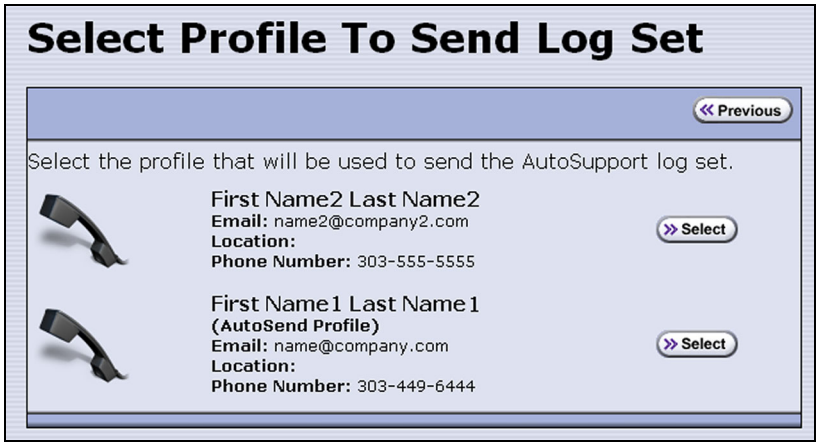


Figure 180 Select the AutoSupport profile to use.

7. Click **Select** next to the profile for the main contact person for HHM issues. The Select Ticket Type screen displays.

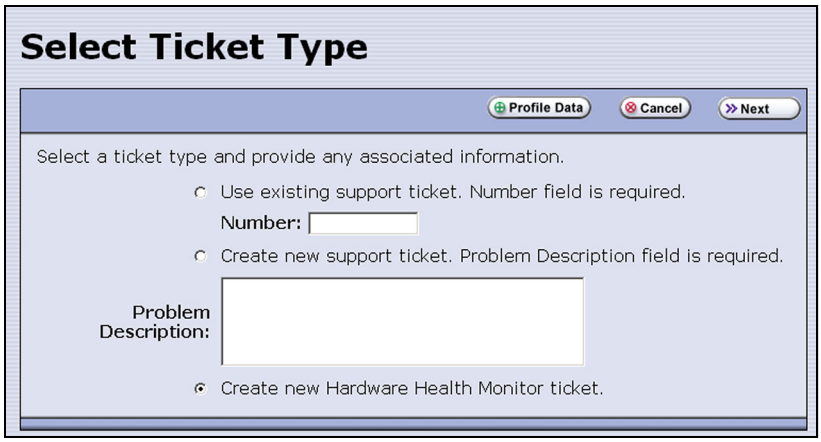


Figure 181 Enter a problem description on the Select Ticket Type screen.

The **Create a New Hardware Health Monitor ticket** option is automatically selected. The options for entering an existing support ticket number and a problem description are not available.

8. If you do not need to make any changes to the contact person's information for this support ticket, skip to Step 9 on page 321.

   If you need to *temporarily* change the contact person's information for this ticket, click **Profile Data**. The Profile Summary screen displays (see Figure 175 on page 302). Make any necessary changes in the Profile Summary screen. Click **Use Settings** to save your changes and return to the Select Ticket Type screen.

9. Click **Next**. The Confirm and Submit Ticket screen displays.

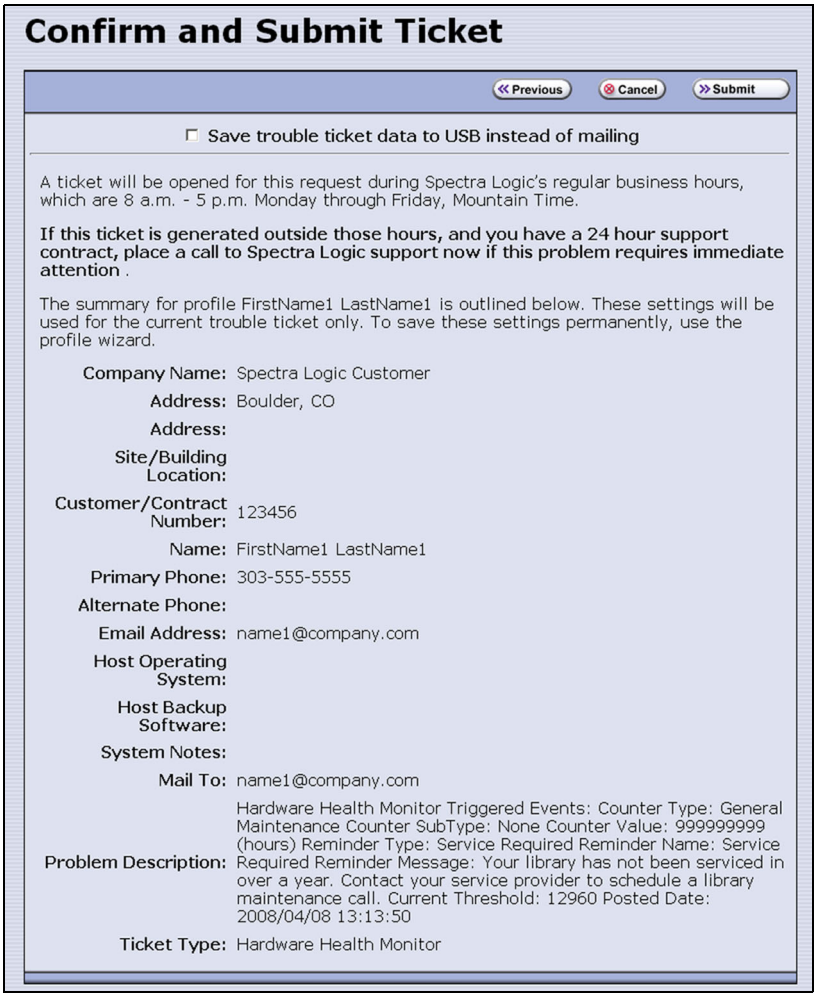


Figure 182 The Confirm and Submit Ticket screen.

10. Verify that all information is correct.

    - To save the ticket information to a USB device instead of emailing it from the library, check the box at the top of the screen.

    Note: The USB option is only available if you plugged a USB device into a USB port on the LCM before you selected **Send AutoSupport Ticket**.

    - If something needs to be changed, click **Previous** to return to the Select Ticket Type screen and make any necessary changes.

11. Click **Submit** to send the Hardware Health Monitor ticket to the selected recipient. Click **Cancel** to return to the AutoSupport Profiles screen.

    A progress screen indicates that the ticket request (and the ASL information) is being sent. When completed, the AutoSupport Profiles screen displays.

12. After any required tasks are complete, the threshold can be reset. The HHM icon disappears until the next threshold is reached.

View Hardware Health Monitoring (HHM) Data

The advanced utility called HHM: View Data generates a report showing the current status of the HHM counters. This information includes the following:

- Library serial number and name (if configured)
- Information about key library components monitored by HHM, including the type of reminder generated when the component reaches its maintenance threshold
- Robotics moves: Drive To Drive Moves, Drive To Slot Moves, Slot To Slot Moves, Slot To Drive Moves, Import Moves, and Export Moves.

Caution In addition to the HHM: View Data utility, two additional HHM utilities configure the HHM counters and thresholds for the monitored components. **Do not** change the values for any counters or thresholds unless you are specifically instructed to do so by Spectra Logic Technical Support.

Note: You can also use the XML command interface to retrieve the HHM data (see the *Spectra Tape Libraries XML Command Reference* for more details).

Use the following steps to view the current HHM data.

1. Log into the library as a user with superuser or administrator privileges.
2. Select **Maintenance** ⋯ **Tools** ⋯ **Utilities**. The Utilities screen displays.
3. If you want to save the HHM report to a USB device, insert the USB device into the LCM's USB port and allow time for the device to mount; otherwise, skip to the next step.

   Note: The option to save the HHM report to USB is only displayed if you connect the USB device to the LCM **before** you select **Show Advanced** (see Using a USB Device on page 145).
4. Click **Show Advanced**. The Advanced Utilities Confirmation screen displays.
5. Click **Next**. The Utilities screen refreshes to show a list of the advanced utilities.

6. Scroll through the list of advanced utilities and select **HHM: View Data**. The screen refreshes to show the details for the utility.

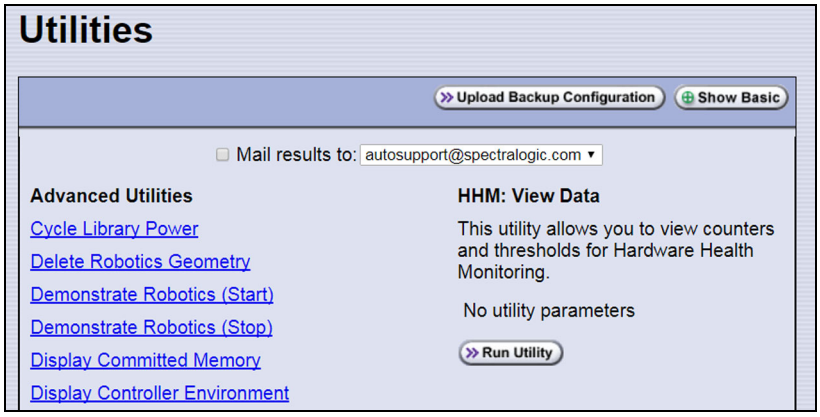


Figure 183 The HHM: View Data utility.

7. If you want to save the output from the utility, use the check boxes at the top of the screen to select the location; otherwise skip to Step 8.

Selecting this option...	Saves the report...
Mail results to	As an attachment to an email sent to the specified mail recipient. Use the drop-down list to select the recipient for the report file. To send the email with the attached library configuration file to someone who is not already listed as a library user, you must first configure that person as an email recipient (see Configure Mail Users on page 99). **Note:** Do not use the default *autosupport@spectralogic.com* email recipient unless Spectra Logic Technical Support specifically instructs you to do so. Spectra Logic does not save emailed HHM report files unless they are specifically requested for troubleshooting.
Save to USB	To a USB device connected to the USB port on the LCM. **Note:** This option is only available if you inserted a USB device in Step 3 on page 322.

8. Click **Run Utility**.

   After a brief delay, the Utility Results screen displays the current HHM data. Scroll as necessary to view all of the data.

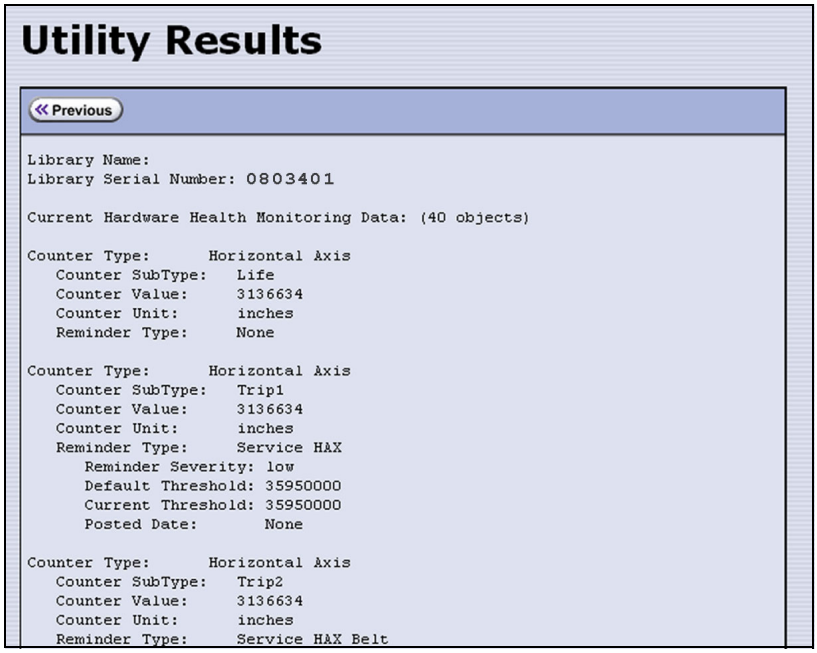


Figure 184 The HHM: View Data Utility Results screen.

9. If you chose to save the file to a USB device, a message displays showing the filename for the trace file.

   If you are connected to the library using a web browser, you can also copy and paste the results from the Utility Result screen into a text file and email it to Spectra Logic Technical Support if they request it.

10. Click **Previous** to return to the list of advanced utilities.

CAPTURING TRACES

Overview Spectra Logic uses traces to help diagnose problems with the library. You only need to capture traces when instructed to do so by Spectra Logic Technical Support. They tell you what type of trace you need to capture.

Emailing Trace Results If you plan to email trace results directly from the library, make sure that you set up the recipients as mail users (see Configure Mail Users on page 99).

If you are connected to the library using a web browser, you can also copy and paste the trace results into a text file and email it to Spectra Logic Technical Support if they request it.

Saving Trace Results to USB If you plan to save trace results to USB, you must connect the USB device to the LCM and allow time for the device to mount **before** you select **Traces** on the Maintenance Tools screen (see Connect a USB Device to the Library on page 146). If a USB device is not connected, the USB option is not available. You can, however, still save trace results to the memory card in the LCM. You can also view the results without saving them.

User Privilege Requirements Only a user with superuser or administrator privileges can capture traces.

1. Log into the library as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Maintenance ⋯⁘ Tools** to display the Maintenance Tools screen.

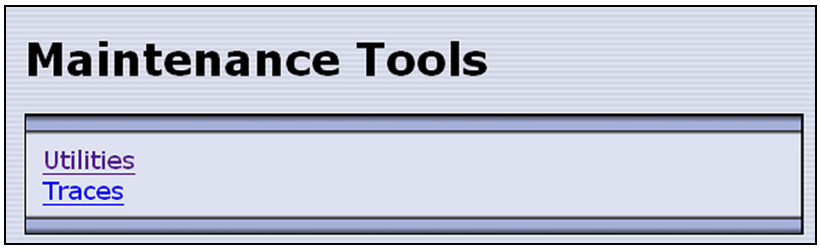


Figure 185 The Maintenance Tools screen.

3. If you want to save the traces to a USB device, connect the USB device to the LCM and allow time for the device to mount; otherwise, skip to the next step.
4. Select **Traces**. The System Traces screen displays with the trace options that were selected the last time the screen was viewed.

5. Select the type of trace that Spectra Logic Technical Support requested.

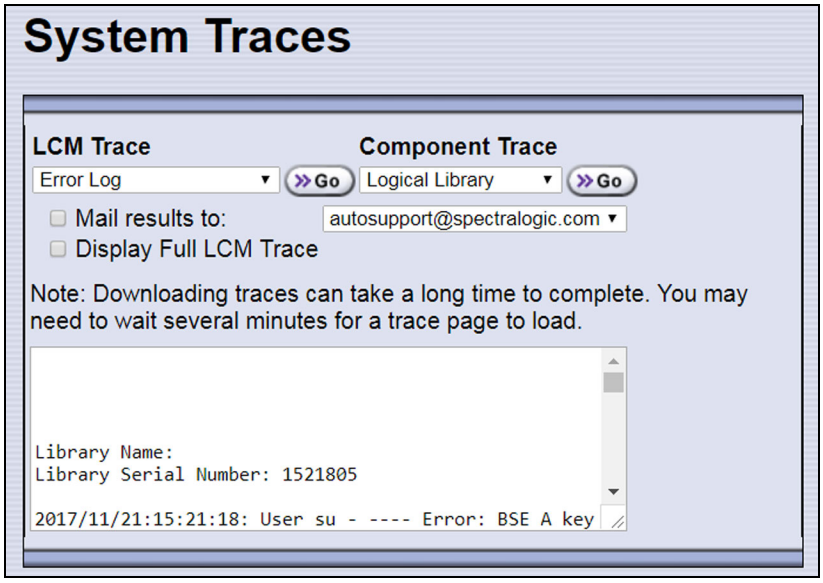


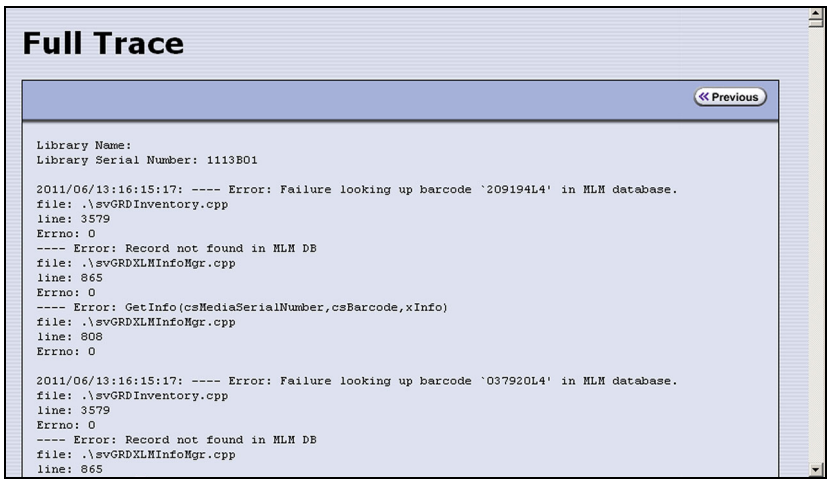
Figure 186 Select the traces you want to capture on the System Traces screen (Error Log trace results shown).

- **LCM Trace**—Captures a trace relating to a single aspect of operations related to the LCM.
- **Component Trace**—Captures a trace relating to the logical library or a single aspect of operations related to the robotics or a controller (controlling drive or F-QIP).

6. Use the check boxes to select any combination of the options for saving the generated trace.

Option	Description
Mail results to	Sends the trace report to a previously configured mail recipient. Use the drop-down list to select the recipient for the report file. To send the email with the attached library configuration file to someone who is not already listed as a library user, you must first configure that person as an email recipient (see Configure Mail Users on page 99). **Note:** Do not use the default *autosupport@spectralogic.com* email recipient. Spectra Logic does not save emailed traces unless they are specifically requested for troubleshooting.
Save to USB	Saves the report to the USB device. The results can then be viewed from any device that can read from a USB device. **Note:** This option is only available if you inserted a USB device in Step 3 on page 325.
Display Full LCM Trace	Opens a new screen that shows the entire trace. **Note:** The **Display Full LCM Trace** check box only applies to selections made in the **LCM Trace** list, not selections made in the **Component Trace** list. If **Display Full LCM Trace** is selected when you are generating a component trace, the selection is ignored.

7. Click **Go** next to either LCM Trace or Component Trace. The library retrieves the requested trace, which may take several minutes.

If you...	The trace results...
Did not select **Display Full LCM Trace**,	Display in the scrolling box on the System Traces screen (see Figure 186 on page 326).
Selected **Display Full LCM Trace**,	Display in the Trace Results screen. Click **Previous** to return to the System Traces screen.  **Figure 187** Select the Display Full LCM Trace option to view the entire trace on the Full Trace screen (Error Log trace results shown).

8. If you chose to save the file to a USB device or mail it, a message displays showing the filename for the trace file.

RESETTING THE LIBRARY

Most situations that require resetting the library (for example, when you make changes to certain library configuration settings) only require resetting the LCM, as described in Reset the LCM on page 329. Because resetting the LCM only affects the BlueScale software, hosts, servers, and software are still able to communicate with the drives. Any backups that are in progress can continue while the LCM resets. However, any action that requires the robotics fails until the reset is complete.

Performing some types of troubleshooting operations or recovering from some error conditions require you to reboot (power-cycle) the library. Power-cycling the library resets all of the components in the library. Any drives that are not assigned to a partition generate system messages showing that the drive disappeared and then reappeared whenever the library is power-cycled.

Caution Do not reset the library unless you are specifically instructed to do so. Trace data generated by the library may be lost when you reset the library or a component, making diagnosing problems difficult.

Note: Any drives that are not assigned to a partition generate system messages showing that the drive disappeared and then reappeared whenever the library is power-cycled.

Use the following steps if Spectra Logic Technical Support instructs you to reset the entire library.

1. If possible, pause PostScan if it is running (see Pause the PostScan Process on page 265). Any tapes currently being scanned are returned to their storage locations.
2. Discontinue all I/O to the library.
3. Power off the library (see Power Off the Library on page 131).
4. Wait at least 10 seconds.
5. Power on the library (see Power On the Library on page 129) and wait while the library performs its initialization process.
6. If a cartridge is left in a drive after the reset is complete, see Resolving Operational Issues on page 316 for information about returning the cartridge to its storage location.

RESETTING COMPONENTS

If instructed to do so by Spectra Logic Technical Support or by error messages, you can reset certain library components as described in this section. See Resetting the Library on page 328 if you need to reset the entire library.

Caution Do not reset a component unless you are specifically instructed to do so. Trace data generated by the library or the component may be lost when you perform a reset, making diagnosing problems difficult.

Reset the LCM

To reset the LCM, insert the tip of a toothpick or other similar **non-conductive** object into the hole on the back of the LCM to press the reset button.

Caution Do not use a metallic object to press the reset button. You may inadvertently cause an electrical short inside the module.

Important Resetting the LCM resets the motion control for the robotics. Any move requests fail until the LCM completes its initialization.

Important Resetting the LCM resets the front panel and the web server. Any connections to the library through the BlueScale web interface are lost. Wait five minutes for the reset to complete and then reconnect. Backup operations are not affected.

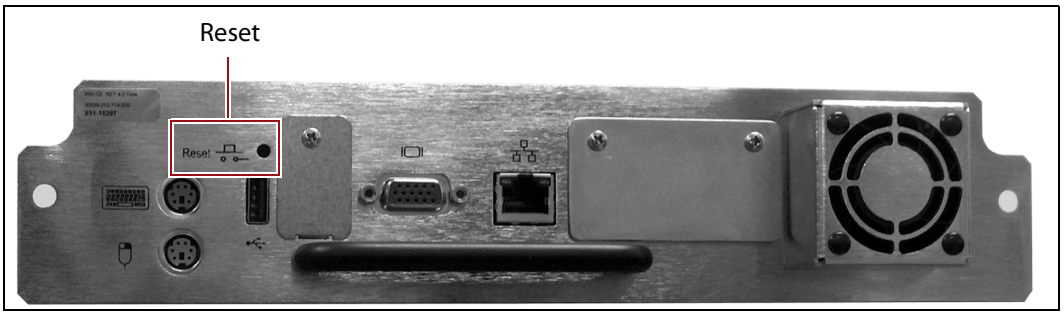


Figure 188 The reset button on the Spectra PC.

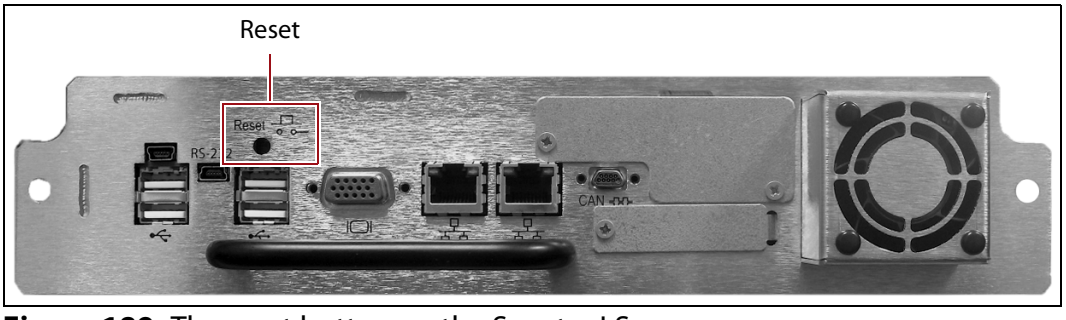


Figure 189 The reset button on the Spectra LS.

Reset an F-QIP Controller

Hardware Reset

To perform a hardware reset of an F-QIP controller, insert the tip of a toothpick or other similar **non-conductive** object into the hole in the back panel to press the Reset button.

Caution Do not use a metallic object to press the reset button. You may inadvertently cause an electrical short inside the module.

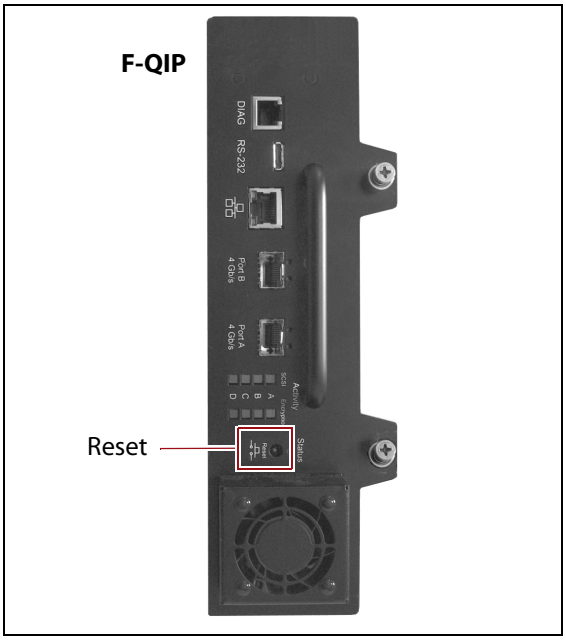


Figure 190 Location of the controller hardware Reset button.

BlueScale Reset

You can also reset the controller through the BlueScale user interface.

1. Determine the BlueScale identifier for the controller you need to reset.
2. Log into the library as a user with superuser or administrator privileges.
3. Select **Maintenance** ⋯⁘ **Tools** ⋯⁘ **Utilities**. The Utilities screen displays.
4. Click **Show Advanced**. The Advanced Utilities Confirmation screen displays.
5. Click **Next**. The Utilities screen refreshes to show a list of the advanced utilities.

6. Scroll through the list of advanced utilities and select **Reset Controller**. The screen refreshes to show the details for the utility.

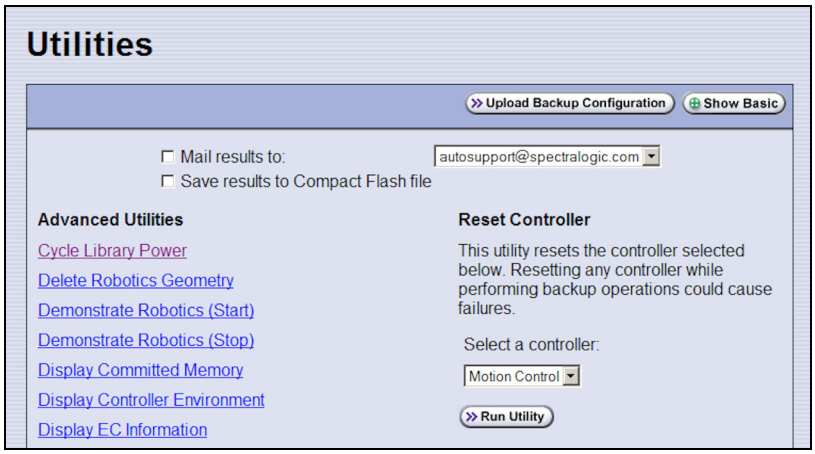


Figure 191 The Reset Controller utility.

7. Use the drop-down list to select the component identifier for the controller that you need to reset.
8. Click **Run Utility** to reset the selected controller.

   When the reset is complete, the Utility Results screen displays, showing that the controller was reset.

   Note: When the controller is reset, the library posts system messages that the F-QIP disappeared and reappeared.
9. The controller is ready for use.

TESTING THE ROBOTICS

Overview If you are experiencing problems that result in system messages indicating that there is a problem with the library's robotics (for example, motion failures), Spectra Logic Technical Support may instruct you to perform basic motion tests of the robotics. You only need to perform this test if you are instructed to do so.

The Run All Motion Basic Tests feature described in this section performs the same series of tests on the robotics as the "Run All Motion Basic Tests" diagnostic accessed by selecting **Maintenance ···⁘ Diagnostics**. When the tests are started from the Robotics Status screen, they run in the background; you can continue to use the BlueScale interface to perform other tasks. When the tests are started from the Diagnostics screen, you must wait until the tests are complete before you can perform other tasks.

The library runs all of the tests, even if one or more of the tests fail. When all of the tests are complete, the library generates a system message that contains the status for all the tests.

Emailing Test Results If Spectra Logic Technical Support requests the results of the test, you can email the Robotic Motion trace to Spectra Logic Technical Support (see Capturing Traces on page 325).

User Privilege Requirements Only a user with superuser or administrator privileges can test the robotics.

Start the Tests

1. Log into the library as a user with superuser or administrator privileges.
2. If necessary, select **General** ⋯ **General Status** to display the library's General Status screen.
3. Click **Robotics** to display the Robotics Status screen.

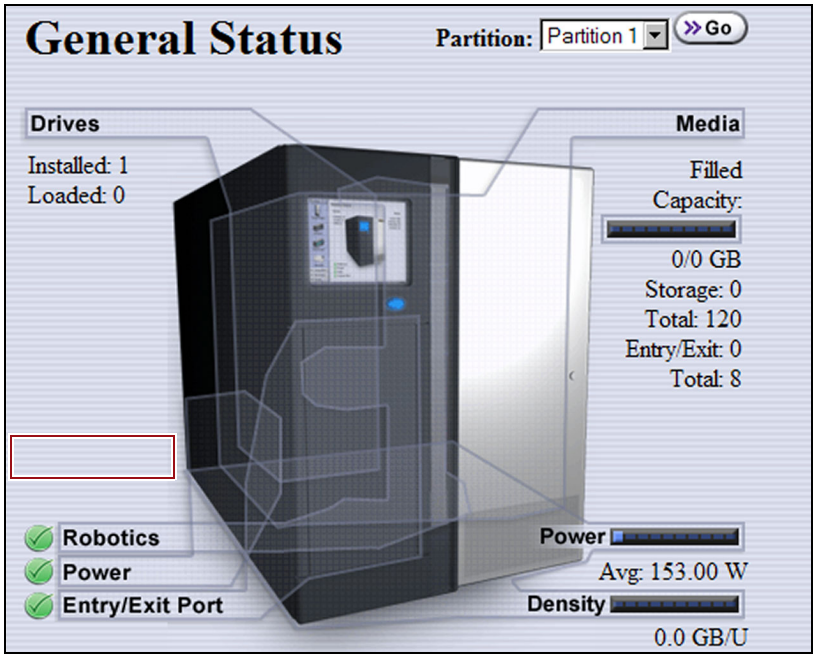


Figure 192 Click **Robotics** to display the Robotics Status screen.

4. Click **Start** to start the Run All Motion Basic Tests.

   Note: After the tests start, you can use the BlueScale interface to perform other tasks. You only need to return to this screen if you need to stop the tests.

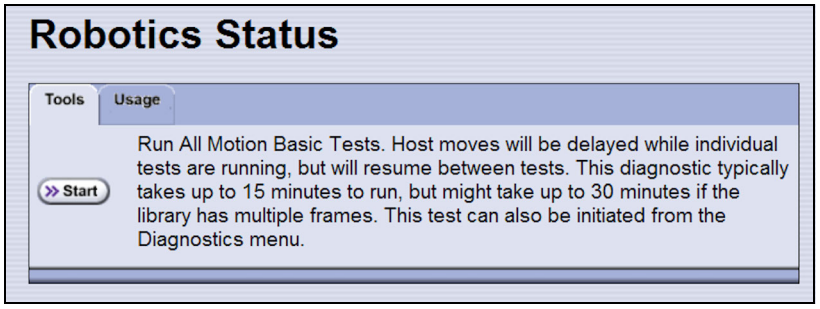


Figure 193 Start the Run All Motion Basic Tests diagnostic.

If you need to end the tests before they are completed, return to the Robotics Status screen and click **Stop**. If you cancel the tests, the library completes the current test, halts further testing, and redisplays the Robotics Status screen.

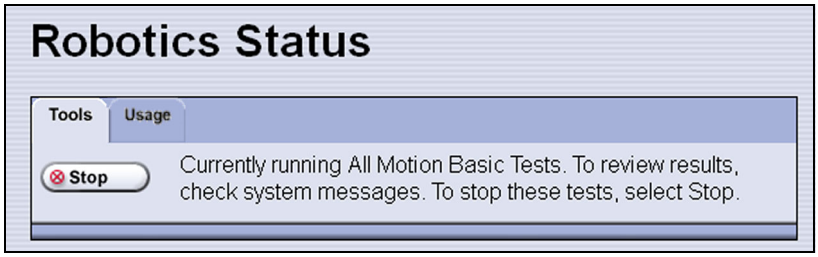


Figure 194 Click **Stop** to terminate the diagnostic.

5. When the last test completes, the library posts a system message showing the diagnostic results. View the system messages to see the test results (see Check and Respond to Messages on page 134).

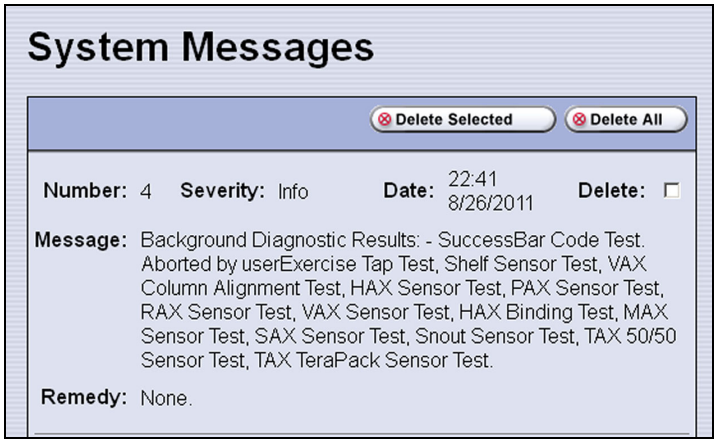


Figure 195 A system message shows the results of Run All Motion Basic Tests (tests aborted by user).

RESTORING THE LIBRARY CONFIGURATION

Overview If you have valid backups of the library's configuration and the MLM database saved on a USB device or sent as an email attachment, you can use them to restore the library in the event of a disaster. You can also use these backups to restore the library if problems require you to replace the LCM or the memory card in the LCM. See Backing Up the Library Configuration on page 122 for information about backing up the library configuration.

Notes:
- All backup files of the library configuration include any BlueScale encryption keys that were stored in the library at the time the file was created.
- The backup of the MLM database also contains the DLM database.

To restore the...	Using the...	See...
Library configuration, the MLM and DLM databases, and the BlueScale encryption keys stored in the library	Auto Configuration Save file,	Restore From an Auto Configuration Save File on page 335.
Library configuration and the BlueScale encryption keys stored in the library	Saved configuration file,	Restore the Library Configuration Using a Saved Configuration on page 340.
MLM and DLM databases	MLM database backup file,	Restore the MLM and DLM Databases on page 342.
BlueScale encryption keys	Exported key file,	the *Spectra Encryption User Guide*.

User Privilege Requirements Only a user with superuser or administrator privileges can restore the library configuration and the MLM and DLM databases. To restore BlueScale encryption keys, the user must also be logged in as an encryption user. See Configuring Library Users on page 80 and the *Spectra Encryption User Guide* for further information.

Restore From an Auto Configuration Save File

The advanced utility called "Restore Library Configuration from Auto Save" restores the library configuration, as well as the MLM and DLM databases, using the configuration backup file that the library generates automatically (see Use Automatic Backup of the Library Configuration on page 123). It also restores any BlueScale encryption keys that were stored in the library when the backup file was created.

Important Before restoring your system using the automatically generated backup file, check the time stamp included in the file name to ensure that you have the most current file.

Important The library does not automatically save a backup when you make changes to any of the library configuration settings other than those for partitions. Any changes made since the last backup need to be entered manually.

The library automatically generates a configuration backup file whenever any of the following events occurs:

- When you make a change to a partition, the library immediately generates a configuration backup file and saves it to the memory card in the LCM. If you configured the option to email the backup file, the backup file is sent as an email attachment to the specified recipient (see Enable Email for the Auto Configuration Save File on page 101).
- Changes to any of the library configuration settings other than those for partitions are automatically saved in the configuration backup file that the library creates each week. The timing for this backup is based on the first time the automatic backup file is generated.
- If you cannot restore from the configuration backup file on the LCM and you have manually generated backups of the library configuration and the MLM database that are more current than the available automatically generated configuration backup file that is saved elsewhere, you may want to use those backups instead of the automatically generated configuration backup file (see Restore the Library Configuration Using a Saved Configuration on page 340 and Restore the MLM and DLM Databases on page 342).

Restore the Library

Use the following steps to restore the library configuration, the MLM and DLM databases, and any BlueScale encryption keys using an automatically generated configuration backup file.

Note: If you cannot use the automatically generated configuration backup file stored in the library, locate an Auto Configuration Save file that was saved to a USB device or sent as an email attachment.

Important The library cycles power after restoring the previous configuration.

1. If you plan to restore using the zip file containing the automatically generated configuration backup file that was sent as an email attachment, use the following instructions to copy it to a USB device; otherwise, skip to Step 2.
   a. Create a folder called `\autocfgsave` on a USB device.
   b. Copy the zip file you received in the email to the `\autocfgsave` folder on the USB device.
   c. Connect the USB device to the USB port on the LCM and allow time for the device to mount before continuing.
2. Log into the library as a user with superuser or administrator privileges.
3. Select **Maintenance** ⋯⁘ **Tools** ⋯⁘ **Utilities**. The Utilities screen displays.
4. Click **Show Advanced**. The Advanced Utilities Confirmation screen displays.
5. Click **Next**. The Utilities screen refreshes to show a list of the advanced utilities.

6. Scroll through the list of advanced utilities and select **Restore Library Configuration from Auto Save**. The screen refreshes to show the details for the utility.

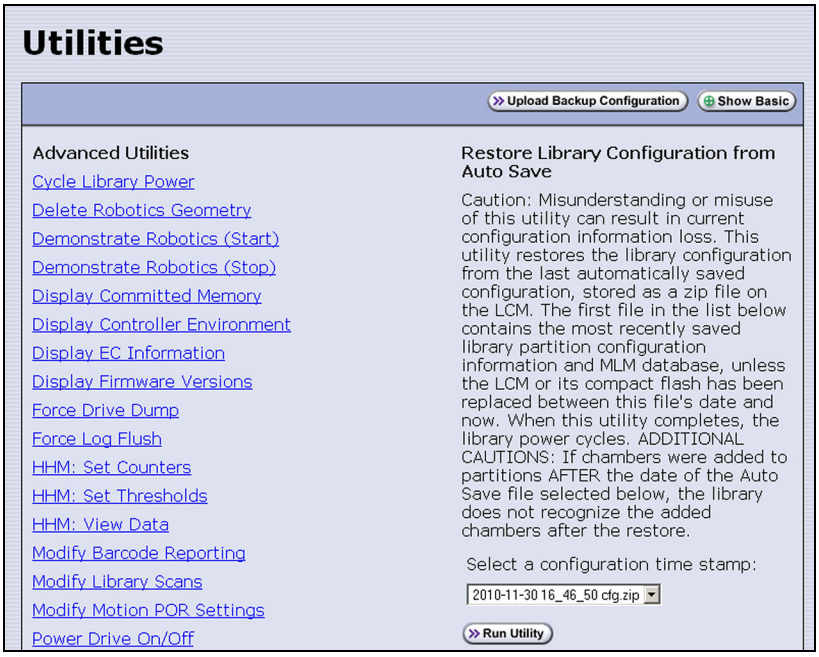


Figure 196 The Restore Library Configuration from Auto Save utility.

7. Use the **Select a configuration time stamp** drop-down list to select the configuration backup file you want to use. The automatically generated configuration backup files are named `<date-time>cfg.zip`, where `<date-time>` is the time stamp for when the file was created.

   Unless you replaced the LCM or its memory card, the first file listed is the zipped configuration backup file stored on the LCM memory card.

   Note: If available, the zipped configuration backup file stored on the LCM memory card usually contains the most recently saved library configuration information, as well as the MLM and DLM databases. Check the time stamp in the filename to determine whether any manually generated backup file you have is more recent.

8. Click **Run Utility**.

Important

Before the library is restored using the configuration backup file on a USB device, the library's current configuration is saved to the USB device with a time stamp indicating when the file was created. The library is then restored using the selected configuration backup file on the USB device.

The USB device now contains one additional auto configuration save file.

After a brief delay, the Utility Results screen appears, showing that the configuration was restored. The library then performs a power- cycle reset.

9. Once the library begins its power-on sequence, remove the USB device if necessary.

Important If you do not remove the USB device, the library power-on sequence fails.

If the library fails to boot, power off the library as described in Power Off the Library on page 131. Once the library is powered off, remove the USB device and power on the library as described in Power On the Library on page 129.

Restore Other Configuration Changes

The library does not immediately generate a configuration backup file when you make changes to any of the library configuration settings other than those for partitions. If you made any changes to the library configuration after the automatically generated configuration backup file you used to restore the library was generated, you need to repeat those changes after completing the restore.

- If you have a manual backup of the library configuration that is more current than the automatically generated configuration backup file you used, you can use it to restore the updated configuration (see Restore the Library Configuration Using a Saved Configuration on page 340).
- If you do not have a manual backup available, you need to restore the following changes manually:
  - If you made configuration changes after the creation date of the automatically generated configuration backup file you used to restore the configuration, you need to use the options in the System Configuration screen to repeat those changes after the restore is complete.
  - If you entered activation keys after the creation date of the automatically generated configuration backup file you used to restore the configuration, you need to use the Option Enablement pane of the System Configuration screen to re-enter those keys (see Enter Activation Keys on page 87).

Update the Library Inventory

When you restore the configuration, any cartridges that were imported into a partition after the configuration backup file you used was generated are not recognized as belonging to the partition. Instead, the library notifies you that there are unassigned cartridges in the media slots. Use the following instructions to update the library inventory to reflect the correct number of cartridges assigned to the partition.

1. Log in as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Configuration ⋯⁘ Partitions**. The Shared Library Services screen displays.
3. Click **Edit** for the partition to which the unassigned cartridges should belong.

4. Click **Next** to advance through the partition configuration screens until you reach the Slots and Drives screen.

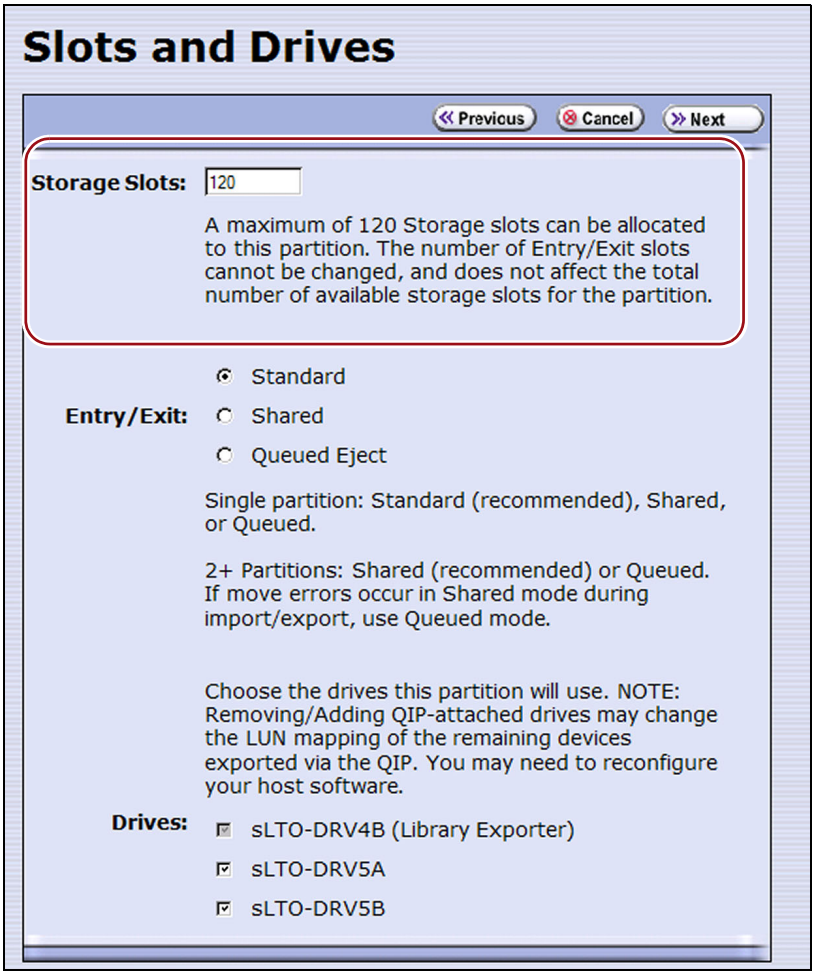


Figure 197 The Slots and Drives screen.

5. Decrease the number of storage slots assigned to the partition by the number of missing cartridges.
6. Click **Next** to advance through the remainder of the screens without making any additional changes until you reach the Save Library Configuration screen.
7. Click **Save**. The Share Library Services screen redisplays.
8. Repeat Step 2 on page 338 through Step 6, this time increasing the number of storage slots assigned to the partition to the original number. The cartridges are reassigned to the partition.

Important If the library has multiple partitions and you imported cartridges into all of the partitions after the configuration backup file you used to restore the library was generated, the cartridges can potentially end up in the wrong partition. Carefully examine the cartridge inventory for each partition. Export any wrongly assigned cartridges and reimport them into the correct partition.

9. Review the information on the screen and confirm that all settings are correct for this partition's configuration.
   - If the configuration information is correct, proceed to Step 10.
   - If the configuration information is not correct:
     - Click **Cancel** and configure the partition again from the beginning.

     —OR—

     - Click **Previous** to move backward through the configuration screens until you reach the settings that need correction. Make any necessary corrections, then click **Next** to move forward through the screens and return to the Save Partition screen.
10. Click **Save**. The library requires several minutes to store the configuration information, after which the Shared Library Services screen redisplays.

Restore the Library Configuration Using a Saved Configuration

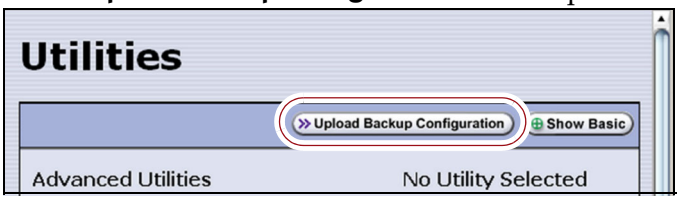
Use the following steps if you want to restore the library from a configuration backup file that was generated manually, as described in Use Manual Backup of the Library Configuration on page 124.

Note: The manually-generated configuration backup files do not include the MLM and DLM databases. If you also need to restore the MLM and DLM databases, you must use a separately generated backup of the MLM database (see Restore the MLM and DLM Databases on page 342).

1. Log into the library as a user with superuser or administrator privileges.
2. Select **Maintenance** ⋯⁘ **Tools** ⋯⁘ **Utilities**. The Utilities screen displays.
3. Click **Show Advanced**. The Advanced Utilities Confirmation screen displays.
4. Click **Next**. The Utilities screen refreshes to show the Advanced Utilities.

5. Scroll through the list of advanced utilities and select one of the following, as applicable for your situation. The screen refreshes to show the details for the selected restore utility.

   Note: The Advanced Utilities screen lists the utilities in alphabetical order. The following table lists the utilities in most-frequently-used order.

Use this Restore Option...	To...
Restore Library Configuration from Auto Save	Restore using an automatically generated configuration backup file that is stored on a USB device or LCM memory card (see Restore From an Auto Configuration Save File on page 335). **Note:** The automatically generated configuration backup file contains the library configuration, as well as the MLM and DLM databases.
Restore Library Configuration from USB	Restore a library configuration file previously stored on a USB device. **Note:** Before starting this procedure, insert the USB device into the USB port on the LCM and allow time for the device to mount.
Upload Backup Configuration	Upload a configuration backup file to a temporary location in the library from a computer that has network access to the library. **Note:** **Upload Backup Configuration** is only available when you access the library through the BlueScale web interface. **1.** Click **Upload Backup Configuration** at the top of the screen.  **2.** When the upload is complete, you must then run the **Restore Library Configuration from Uploaded File** utility to restore the library configuration.
Restore Library Configuration from Uploaded File	Complete the restore process after using **Upload Backup Configuration** to upload a saved configuration file from a computer. **Note:** This option is used in conjunction with **Upload Backup Configuration**, which must be run first.

6. Click **Run Utility**.

Important Before the library is restored using a saved configuration file on the USB device, the current configuration is saved to the USB device with a time stamp indicating when the file was created. The library is then restored using the selected auto saved configuration.

The USB device now contains one additional configuration file.

After a brief delay, the Utility Results screen appears, showing that the configuration file was uploaded and/or the configuration restored. The library then performs a power- cycle reset.

7. If you imported cartridges into empty slots in a partition after you generated the backup configuration file, see Restore Other Configuration Changes on page 338.
8. Once the library begins its power-on sequence, remove the USB device if necessary.

Important If you do not remove the USB device, the library power-on sequence fails.

If the library fails to boot, power off the library as described in Power Off the Library on page 131. Once the library is powered off, remove the USB device and power on the library as described in Power On the Library on page 129.

9. If necessary, restore the MLM and DLM databases as described in Restore the MLM and DLM Databases.

Restore the MLM and DLM Databases

Use the following steps to restore the MLM database from a previously saved backup that was created using the Save MLM Database utility (see Back Up the MLM and DLM Databases on page 274).

Caution The Restore MLM Database from USB utility overwrites the existing MLM and DLM databases with the versions previously saved on the USB device.

Notes:
- Restoring the MLM database also restores the DLM database.
- You can also restore the MLM and DLM databases using an automatically generated library configuration backup file (see Restore From an Auto Configuration Save File on page 335).

1. Use your storage management software to stop all backup or restore operations on the library.

Important Restoring the MLM and DLM databases requires the library to be idle.

2. If you plan to restore using an MLM database backup file that was sent as an email attachment, use the following instructions to copy the file to a USB device; otherwise, skip to Step 5.
   a. Create a folder called `SavedMLMDB` on a USB device.
   b. Copy the `xlminfo<date-time>.db` or `cminfo_<date-time>.zdt` file to the `SavedMLMDB` folder on the USB device.
3. Log into the library as a user with superuser or administrator privileges.
4. Stop any PreScan or PostScan operations that are currently running (see Stop the Discovery Process on page 256 and Pause the PostScan Process on page 265).
5. Plug the USB device containing the MLM database backup file into the USB port on the LCM and allow time for the device to mount before continuing.
6. Select **Maintenance ···: Tools ···: Utilities**. The Utilities screen displays.
7. Click **Show Advanced**. The Advanced Utilities Confirmation screen displays.
8. Click **Next**. The Utilities screen refreshes to show the advanced Utilities screen.
9. Scroll down and select **Restore MLM Database from USB**. The screen refreshes to show the details for the utility.

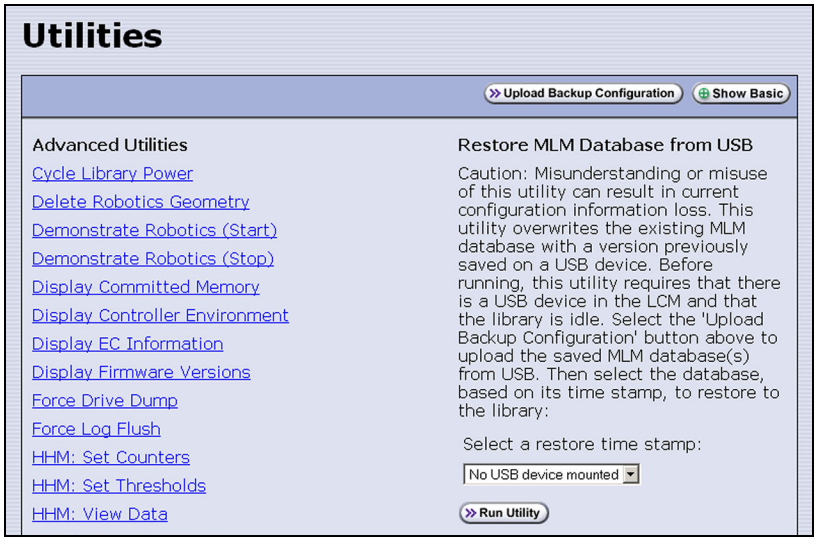


Figure 198 Select the Restore MLM Database from USB utility.

10. Use the **Select a restore time stamp** drop-down list to select the `xlminfo<date-time>.db` or `cminfo_<date-time>.zdt` file containing the MLM database backup you want to use for the restore.

11. Click **Run Utility**.

    After a brief delay, the Utility Results screen displays, showing that the database was restored.

    Note: After an MLM database restore, the **Discover Media** button on the Media Lifecycle Management Tools screen (**Maintenance ⋯ MLM**) may be active even if all cartridges have been discovered.

Accessing the Library Interior and Troubleshooting Blockages

Troubleshooting operations sometimes require you to access the interior of the library. Do not access the interior of the library unless you are specifically instructed to do so by Spectra Logic Technical Support.

WARNING

Risk of electrical shock, and hazardous moving parts. Unless a procedure specifies otherwise, turn off power to the library and disconnect power cords before accessing the inside of the library.

Important

Before accessing the interior of the library contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7). Do not access the interior of the library unless you are specifically instructed to do so by Spectra Logic Technical Support.

If the library halts and a system message indicates that the robotics are blocked, use the following steps to troubleshoot the problem.

Check for Blockages

1. Look through the library's window to check for obvious blockages; if you see any, proceed directly to Prepare the Library below. Otherwise, continue to the next step.
2. Re-issue the move that failed.
3. Watch the robotics as they attempt the move; this shows you where the robotics are blocked.

Prepare the Library

Before accessing the interior of the library, use the following steps to prepare the library.

1. If possible, use your storage management software to move any cartridges that are currently in tape drives back their storage location.
2. If possible, pause PostScan if it is running (see Pause the PostScan Process on page 265). Any tapes currently being scanned are returned to their storage locations.

3. Discontinue all I/O to the library.
4. Capture all available traces (see Capturing Traces on page 325). Trace data generated by the library or other components may be lost when you perform a reset, making diagnosing problems difficult.

Clear the Blockage

1. Power off the library (see Power Off the Library on page 131).

   The power-down sequence takes approximately one minute, while the library allows applications to shut down gracefully.

Caution

Do not power-down the library or remove the front panel before capturing all available traces (see Capturing Traces on page 325). Trace data generated by the library or the component may be lost when you perform a reset, making diagnosing problems difficult.

2. After the library powers down, turn off both main AC power breakers (see Figure 4 on page 30) on the back of the library and unplug the power cords.
3. Use the library key to open the front door.
4. Reach into the library and remove the blockage.

   Note: If you remove any media, re-import it into the library via the E/E port, then after restarting your storage management software, use it to run an inventory of the library.
5. Close the front door of the library and lock it with the key.
6. Plug in the power cords and turn on both AC power breakers.
7. Press the soft power button to power on the library again.
8. If you removed any cartridges, reimport them as described in Importing and Exporting Cartridges on page 204.

Important

If the library is configured with multiple partitions, make sure you import the cartridges into the correct partition.

9. If a cartridge is left in a Global Spare drive when you powered off the library, see Cartridge left in a Global Spare tape drive after a library power-cycle or reset. on page 317 for information about returning the cartridge to its storage location.
10. Use your storage management software to reinventory the library (see Updating the Software Media Inventory on page 233).
11. After the library initializes, try again to complete the move that failed.

    If the problem persists, contact Spectra Logic Technical Support. For contact information, see Contacting Spectra Logic on page 7.

CHAPTER 12

Drive Troubleshooting

This chapter describes procedures for dealing with the most common problems encountered with the library's drives. Try these troubleshooting procedures *before* you open a support ticket with Spectra Logic Technical Support. If you are unable to resolve the problem yourself, open a support ticket (see Opening a Support Ticket on page 437). For additional troubleshooting information, refer to the drive documentation (see LTO Ultrium Tape Drives on page 20).

Note: The library must be under warranty or have a valid service contract in order to qualify for support (see Service Contract Extension on page 458 to learn about service contracts).

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Use the Global Spare Drive	page 349
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Retrieving a Drive Trace File	page 353
Use the Drive Traces Button	page 353
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RESETTING A DRIVE

Overview You may occasionally need to reset a drive as part of a firmware upgrade or for troubleshooting.

Important Drives can be reset using the reset button on the Drives screen or using the Power Drive On/Off utility. This utility should ONLY be run on a drive that is not assigned to a partition. **Do not** use the advanced Power Drive on/off utility to reset a drive that is assigned to a partition. Running this utility on a drive assigned to a partition disables the host interface.

User Privilege Requirements Only a user with superuser or administrator privileges can use the BlueScale software to reset a drive.

Perform the Reset

The following steps describe how to reset a drive using the Reset button on the Drives screen.

1. Determine the BlueScale identifier for the drive you want to reset.

   Note: Drives are identified according to their physical location in the library. For example, sLTO-DRV1B refers to the bottom half-height drive. See Drive Identifiers on page 45 for information about identifiers.

2. Log into the library as a user with superuser or administrator privileges.
3. Select **Configuration** ···⁘ **DLM** (or **Drives**) to display the Drives screen.

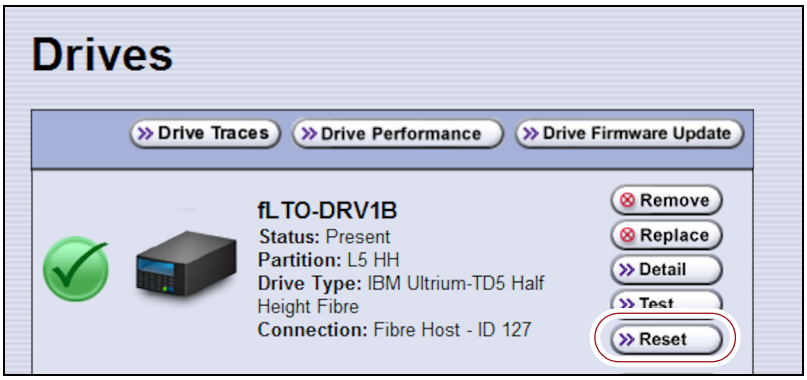


Figure 199 Click **Reset** on the Drives screen.

4. Identify the drive that needs to be reset and click **Reset**. The library power cycles the drive.

   When the drive completes its POST and becomes ready, a status screen displays, showing that the drive was reset.

   Note: When the drive resets, the library posts system messages that the drive disappeared and reappeared.

5. The drive is ready for use.

USING A GLOBAL SPARE DRIVE

Overview The Global Spare option lets you remotely replace a failed drive using a drive that is already installed in the library. Using a Global Spare allows you to continue your backup operations and replace the failed drive the next time you are physically present at the library.

Usage Requirements Before you can use the Global Spare option, the following requirements must be met.

- One or more Global Spare drives must already be configured in the partition where the failed drive is located (see Assign Global Spare Drives on page 162).

Important

The drives that are configured as Global Spares must be connected to the same Fibre Channel arbitrated loop or fabric (SAN) as the drives they replace. If they are not connected to the SAN, they are not accessible to the application software.

After the Global Spare is activated, you may need to reconfigure your switch to access the spare drive.

- The failed drive must be idle, with no pending backup or restore operations. Backups to the other drives in the partition can continue.
- You cannot use a Global Spare drive to replace a failed drive while the library is actively running the Drive Firmware Update wizard in the partition.

Cartridge Inventory If the failed drive contains a cartridge when it is replaced by the Global Spare, that cartridge is removed from the partition's inventory. If you are able to remove the cartridge from the failed drive after you remove it from the library, reimport the cartridge (see Import a Cartridge into a Specific Slot on page 208).

PostScan Requirements If a partition is configured to use either FullScan or QuickScan using Global Spares, keep in mind that the PostScan process "owns" the Global Spare drive it is using until it processes all of the cartridges in the PostScan queue for the partition. As a result, a Global Spare drive that is being used for PostScan is not available for use as a spare.

If all of the Global Spare drives assigned to the partition are in use by the MLM PostScan process, you must pause PostScan to make a Global Spare drive available, as described in Pause the PostScan Process on page 265.

Storage Management Software Guidelines Keep in mind the following storage management software guidelines when using a Global Spare.

- **Backup Exec™ software running on a Windows server**—After sparing or unsparing a drive, you must restart the Backup Exec Device and Media Service for the software to function properly with the spared drive.
- **General guidelines**—In a few rare cases, your backup may fail if a cartridge is loaded into any of the other drives in the partition at the same time that the library is in the process of activating a Global Spare drive for use (as described in this section). Most applications retry the backup operation, but some fail it. If your backup operation fails, wait for the library to complete the Global Spare activation and retry the backup.

User Privilege Requirements Only a user with superuser or administrator privileges can activate or reclaim a Global Spare drive.

Use the Global Spare Drive

Follow these steps to use a Global Spare drive as a temporary replacement for a failed drive.

1. If necessary, use your storage management software to stop any attempts to read from or write to the failed drive. Refer to your storage management software documentation for instructions.
2. Log into the library as a user with superuser or administrator privileges.
3. From the toolbar menu, select **Configuration ···⁘ Partitions** to display the Shared Library Services screen.

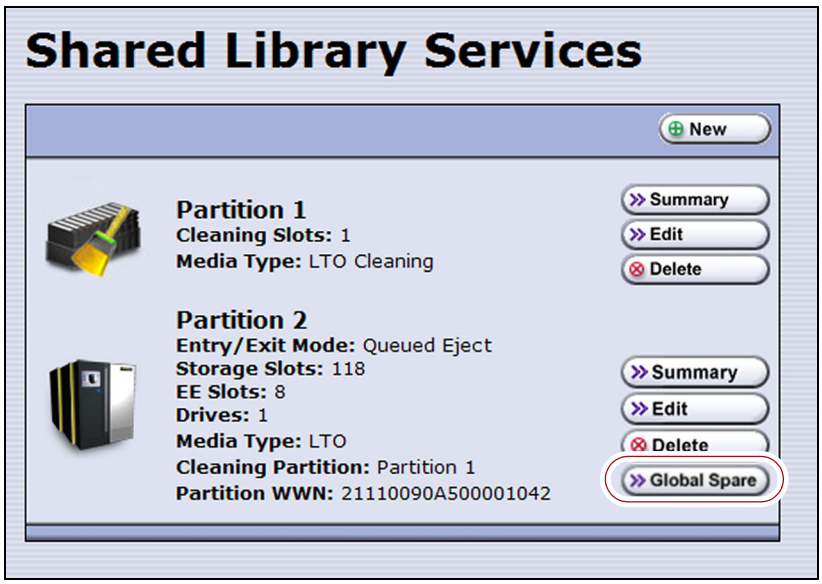


Figure 200 Click **Global Spare** to begin the process of replacing a partition drive with a Global Spare drive.

4. Click **Global Spare** for the partition that contains the failed drive to display the Global Spare Usage screen.

   Note: **Global Spare** is not present if one or more drives are not configured as Global Spares for the partition (see Assign Global Spare Drives on page 162).

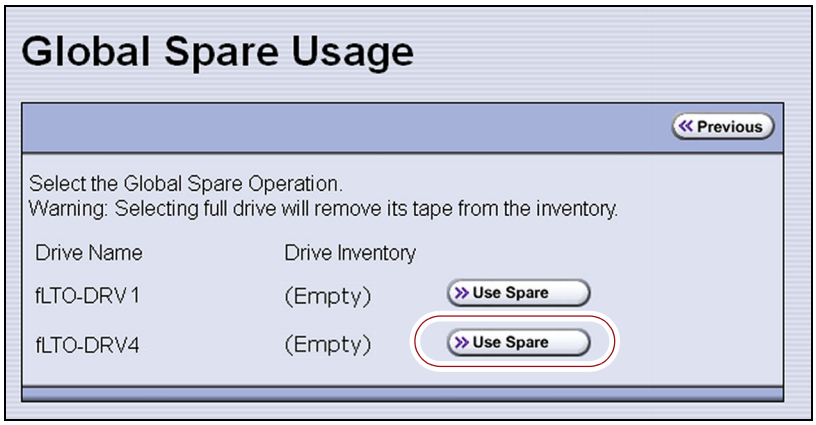


Figure 201 Click **Use Spare** for the drive you want to replace.

5. Click **Use Spare** next to the drive for which you want to substitute an available Global Spare drive. Wait for the library to complete the sparing operation.

   Notes:
   - When you select the drive to replace, the BlueScale software disables the selected drive and configures an available Global Spare drive to report the same WWN and serial number as the drive it is replacing. The failed drive can then be removed and replaced the next time you are physically at the library.
   - If you have more than one available Global Spare drive, the library automatically selects a drive in no particular order.

6. If desired, select **Configuration** ⋯⁘ **DLM** (or **Drives**) to view the Drives screen. The drive icons on the screen change to indicate the failed drive and the Global Spare that replaced it.

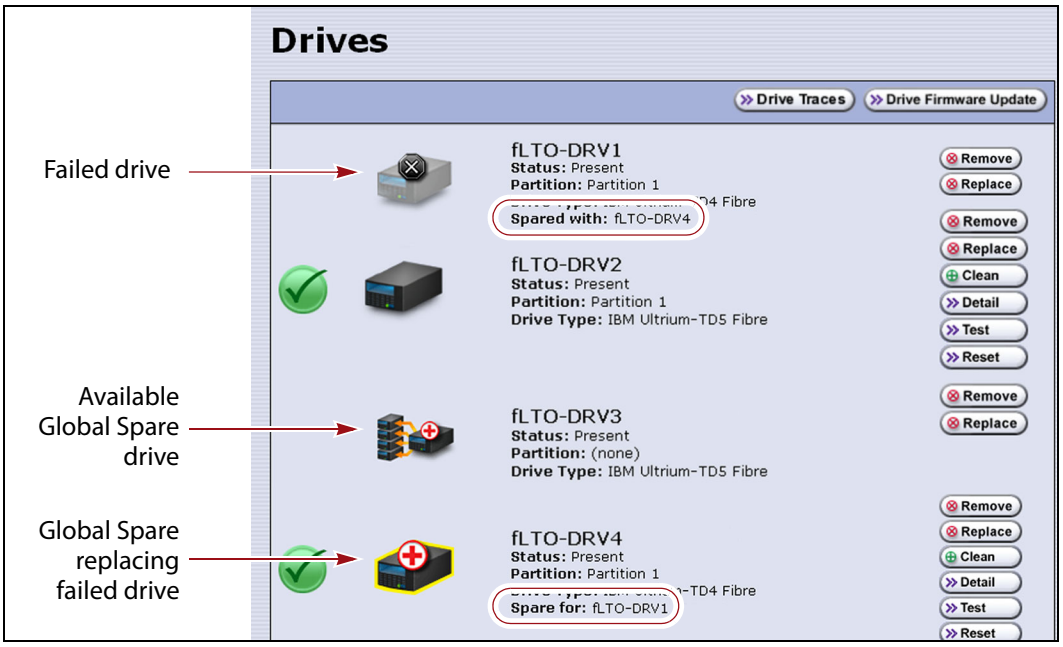


Figure 202 Check the Drives screen to confirm that the failed drive was replaced by a Global Spare drive.

7. If necessary, use your storage management software to bring the Global Spare drive that replaced the failed drive online. Refer to your storage management software documentation for instructions.

Important Replace the failed drive as soon as possible and reconfigure the spare drive to return it to a Global Spare configuration.

Note: If your storage management software cannot access the Global Spare drive, confirm that the drive is properly connected to the same SAN as the failed drive. You may also need to reconfigure the Fibre Channel switch.

Undo the Global Spare Drive

After you physically replace the failed drive (see Replace a Drive on page 434), use the following steps to begin using the replacement drive and return the Global Spare to the pool of available spare drives.

1. Log into the library as a user with superuser or administrator privileges.
2. Use your storage management software to prepare the Global Spare drive. Refer to your storage management software documentation for information.
   a. Stop all storage management software activity to the Global Spare drive that replaced the failed drive.
   b. If necessary, use your storage management software to eject the cartridge from the drive and return it to its slot.
   c. Take the Global Spare drive offline.
3. When the Global Spare drive is empty and offline, select **Configuration** ···⁘ **Partitions** on the toolbar menu to display the Shared Library Services screen.
4. Click **Global Spare** for the partition that contained the failed drive to display the Global Spare Usage screen.

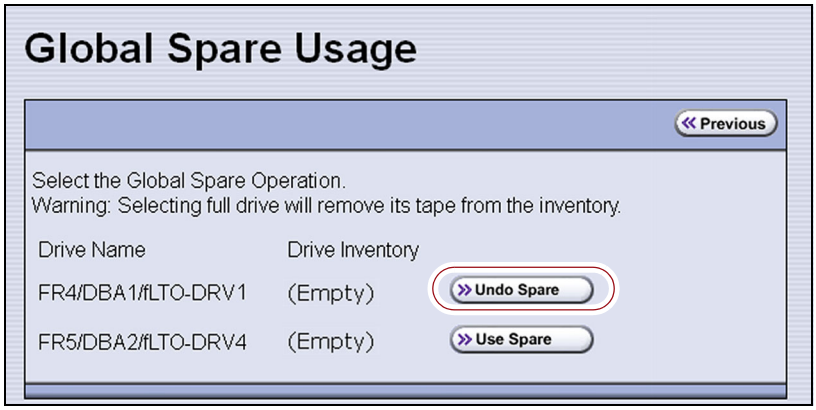


Figure 203 Click **Undo Spare** to begin using the replacement drive you installed.

5. Click **Undo Spare** next to the drive you physically replaced.

   The BlueScale software stops substituting the Global Spare for the drive it replaced and reconfigures the replacement drive back into the partition. The Global Spare is then available to be used again, as needed.
6. Use your storage management software to bring the newly installed drive online and resume backup operations. Refer to your storage management software documentation for instructions.

RETRIEVING A DRIVE TRACE FILE

Spectra Logic uses drive traces and drive dumps to help diagnose problems with a drive. A drive trace is a set of logs collected by the library to help diagnose drive errors. A drive dump is a file generated by the drive when it encounters an error state. You only need to retrieve a drive trace or drive dump when instructed to do so by Spectra Logic Technical Support.

There are three tools for collecting drive traces and dumps. The best tool to use depends on the type of file requested and the ability to download and install ITDT.

- To retrieve a drive trace from LTO-5 and later generation drives, Use the Drive Traces Button.
- To retrieve a drive dump, Use the IBM Tape Diagnostic Tool (ITDT) on page 355.
- To retrieve a drive dump when you cannot use ITDT, Use the BlueScale Retrieve Drive Dump Utility on page 356.

Use the Drive Traces Button

Drive traces for LTO-5 and later generation drives can be generated and retrieved using the Drive Traces button on the Drives screen.

Before You Begin

Before you begin generating a drive trace using the Drive Trace button, make sure you fulfill the following prerequisites.

Emailing Results If you plan to email the drive trace file directly from the library, make sure that you set up the intended email recipient as a mail user (see Configure Mail Users on page 99).

Saving Results to USB If you plan to save the drive trace file to a USB device, you must plug the USB device into one of the USB ports on the LCM and allow time for the device to mount before you click **Drive Traces** (see Using a USB Device on page 145).

> **Note:** If a USB device is not plugged into the LCM, the option to save the drive trace file to a USB device is not available. You can, however, still email the trace file or download the file.

User Privilege Requirements Only a user with superuser or administrator privileges can use the BlueScale software to retrieve a drive trace file.

Generate the Trace

1. Log into the library as a user with superuser or administrator privileges.
2. Select **Configuration** ···⁘ **DLM** (or **Drives**) to display the Drives screen.

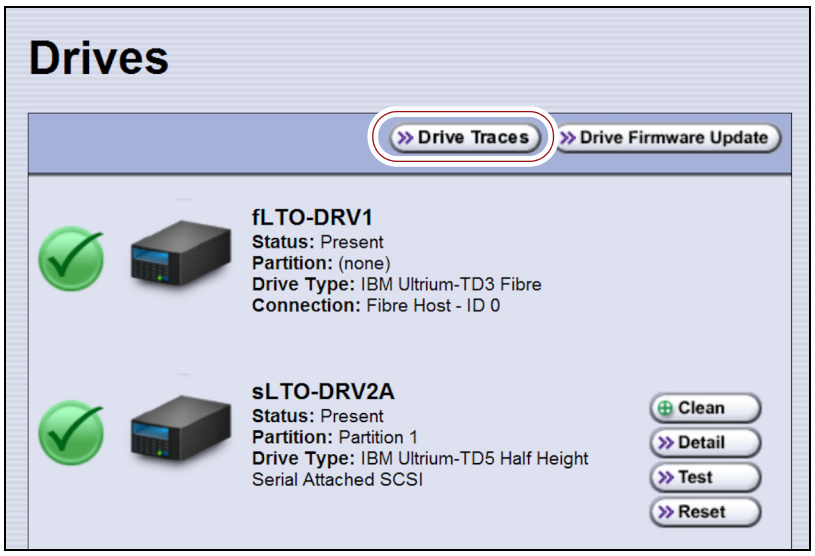


Figure 204 Click **Drive Traces** on the Drives screen.

3. Click **Drive Traces**. The Generate Drive Traces screen displays.

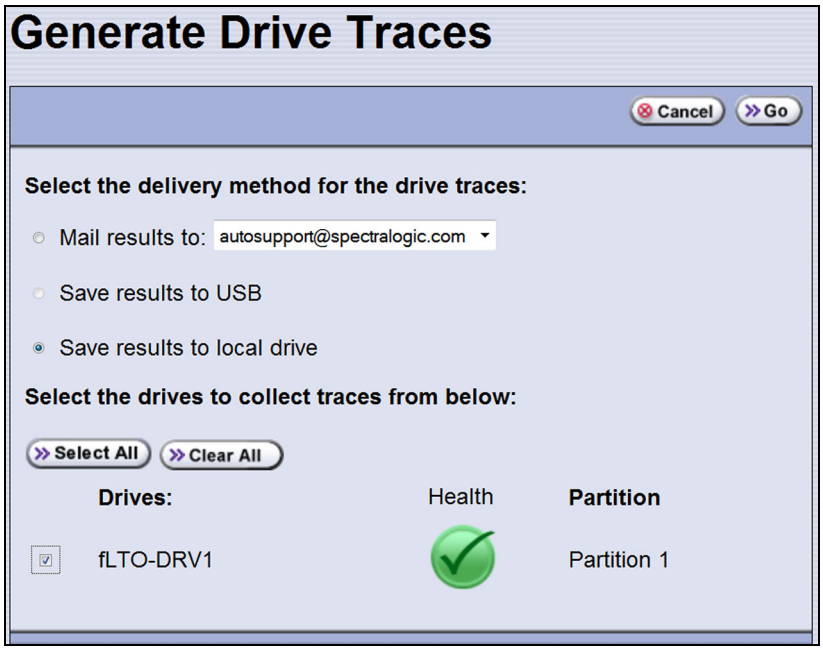


Figure 205 The Generate Drive Traces screen.

4. Select what you want to do with the drive trace file.

Option	Description
Mail results to	Sends the drive trace file to a previously configured email recipient. Use the drop-down list to select the recipient for the trace file. Only previously configured email recipients are listed. To send the email with the attached trace file to someone who is not listed, exit the utility, configure that person as an email recipient (see Configure Mail Users on page 99), and then run the utility again. **Note:** Do not use the default *autosupport@spectralogic.com* email recipient. Spectra Logic does not save emailed drive trace files unless they are specifically requested for troubleshooting.
Save results to USB	Saves the drive trace file to the USB device connected to the LCM. **Note:** This option is only available if you connected a USB device to one of the USB ports on the LCM before clicking **Drive Traces.**
Save results to local drive	Downloads the drive trace file to your local computer. Use your web browser's download features to save the file. **Note:** This option is only available if you are accessing the library through the BlueScale web interface.

5. Select the drives from which you want to generate traces. The drive trace file contains a subdirectory for each drive.
6. Click **Go**. The wizard generates the traces and saves or sends the drive trace file as selected.

Use the IBM Tape Diagnostic Tool (ITDT)

Download ITDT and its related documentation directly from IBM's Fix Central website. For information about navigating IBM's website and downloading the version of ITDT that is appropriate for your operating system, log on to the portal (see Accessing the Technical Support Portal on page 435), open the Knowledge Base, and search for KBA-01768, *Downloading and installing ITDT (IBM Tape Diagnostic Tool).*

Important Use the latest version of ITDT to gather a drive dump from the latest generation of drives.

1. Log into IBM's website at http://www.ibm.com/support/fixcentral, using your individual IBM ID.
2. Select the **Select product** tab.
3. Select the following options:

- **Product Group** = System Storage
- **Select from System Storage** = Tape systems
- **Select from Tape Systems** = Tape drivers and software
- **Select from Tape drivers and software** = IBM Tape Diagnostic Tool (ITDT)
- **Platform** = Select your operating system from the drop-down list and click **Continue**.

4. On the next page, select the version of ITDT that you want to download. If desired, you can select multiple versions.

   Note: If you are unsure which version to select, click **Show Fix Details** to see additional information.

5. Click **Continue.** If you did not log into the website yet, it prompts you to do so now.
6. Choose one of the following methods to download the selected ITDT installation files:
   - **Download using your browser (HTTP)**
   - **Download using bulk FTP**
   - **Download using Download Director**
7. Download and read the ITDT documentation for assistance in using and setting up the program.
8. Refer to the ITDT documentation for information about using ITDT to retrieve drive dump files. Contact Spectra Logic Technical Support if you need assistance (see Contacting Spectra Logic on page 7).

Use the BlueScale Retrieve Drive Dump Utility

If for some reason you cannot install and use ITDT in your environment, use the BlueScale Retrieve Drive Dump utility to collect the dump file from a drive.

Before You Begin

Before you begin the dump utility, make sure you fulfill the following prerequisites.

Insert USB Device This utility saves the drive dump file to a USB device connected to the LCM. You must plug the USB device into one of the USB ports on the LCM and allow time for the device to mount before you access the Utilities screen (see Using a USB Device on page 145).

User Privilege Requirements Only a user with superuser or administrator privileges can use the BlueScale software to retrieve a drive dump file.

Run the Utility

1. Determine the BlueScale identifier for the drive from which you want to retrieve the dump file.

   Note: Drives are identified according to their physical location in the library. See Drive Identifiers on page 45 for detailed information.

2. Log into the library as a user with superuser or administrator privileges.

3. Select **Maintenance ⋯⁘ Tools ⋯⁘ Utilities** to display the Utilities screen.
4. Click **Show Advanced**. The Advanced Utilities Confirmation screen displays.
5. Click **Next**. The Utilities screen refreshes to show a list of the advanced utilities.
6. Scroll through the list of advanced utilities and select **Retrieve Drive Dump**. The screen refreshes to show the details for the utility.

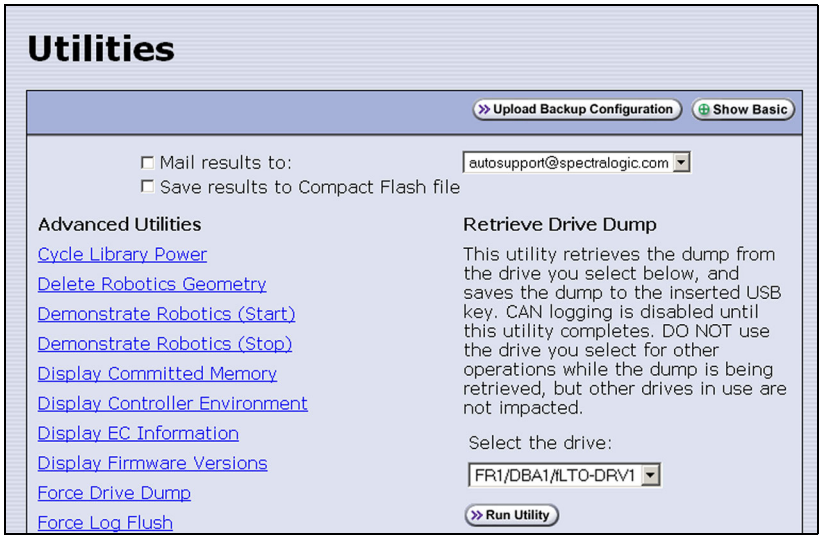


Figure 206 The Retrieve Drive Dump utility.

7. Select any combination of the check boxes at the top of the screen to choose where to send the utility results text.

   Note: The check boxes indicate where to send the utility results text (pass or fail), not where to send the drive dump file. The drive dump file is always saved to the USB device. Do not send the utility results to the default *autosupport@spectralogic.com* email recipient.

8. Use the drop-down list to select the drive from which you want to retrieve the dump.
9. Click **Run Utility** to retrieve the dump file from the selected drive.

Important Do not use the drive from which you are retrieving the dump file for any other purpose while the utility runs.

When the trace is generated, the Utility Results screen displays, showing that the utility ran successfully.

TROUBLESHOOTING LTO DRIVES

The following sections provide information about troubleshooting drive problems.

Identify the Problem

1. When you encounter problems with drive operation while using the library's BlueScale user interface, begin troubleshooting by checking the following:

Check...	To...
System Messages	Review any System Messages that are posted by the library (see Check and Respond to Messages on page 134) and take any action described in the message(s).
Error codes	Look up the definition of an error sense code referenced in a system message using the *Spectra Tape Libraries SCSI Developer Guide*.
Drive documentation	Find detailed troubleshooting information for the drive. See Additional Publications on page 19 for information about obtaining drive documentation.
Technical Support portal	Find information about the most current version of BlueScale software and additional service and support tools. You can access the Technical Support portal at support.spectralogic.com. **Note:** Accessing many of the tools available on the Technical Support portal requires creating a user account. See Accessing the Technical Support Portal on page 435 for instructions. ▪ Check the options under the **Documentation** and **Knowledge Base** menus for additional troubleshooting information. ▪ Check the **Service & Contracts** menu to view information about the warranty and service options available for your library as well as the Spectra Certified Media warranty.

2. Display the Drive Details screen for the drive you suspect is having problems and review the information about the drive (see View Drive Status Information on page 142). Use the following table and the information in Interpret the Detailed Drive Information on page 361 to determine how to proceed.

Detail Field	Description
POST Status	Indicates whether the drive successfully completed its power-on self-tests (POST). When an LTO drive is power-cycled or reset, it automatically runs self-diagnostic tests (POST), which check the drive's memory and sensors, performs motor and servo tests, and tests the data channels, to ensure that the drive is functioning within normal parameters.
Cleaning Status	Indicates whether the drive requires cleaning (see Cleaning a Drive on page 403).
LED Status	Corresponds to the status LED on the drive. See Interpreting the Status LED Information on page 362 for detailed information.
Display Character	Corresponds to the single-character display (SCD) on the drive. The meaning of the character displayed depends on the LTO drive generation. See Interpreting the SCD Codes, beginning on page 362 for detailed information.
Cartridge Status	Indicates whether a cartridge is currently loaded in the drive, tape motion, and other information related to reading and writing data.

3. If you were successfully operating the storage management software and library in the past, but are now experiencing problems reading and writing data, check the following:

Check this...	If...
Write-protect switch setting	You are having trouble writing data to a cartridge. Make sure that the cartridge is write-enabled (see Prepare the Cartridges for Use on page 215) before importing it into the library.
Cartridge age	A tape cartridge was in use for a long time or if it was used frequently, try using a new cartridge.
Drive cleaning	The drive indicates that a cleaning is required. Follow the instructions in Cleaning a Drive on page 403 to clean the drive. **Note:** If the storage partition is associated with a cleaning partition and the cleaning partition contains a usable cleaning cartridge, drives are automatically cleaned whenever necessary.

4. If you experience problems accessing the drives in the library from the storage management software on the host, check the following:

Check...	To...
Interface connections	Make sure that the Fibre Channel connections to the drives are secure. **Important:** After you power on the library and the Fibre Channel arbitrated loop or fabric completes its initialization, avoid disconnecting the Fibre Channel drives from the network. If you need to disconnect a drive from the network, use the utility provided with your switch or hub to bypass the affected ports before breaking the connection. The bypass sets the port to a non-participating state on the network. After you reconnect the drive to the library, use the utility to return the port to a participating state.
Software installation	Make sure that your host application is installed and configured correctly (refer to your software documentation). Pay special attention to steps that describe how to configure the software for use with the drive(s).
Drive addressing	Make sure that the drive address configured in the host application is the same one you specified when you configured the partition containing the drive (see Creating a Storage Partition Using Direct-Attached Fibre Channel or SAS Drives on page 157).
Host and software documentation	Determine whether a device driver is required. Some operating environments require you to install device drivers before the application software can correctly communicate with the drives. When you update the drive firmware, you may also need to update the device driver for the drive. See Updating Drive Device Drivers on page 432 for instructions.

Interpret the Detailed Drive Information

The Drive Details screen includes information about the drive and drive sled firmware versions, the location-based Spectra serial number, and the manufacturer's serial number. It also shows additional detailed status information, including the state of the status LED and the single character display (SCD) on the drive. See View Drive Status Information on page 142 for information about accessing this screen.

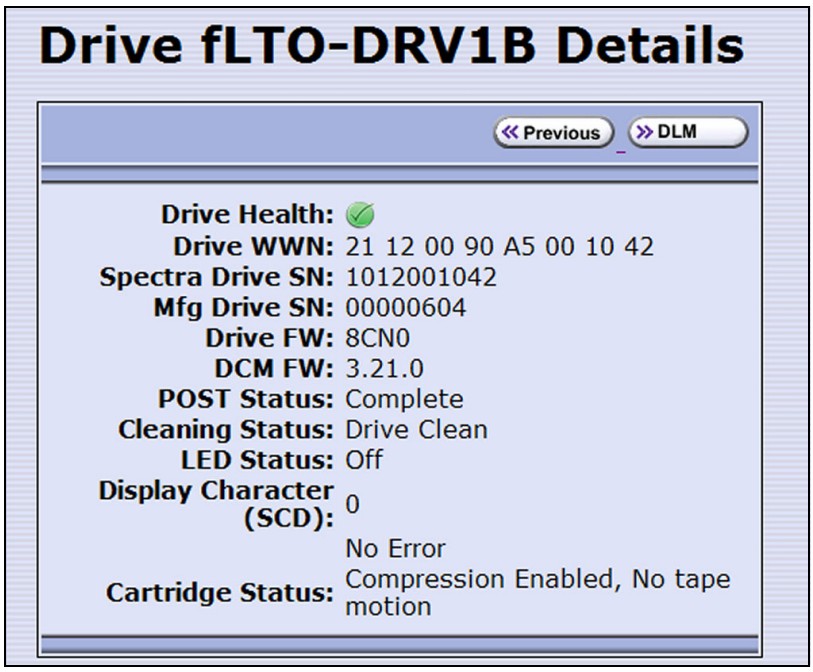


Figure 207 Use the information on the Drive Details screen to help troubleshoot drive problems.

The following sections describe how to use information on the Drive Details screen to help troubleshoot drive problems.

Responding to the Drive Cleaning Notification

Whenever a tape is loaded or unloaded, the read/write heads are physically cleaned by a brush located within the drive. However, after reading and writing a large amount of data (the exact amount varies by drive type and generation) or if read or write errors occur, the drive requests to be cleaned with a cleaning cartridge. The request is made by sending a Tape Alert message to the host, and displaying a **C** on the SCD The notification is also posted to the library's Drive Details screen (Figure 207) and the DLM drive health icon for the drive changes to yellow (see Using the Drive Health Icons on page 283 for additional information).

If needed, clean the drive as described in Cleaning a Drive on page 403. Use only a certified LTO cleaning cartridge. To order cleaning cartridges, see Media and Media Accessories on page 456.

Interpreting the Status LED Information

The Drive Details screen shows the state of the drive's status LED. The LED states are the same for all generations of LTO drives. Refer to the tape drive documentation about interpreting the LED (see Drive Technology on page 36).

Notes:
- The LED status information shown on the Drive Details screen always indicates that the LED is off for LTO-4 Fibre Channel drives running firmware version 8940 or later and all firmware versions for LTO-5 and later generation Fibre Channel drives. If you need to determine the state of the LED, use the IBM Tape Diagnostic Tool (ITDT). Download and install the software as described in Use the IBM Tape Diagnostic Tool (ITDT) on page 355.
- Make sure you install ITDT on a computer that is connected to the same SAN as the drives in the library.

Contact Spectra Logic Technical Support if you need assistance (see Contacting Spectra Logic on page 7).

Interpreting the SCD Codes

The Display Character (SCD) field on the Drive Details screen shows the current state of the single-character display on the drive.

Permanent Errors If the drive detects a permanent error and displays an SCD error code other than zero (0), it automatically performs a drive dump. If you force a drive dump, the existing dump is overwritten and data is lost. You might also lose the dump data if you turn off the power to the drive. See Retrieving a Drive Trace File on page 353 for information about retrieving the trace data from the drive.

Notes:
- Some of the solutions listed in the following table include testing the drive. See Using DLM to Test an LTO Drive on page 373 for instructions.
- In some cases, additional tests using ITDT are required. Download and install the software as described in Use the IBM Tape Diagnostic Tool (ITDT) on page 355. Refer to the ITDT documentation for information about using this utility to retrieve the dump file. Contact Spectra Logic Technical Support if you need assistance (see Contacting Spectra Logic on page 7).

Multiple Errors The SCD is blank during normal operation. If multiple errors occur, the code with highest priority (lowest number) displays first. Once corrected, the code with the next highest priority displays, until none remain.

Note: The drive may need to be reset in order to clear the error code.

WORM Media LTO-3 and later generations of LTO drives support using WORM media. To learn more about WORM media, see LTO WORM Media on page 478.

The following conditions cause WORM media errors to occur:

- Information in the servo manufacturer's word on the tape must match information from the cartridge MAM. If it does not match, the drive's SCD displays error code **7**.
- Inserting a WORM tape cartridge into a drive that is not compatible with WORM media causes the cartridge to be treated as an unsupported medium. The drive's SCD displays error code **7**.

SCD Code Descriptions for LTO-3 and Later Generations The following table shows the SCD codes and, where applicable the associated DLM Drive Health icon, for LTO-3 and later generations of LTO drives. See the table on page 284 for a description of what the Drive Health icons indicate.

Note: The single-character display does not use the characters B, D, G, I, O and Z to prevent misinterpretation as the characters 8, 0, 6, 2, and 1.

Code	DLM Health Icon	Cause and Solution
0		**No error occurred.** No action is required. The power was cycled or diagnostics finished with no errors.
1		**Cooling problem.** The recommended operating temperature was exceeded. Perform one or more of the following: ▪ Make sure that the cooling fan is rotating and is quiet. ▪ Remove any blockage that prevents air from flowing freely through the drive. ▪ Make sure that the operating temperature and airflow is within the specified range (refer to the tape drive documentation for these specifications). If the operating temperature is within the specified range and the problem persists, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7). **Note:** The error code clears when you reset or power cycle the drive or when you place it in maintenance mode.

Code	DLM Health Icon	Cause and Solution
2		**Power problem.** The externally supplied power is approaching the specified voltage limits (the drive is still operating) or is outside the specified voltage limits (the drive is not operating). **If the problem is only exhibited by one drive in the library:** ▪ Make sure that the library's power connector is properly seated. ▪ If the problem persists, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7). **Note:** The error code clears when you reset or power cycle the drive or when you place it in maintenance mode. **If the problem is exhibited by multiple drives in the library:** The power throughout the library needs to be checked. Contact Spectra Logic Technical Support for assistance (see Contacting Spectra Logic on page 7).
3		**Firmware problem.**  **Important:** Do not force a dump; one already exists. The drive determined that a firmware error occurred. Perform the following: **1.** Collect the drive trace file (see Retrieving a Drive Trace File on page 353). **2.** Reset the drive (see Resetting a Drive on page 347), then retry the operation that produced the error. **3.** If the problem persists, contact Spectra Logic Technical Support and send the drive dump to them, if requested (see Contacting Spectra Logic on page 7). **Note:** The error code clears when you reset or power cycle the drive or when you place it in maintenance mode.
4		**Firmware or drive problem.**  **Important:** Do not force a dump; one already exists. A firmware or drive hardware failure occurred. Perform the following: **1.** Collect the drive trace file (see Retrieving a Drive Trace File on page 353). **2.** Reset the drive (see Resetting a Drive on page 347), then retry the operation that produced the error. **3.** If the problem persists, contact Spectra Logic Technical Support and send the drive dump to them, if requested (see Contacting Spectra Logic on page 7). **Note:** The error code clears when you reset or power cycle the drive or when you place it in maintenance mode.

Code	DLM Health Icon	Cause and Solution
5		**Drive hardware problem.** **Important:** Do not force a drive dump; one already exists. The drive determined that a tape path or read/write error occurred. To prevent damage to the drive or tape cartridge, the drive does not allow you to insert a cartridge if the current cartridge was successfully ejected. If the problem persists, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7). Perform the following: **1.** Collect the drive trace file (see Retrieving a Drive Trace File on page 353). **2.** Reset the drive (see Resetting a Drive on page 347), then retry the operation that produced the error. **3.** If the problem persists, contact Spectra Logic Technical Support and send the drive dump to them, if requested (see Contacting Spectra Logic on page 7). **Note:** The error code clears when you reset or power cycle the drive or when you place it in maintenance mode.
6		**Drive or media error.** See Chapter 8 – Configuring and Using Media Lifecycle Management, beginning on page 234 for information about using MLM to determine the health of the cartridge. See Chapter 9 – Using Drive Lifecycle Management, beginning on page 280 for information about using DLM to determine the health of the drive. The drive determined that an error occurred, but it cannot isolate the cause. Ensure the tape cartridge is the correct media type: ▪ See LTO Read/Write Compatibility on page 478 for information about which media is compatible with each LTO drive generation. ▪ Drive does not accept an expired cleaning cartridge. ▪ Drive does not accept a WORM cartridge when running diagnostic tests in Maintenance Mode. ▪ Drive does not write over existing data sets on a WORM cartridge. Ensure you are appending data sets on WORM media rather than attempting to write over existing data sets. Confirm that the cartridge is the correct media type. If it is, determine whether the problem is associated with writing or reading data to a single cartridge or multiple cartridges.

Code	DLM Health Icon	Cause and Solution

6 (cont.)		**Problems Writing Data on a Cartridge with a Known Volume Serial Number**
		Retry the operation with a different cartridge.
		▪ If the operation succeeds, the original cartridge was defective. If possible, copy data from the defective cartridge and set the original cartridge aside. If additional tests confirm that the cartridge was the source of the error, you can discard it.
		▪ If the operation fails and another drive is available, insert the original cartridge into the other drive and retry the operation.
		  ▪ If the operation fails, discard the defective cartridge.
		  ▪ If the operation succeeds, use the Drive Health Verification wizard to test the original drive (see Using DLM to Test an LTO Drive on page 373).
		  ▪ If the drive fails the DLM drive test, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).
		  ▪ If the drive passes the DLM drive test, the error was temporary.
		▪ If the operation fails and another drive is not available, use the Drive Health Verification wizard to test the drive.
		  ▪ If the drive fails the DLM drive test, contact Spectra Logic Technical Support.
		  ▪ If the drive passes the DLM drive test, retry the operation to determine whether the error was temporary. If the operation fails again, discard the cartridge.
		Problems Reading Data on a Cartridge with a Known Volume Serial Number
		Perform one of the following procedures:
		▪ If another drive is available, insert the cartridge into the other drive and retry the operation.
		  ▪ If the operation fails, discard the defective cartridge.
		  ▪ If the operation succeeds, use the Drive Health Verification wizard to test the original drive (see Using DLM to Test an LTO Drive on page 373).
		  ▪ If the drive fails the DLM drive test, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).
		  ▪ If the diagnostics succeed, the error was temporary.
		▪ If another drive is not available, use the Drive Health Verification wizard to test the drive.
		  ▪ If the drive fails the DLM drive test, contact Spectra Logic Technical Support.
		  ▪ If the drive passes the DLM drive test, retry the operation to determine whether the error was temporary. If the operation fails again, discard the cartridge.
		Problems with One or More Cartridges with Unknown Volume Serial Numbers
		If the problem occurs with multiple tape cartridges or if you do not know the tape cartridge's volume serial number, use the Drive Health Verification wizard to test the drive (see Using DLM to Test an LTO Drive on page 373).
		▪ If the drive fails the DLM drive test, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).
		▪ If the drive passes the DLM drive test, the problem is not related to the drive.

Code	DLM Health Icon	Cause and Solution

7		**High probability of media error.** An error occurred because of a faulty tape cartridge.
		▪ Ensure the tape cartridge is the correct media type:
		  ▪ See LTO Read/Write Compatibility on page 478 for information about which media is compatible with each LTO drive generation.
		  ▪ Drive does not accept an expired cleaning cartridge.
		  ▪ Drive does not accept a WORM cartridge when running diagnostic tests in Maintenance Mode.
		  ▪ Drive does not write over existing data sets on a WORM cartridge. Ensure you are appending data sets on WORM media rather than attempting to write over existing data sets.
		▪ If the tape cartridge is the correct media type, try another tape cartridge in the drive.
		▪ If the problem occurs with multiple tape cartridges, run the tape cartridge in a different drive.
		  ▪ If the operation in the other drive fails and the SCD displays 6 or 7, replace the media.
		  ▪ If the operation succeeds, use the Drive Health Verification wizard to test the drive (see Using DLM to Test an LTO Drive on page 373).
		CAUTION! When you use ITDT to run the Test Cartridge & Media diagnostic, data on the suspect tape is overwritten.
		  ▪ If the Test Cartridge & Media diagnostic fails, replace the media.
		  ▪ If the diagnostic runs successfully, use the Drive Health Verification wizard to test the drive (see Using DLM to Test an LTO Drive on page 373).
		  ▪ If the drive fails the DLM drive test, replace the drive.
		  ▪ If the drive passes the DLM drive test, repeat the operation that produced the initial media error.
		Note: The error code clears when you reset or power cycle the drive or when you place it in maintenance mode.

8		**SCSI interface or Fibre Channel failure.** A failure occurred in the drive hardware or in the SCSI bus. The error code clears after 10 seconds if the error does not recur. If the error persists, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).
9		**RS-422 error**. The drive determined that a drive interface or library interface failure occurred. The error code clears after 10 seconds if the error does not recur. If the error persists, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).

Code	DLM Health Icon	Cause and Solution
A		**Degraded operation.** The drive determined that a problem occurred that degraded the operation of the drive, but it did not restrict continued use. The drive is usable, though the single-character display (SCD) continues to indicate an error and the status light flashes amber. The error code may clear when you cycle power to the drive. **1.** Reset the drive (see Resetting a Drive on page 347) to clear the error code. **2.** Confirm that the drive is using the current firmware version (see Updating Drive Firmware on page 409) and update the firmware if necessary. **3.** Use the Drive Health Verification wizard to test the drive (see Using DLM to Test an LTO Drive on page 373). **4.** If the problem persists, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).
C		**Cleaning indicator.** The drive needs to be cleaned, or is in the process of loading the cleaning cartridge or being cleaned. The error code clears when you clean the drive and unload the cleaning cartridge. See Cleaning a Drive on page 403 for instructions.
d		Two drives on the Fibre Channel loop have the same Arbitrated Loop Physical Address.
E		The Fibre Channel port connection is off-line.
e		The drive detected a configuration error during an encryption operation. **1.** Make sure that you are using LTO-4 or later generation data cartridges. Encryption is only supported for LTO-4 and later generation cartridges. **2.** Retry the encryption operation with the suspect cartridge in another encryption-enabled drive. **3.** Replace the cartridge if you see the same problem in multiple drives.
F		**Drive Fiber Cable error.** The Fibre Channel drive does not detect light or a related diagnostic failed to detect light through the fiber optic connection to the drive. ▪ Verify the fiber cables and connections between the drive and the host are the correct type and are working properly. Verify all equipment and devices are powered ON. ▪ Verify the configuration settings for the drive are set correctly and are compatible with the topology of the network. ▪ Verify that the host fiber adapter and port are working properly and are compatible with the topology of the network. ▪ Verify that the fiber channel switch ports are working properly and are compatible with the topology of the network. ▪ Verify that the fiber cable is connected to Port A (0) of the drive. ▪ Verify that Port A (0) on the Fibre Channel drive is working properly by using ITDT to run the "Function Code 6: Run Host Interface Wrap Test."

Code	DLM Health Icon	Cause and Solution
J		**Incompatible Media.** The drive determined that incompatible media was loaded into the drive.
P		The cartridge in the drive is write-protected. The storage management software cannot write data to a write-protected cartridge. The library cannot update the cartridge MAM when the cartridge is write-protected.
u		Firmware update is in progress.
b, c, H, h, n, o	N/A	Reserved or not actively in use, or no error or message assigned. There may be a problem with the SCD. Reset the drive and determine whether all segments on the SCD are lit. ▪ If they are all lit, confirm that the drive is using the current firmware version (see Updating Drive Firmware on page 409) and update the firmware if necessary. ▪ If the problem persists, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).
...	N/A	The message display lost communication with the drive. This message appears on Line 2 of the message display. The three dots may occasionally display during normal processing.

SCD Codes for LTO-2 Drives If multiple errors occur, the code with the highest priority (lowest number) displays first. Once corrected, the code with the next highest priority displays, until none remain.

Note: The SCD is blank during normal operation.

Code	DLM Health Icon	Cause and Solution
0		**No error occurred.** No action is required. The power was cycled or diagnostics finished with no errors.
1		**Cooling problem.** The recommended operating temperature was exceeded. Perform one or more of the following: ▪ Ensure that the cooling fan is rotating and is quiet. ▪ Remove any blockage that prevents air from flowing freely through the tape drive. ▪ Ensure that the operating temperature and airflow is within the specified range. ▪ If the operating temperature is within the specified range and the problem persists, replace the drive. **Note:** The error code clears when you reset or power cycle the tape drive or when you place it in maintenance mode.

Code	DLM Health Icon	Cause and Solution
2		**Power problem.** The externally supplied power is approaching the specified voltage limits (the tape drive is still operating) or is outside the specified voltage limits (the tape drive is not operating). ▪ Make sure that the library's power connector is properly seated. ▪ If the problem persists, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7). **Note:** The error code clears when you reset or power cycle the tape drive or when you place it in maintenance mode.
3		**Firmware problem.**  **Important:** Do not force a dump; one already exists. The tape drive determined that a firmware error occurred. Perform the following: **1.** Collect the drive trace file (see Retrieving a Drive Trace File on page 353). **Note:** You can also use the server's SCSI interface. Use a device driver utility or system tool (for instructions about reading a drive dump from tape, visit http://ssddom02.storage.ibm.com/tape/lto/). **2.** Reset the drive (see Resetting a Drive on page 347) to clear the error code. **3.** Confirm that the drive is using the current firmware version (see Determine the Drive Generation and Firmware Version on page 412). **4.** Update the firmware if necessary (see Updating Drive Firmware on page 409). **5.** Retry the operation that produced the error. **6.** If the problem persists, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7). **Note:** The error code clears when you reset or power cycle the tape drive or when you place it in maintenance mode.
4		**Firmware or drive problem.**  **Important:** Do not force a dump; one already exists. A firmware or drive hardware failure occurred. Perform the following: **1.** Collect the drive trace file (see Retrieving a Drive Trace File on page 353). **Note:** You can also use the server's SCSI interface. Use a device driver utility or system tool (for instructions about reading a drive dump from tape, visit http://ssddom02.storage.ibm.com/tape/lto/). **2.** Reset the drive (see Resetting a Drive on page 347) to clear the error code. **3.** Retry the operation that produced the error. **4.** If the problem persists, confirm that the drive is using the current firmware version (see Determine the Drive Generation and Firmware Version on page 412). **5.** Update the firmware if necessary (see Updating Drive Firmware on page 409). **Note:** The error code clears when you reset or power cycle the tape drive or when you place it in maintenance mode.

Code	DLM Health Icon	Cause and Solution
5		**Tape drive hardware problem.** The tape drive determined that a tape path or read/write error occurred. To prevent damage to the drive or tape cartridge, the drive does not allow you to insert a cartridge if the current cartridge was successfully ejected. If the problem persists, replace the drive. **Note:** The error code clears when you reset or power cycle the tape drive or when you place it in maintenance mode.
6		**Tape drive or media error.** See Chapter 8 – Configuring and Using Media Lifecycle Management, beginning on page 234 for information about using MLM to determine the health of the cartridge. See Chapter 9 – Using Drive Lifecycle Management, beginning on page 280 for information about using DLM to determine the health of the drive. The tape drive determined that an error occurred, but it cannot isolate the error to faulty hardware or to the tape cartridge. Perform the following actions: **For Problems with Writing Data** If the problem occurred while the tape drive was writing data to the tape, and if you know the volume serial number (located on the cartridge label) of the tape cartridge that was loaded in the drive when the problem occurred, retry the operation with a different cartridge: ▪ If the operation succeeds, the original cartridge was defective. Copy data from the defective cartridge and discard it. ▪ If the operation fails and another tape drive is available, insert the cartridge into the other unit and retry the operation. ▪ If the operation fails, discard the defective cartridge. **For Problems with Reading Data** If the problem occurred while the tape drive was reading data from the tape, and if you know the volume serial number of the tape cartridge, perform one of the following procedures: ▪ If another tape drive is available, insert the cartridge into the other unit and retry the operation: ▪ If the operation fails, discard the defective cartridge. **Note:** The error code clears when you reset or power cycle the tape drive or when you place it in maintenance mode.
7		**High probability of media error.** An error occurred because of a faulty tape cartridge. Try another tape cartridge. If the problem occurs with multiple tape cartridges, run the tape cartridge in a different tape drive. If the operation in the other unit fails and **6** or **7** displays, replace the media. **Note:** The error code clears when you reset or power cycle the tape drive or when you place it in maintenance mode.
8		**Primary port interface error.** A failure occurred in the tape drive hardware or in the primary port interface. The error code clears 10 seconds after the drive detected the error or when you place the drive in maintenance mode.

Code	DLM Health Icon	Cause and Solution
9		**Tape drive, library interface, or RS-422 error.** A failure occurred in the drive hardware, the library interface, or the RS-422 connection. Replace the drive. The error code clears 10 seconds after the drive detected the error or when you place the drive in maintenance mode.
A		**Degraded operation.** The drive is usable, though the SCD continues to indicate an error and the status light flashes amber. The error code may clear when you reset the tape drive. **1.** Reset the drive (see Resetting a Drive on page 347) to clear the error code. **2.** Confirm that the drive is using the current firmware version (see Determine the Drive Generation and Firmware Version on page 412) and update the firmware if necessary. **3.** Use the Drive Health Verification wizard to test the drive (see Using DLM to Test an LTO Drive on page 373). **4.** If the problem persists, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7). **Note:** The error code may clear when you reset or power cycle the tape drive or when you place it in maintenance mode.
C		**Cleaning indicator.** The tape drive needs to be cleaned. The error code clears when you clean the drive or place it in maintenance mode.
d		**Fibre Channel AL_PA conflict.** Two tape drives on a Fibre Channel loop have the same AL_PA.
E		The Fibre Channel port is offline.
F		**Drive Fibre Channel error.** The Fibre Channel drive does not detect light or a related diagnostic failed to detect light through the fiber optic connection to the drive. ▪ Verify the fiber cables and connections between the tape drive and the host are the correct type and are working properly. Verify all equipment and devices are powered ON. ▪ Verify the configuration settings for the drive are set correctly and are compatible with the topology of the network. ▪ Verify that the host fiber adapter and port are working properly and are compatible with the topology of the network. ▪ Verify that the fiber channel switch ports are working properly and are compatible with the topology of the network. ▪ Verify that the fiber cable is connected to Port A (0) of the tape drive. ▪ Verify that Port A (0) on the Fibre Channel drive is working properly by running "Function Code 6: Run Host Interface Wrap Test."

Code	DLM Health Icon	Cause and Solution
c, b, h, n, or u	**N/A**	**No error or message assigned.** There may be a problem with the SCD. Reset the drive and determine whether all segments on the SCD are lit. ▪ If they are all lit, confirm that the drive is using the current firmware version (see Determine the Drive Generation and Firmware Version on page 412) and update the firmware if necessary. ▪ If the problem persists, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).
...	**N/A**	The message display lost communication with the tape drive. This message appears on Line 2 of the message display. The three dots may occasionally display during normal processing.

USING DLM TO TEST AN LTO DRIVE

Overview BlueScale Drive Lifecycle Management (DLM) lets you monitor the DLM health information of each LTO drive in the library and helps you identify drives that experience a high number of errors or other problems during operation. See Chapter 9 – Using Drive Lifecycle Management, beginning on page 280 for detailed information about using DLM to monitor the health of LTO drives.

If you suspect that a drive is experiencing problems or if the Drive Lifecycle Management report indicates that a drive is experiencing repeated errors, you can use the DLM Drive Health Verification wizard to test the drive. This test, when used in conjunction with other DLM data and MLM data, can help you determine whether a drive or the media is the source of the errors you are investigating.

Requirements for Using the Wizard

Before you can run the DLM Drive Health Verification wizard, the following requirements must be met:

- The drive must not contain a cartridge.
- A scratch tape that is the same LTO generation as the drive being tested must be available in the entry/exit port. The scratch tape health must be Good (green) for an MLM-enabled cartridge or Usable for a cartridge that is not MLM-enabled.

Caution Make sure that the scratch tape does not contain data that you need to retain. The test process overwrites all data on the tape.

Important The DLM Drive Health test requires the scratch tape used for the testing to be the same generation as the drive. If the tape is not the same generation as the drive, the test fails.

Important The test fails if the scratch cartridge health is not Good or Usable.

Notes:
- If the cartridge health is unknown (that is, it is not currently listed in the library's MLM database), the library loads the cartridge into a drive to determine the health before beginning the test.

- The scratch cartridge must have a barcode label.
- The scratch cartridge is not write-protected.
- If the scratch cartridge is encrypted, the BlueScale encryption key must be stored in the library and associated with the partition containing the drive to be tested.
- If a cleaning partition is associated with the partition containing the drive, make sure the cleaning partition contains a cleaning cartridge with Good (green) or Usable health. You can use MLM to determine the health of the cleaning cartridges currently in the cleaning partition (see Generate MLM Reports on page 266). If necessary, import a known good cleaning cartridge into the cleaning partition (see Import a Cartridge into a Specific Slot on page 208).

  If the partition does not use a cleaning partition, a cleaning cartridge with Good or Usable health must be in the entry/exit port. Import a known good cleaning cartridge into the entry/exit port (see Import a Cartridge into a Specific Slot on page 208).

  Notes:
  - The test fails if the cleaning cartridge health is not Good or Usable.
  - The cleaning cartridge must have a barcode label.

- Only a user with superuser or administrator privileges can perform a DLM Drive Health test. See Configuring Library Users on page 80 for information about the three types of user groups and what types of privileges each has.

Run the DLM Drive Health Verification Wizard

Use the following steps to launch the DLM Drive Health Verification wizard.

1. Log into the library as a user with superuser or administrative privileges.
2. If necessary, import a scratch tape and a cleaning cartridge into the library's entry/exit port (see Requirements for Using the Wizard on page 374).
3. From the toolbar menu, select **Configuration** ···⁘ **DLM** to display the Drives screen.

   Note: The **Test** button is not present if DLM is not enabled.

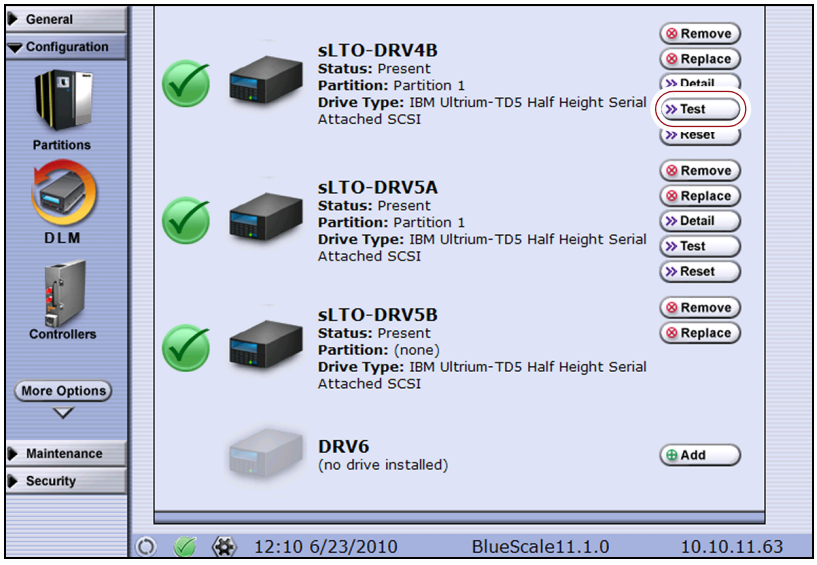


Figure 208 Click **Test** on the Drives screen to launch the wizard.

4. Click **Test** next to the drive you want to test to start the DLM Drive Health Verification wizard.

   The wizard determines whether all of the requirements for the test are met.

   All Requirements Met If all of the requirements for performing the test are met, the Drive Health Verification screen displays a warning about the upcoming test process. Proceed to Step 5 on page 376.

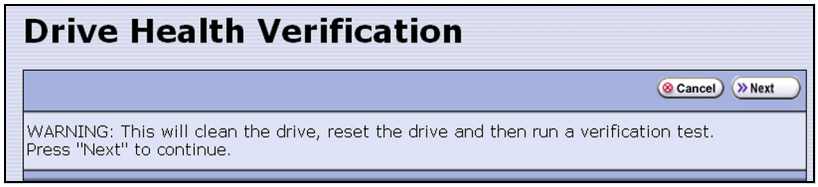


Figure 209 Click **Next** on the Drive Health Verification screen to begin the verification process.

Requirements Not Met If one or more requirement needs attention, the Drive Health Verification screen displays information about what needs to be done.

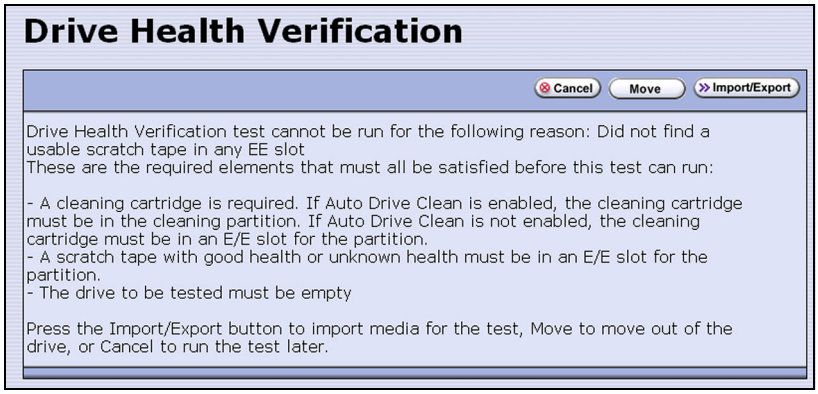


Figure 210 Address all of the requirements on the Drive Health Verification screen.

Note: If you are accessing the library remotely using the BlueScale web interface and either the scratch cartridge or the cleaning cartridge is not available, then **Cancel** is the only option available.

Use the following steps to address the requirements listed on the Drive Health Verification screen.

   a. Click **Move** or **Import/Export**, as required, to move a cartridge out of the drive or import a scratch cartridge and a cleaning cartridge into the partition.

   b. After you complete the necessary actions, begin the entire process again, starting with Step 3 on page 375.

   c. When all of the requirements are met, proceed to Step 5.

5. Click **Next** to display the DLM Select Scratch Cartridge screen.

6. On the DLM Select Scratch Cartridge screen, select the scratch cartridge you want to use for the test.

   Note: Only data cartridges located in the entry/exit port are listed and available for selection.

Caution If the entry/exit port contains multiple data cartridges, make sure that you select a cartridge that does not contain data that you want to retain. The test process overwrites all data on the tape.

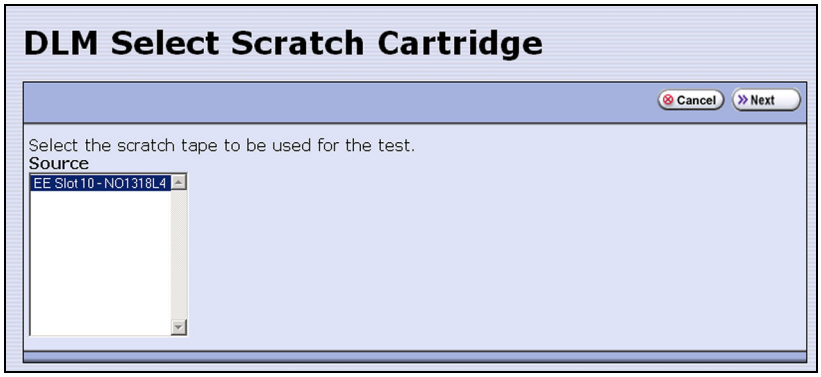


Figure 211 The DLM Select Scratch Cartridge screen.

7. Click **Next** to begin the automatic test process. A series of status screens lets you know how the test is progressing. The test process requires approximately 15 minutes to complete.
8. When the test is complete, review the DLM Test Results screen to determine the outcome of the test and respond as required.
   - If the drive passes the test, the drive health is set to Good (green). You can continue using the drive.



Figure 212 The DLM Test Results screen (test successful).

   - If the drive fails the test, the drive health is set to Poor (red). Contact Spectra Logic for assistance (see Contacting Spectra Logic on page 7).

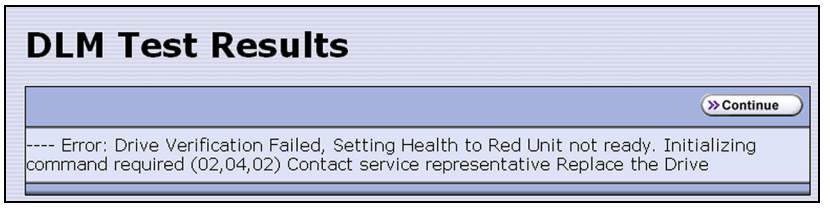


Figure 213 The DLM Test Results screen (test failed).

9. Click **Continue** to return to the Drives screen.

CHAPTER 13

Maintaining the Library

This chapter describes the common maintenance tasks for the Spectra T120. See Chapter 14 – Maintaining the Drives, beginning on page 402 for detailed information about maintaining the library's drives.

Important Contact Spectra Logic Technical Support before making any changes to your library hardware or performing any maintenance operations.

Topic	
Updating, Servicing, or Moving the Library	below
Renewing the BlueScale Software Support Key	page 380
Updating the BlueScale Software and Library Firmware	page 382
Check the Library BlueScale Software Version	page 383
Check Component Firmware Versions (Optional)	page 384
Check the Currently Released BlueScale Version	page 386
Download the BlueScale Package	page 386
Prepare for the BlueScale Package Update	page 388
Manage Update Packages	page 397
Replacing the Air Filter	page 398
Calibrating the Touch Screen	page 401

UPDATING, SERVICING, OR MOVING THE LIBRARY

Contact Spectra Logic Technical Support before making any changes to your library hardware or performing any service operations.

Warning

The rack kit is only intended to provide a method for mounting the library in the rack. It is not intended to be used for servicing the library, as there is no service to the library that is assisted by sliding the library out of the rack. The library must either be serviced in the rack, or completely removed from the rack for service.

Installing Additional Drives

Installing an additional drive causes the library to reassign element addresses. To avoid errors, reconfigure your storage management software after adding a new drive (refer to your software documentation for instructions).

Servicing the Library

In the event that it is necessary to replace a component, make sure that you have instructions for performing the procedure *and* you either:

- Are instructed to do so by Spectra Logic Technical Support,
  —OR—
- Have a support contract such as Assisted Self-Maintenance (ASM).

Moving the Library

The library hardware is configured to ensure proper thermal control, air flow, and dust filtering. After the library is installed, do not move the library. Do not remove any library components (except the cartridges).

Important

Moving the library without assistance from a Spectra Certified Field Engineer voids your service contract. Contact Spectra Logic Technical Support for assistance if you need to relocate your library (see Contacting Spectra Logic on page 7).

RENEWING THE BLUESCALE SOFTWARE SUPPORT KEY

You must have a current support agreement and corresponding BlueScale Software Support key entered in the library before you can update the library's BlueScale software and the component firmware. You are able to download updated BlueScale packages from the Technical Support portal; however, without a valid BlueScale Software Support key installed on the library, you are not able to apply the updates to the library.

Notes:
- Spectra Logic sends you an email notification before your current support key expires.
- The library also generates informational messages to let you know that the support key is about to expire.

If your BlueScale Software Support key expires, you see the following screen when you attempt to update the library.

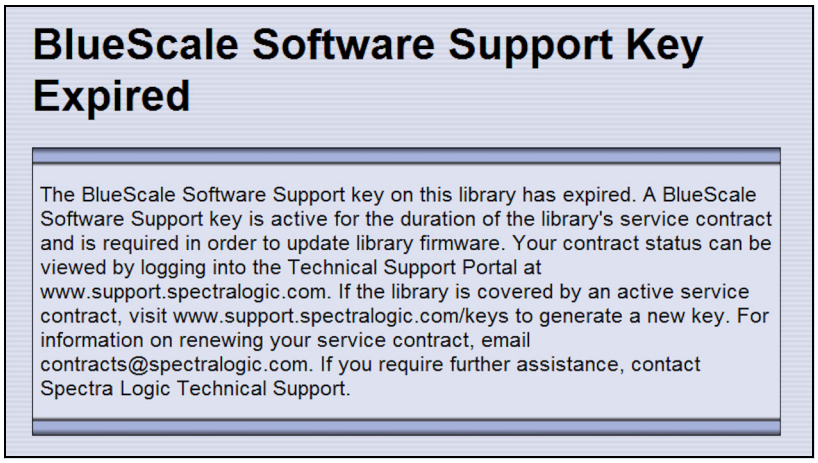


Figure 214 The BlueScale Software Support Key Expired screen.

You must renew the BlueScale Software Support key before you can continue. You must have a current service contract to generate a new BlueScale Software Support key, if you do not have a current service contract, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).

If your library is covered by warranty or a service contract, and you need a BlueScale Software Support key, follow these steps:

1. Log into your account on the Technical Support portal at support.spectralogic.com.

   Note: See Accessing the Technical Support Portal on page 435 for information about creating an account and accessing the Technical Support portal.

2. Select **Incidents & Inventory ···⁘ Service Key Generation**.

3. The Service Key Generation page displays with a list of the products you own. In the Product Name column, click the product for which you want to generate a service key.

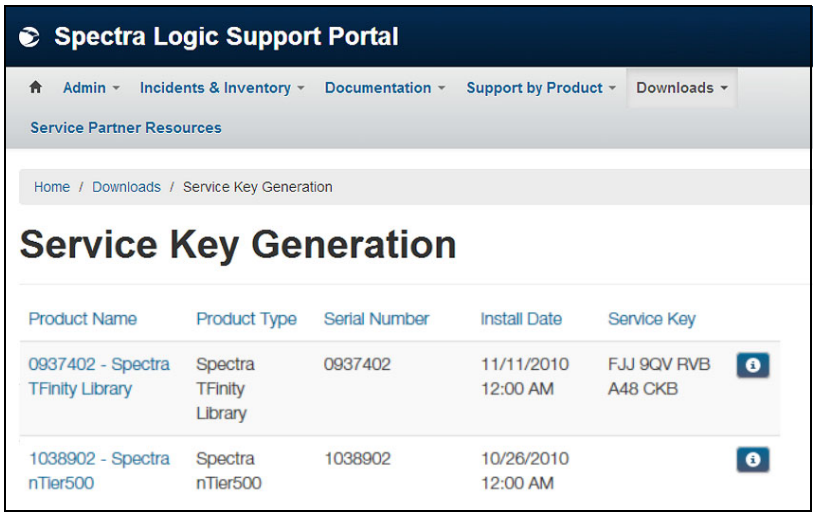


Figure 215 The Service Key Generation screen.

4. On the Software Support Keys Generator page, the **Product Name**, **Product Type**, and **Serial Number** fields are populated with the information for your library. Click **Generate Key**. The page refreshes to display the new Product Service Key.



Figure 216 The Software Support Key Generator page.

5. After you generate your key, enter it into the library as described in Enter Activation Keys on page 87.

UPDATING THE BLUESCALE SOFTWARE AND LIBRARY FIRMWARE

Overview The BlueScale software and library firmware are updated regularly to provide new functionality and resolve issues. Spectra Logic recommends that you keep your library up-to-date at all times. If your library is not using the most current BlueScale software version, updating it to the most current version is strongly recommended.

Important

Your library must either still be under warranty or you must have a current service contract with Spectra Logic Technical Support before you can perform BlueScale package updates, including firmware updates for library components. The BlueScale Software Service key associated with your service contract must be entered into the System Configuration screen before you can update the library.

- For instructions on how to renew and enter your BlueScale Software Support key, see Renewing the BlueScale Software Support Key on page 380.
- If you have questions about your service agreement, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).

New Package Availability The most currently released version of the BlueScale package for the library is available on the Product Software page on the Technical Support portal.

If Auto Download is configured (see Configure a Package Server on page 118), the library checks configured package servers once a week for a library update package newer than what the library is currently running. If a new package is available, the library downloads it, posts a system message, and displays an icon on the status bar to indicate the update is available (see Auto Download Icon on page 68). If the library already downloaded an update package, you can continue with Prepare for the BlueScale Package Update on page 388.

Package Support Packages are groupings of program code that contain the BlueScale software and firmware for the library components. Spectra Logic provides complete support for the two most recently released BlueScale packages. If your library is not running the most current BlueScale version, you may be required to update your library to resolve an issue or to verify that the problem still exists.

The *Spectra T120 Library Release Notes and Documentation Updates*, available after logging in to the Technical Support portal, provides information about the updates in the current BlueScale package, as well as updates to this guide and other documentation.

User Privilege Requirements All users can view the BlueScale software version that the library is using on the status bar at the bottom of each screen (see Figure 25 on page 67). Only a user with superuser or administrator privileges can update the library. See User Security on page 70 for information about the three types of user groups and what types of privileges each has.

Check the Library BlueScale Software Version

Use the following steps to determine the BlueScale software version currently running on the library.

1. Log into the library as a user with superuser or administrator privileges.
2. Determine the BlueScale software version currently running on the library.
   - The status bar at the bottom of each BlueScale screen shows the BlueScale version running on the library.

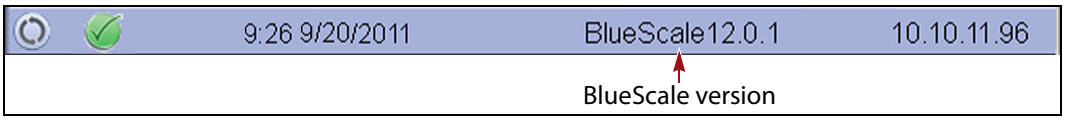


Figure 217 The BlueScale version shown on the status bar.

—OR—

- Select **Maintenance** ···⁘ **Package Update** from the toolbar menu to view the current BlueScale package version on the Package Update screen.

  Note: If the library notifies you that your BlueScale Software Support key expired, see Renewing the BlueScale Software Support Key on page 380.

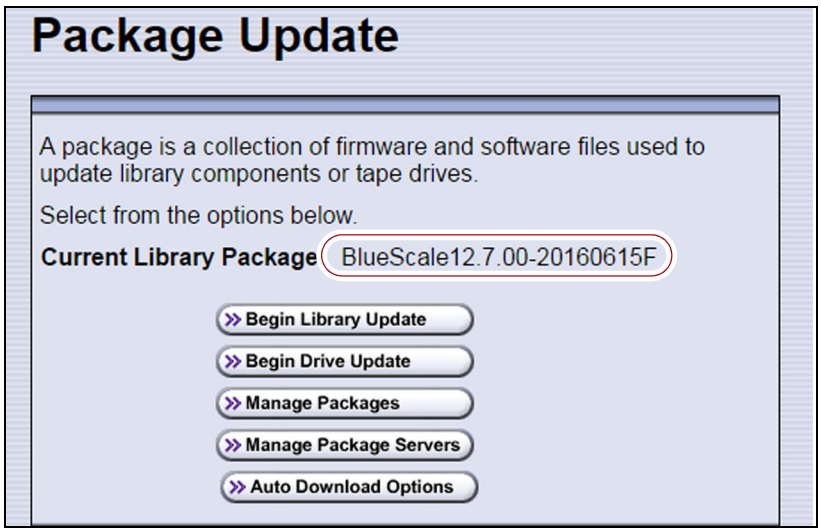


Figure 218 The BlueScale version shown on the Package Update screen.

Check Component Firmware Versions (Optional)

Note: This is typically only useful when recommended by Spectra Logic Technical Support.

1. Log into the library as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Maintenance ⋯⁘ Tools**. The Maintenance Tools screen displays.



Figure 219 The Maintenance Tools screen.

3. If you want to save the information about the firmware versions to a USB device, connect a USB device to a USB port on the LCM and allow time for the device to mount.

   Note: The option to save the information to a USB device is only displayed if you connect a USB device before you select **Utilities** (see Using a USB Device on page 145).

4. Select **Utilities**. The Utilities screen displays.
5. Select **Display Firmware Versions**. The Utilities screen refreshes to show a description of the Display Firmware Versions tool.

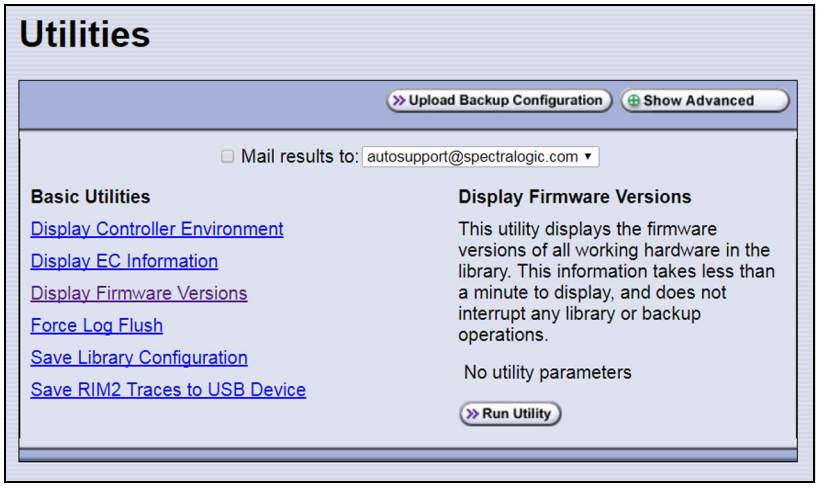


Figure 220 Select the **Display Firmware Versions** utility.

6. If you want to save the output from the utility, use the check boxes at the top of the screen to select the location; otherwise skip to Step 7.

Selecting this location...	Saves the output...
Mail results to	As an attachment to an email sent to the specified mail recipient. Use the drop-down list to select the recipient for the report file. To send the email with the output to someone who is not already listed as a library user, you must first configure that person as an email recipient (see Configure Mail Users on page 99). **Note:** Do not use the default *autosupport@spectralogic.com* email recipient unless Spectra Logic Technical Support specifically instructs you to do so. Spectra Logic does not save emailed results files unless they are specifically requested for troubleshooting.
Save to USB	To a USB device connected to a USB port on the LCM. **Note:** This option is only available if you inserted a USB device in Step 3 on page 384.

7. Click **Run Utility**. The Utility Results screen displays, showing a list of the firmware levels for all installed components.

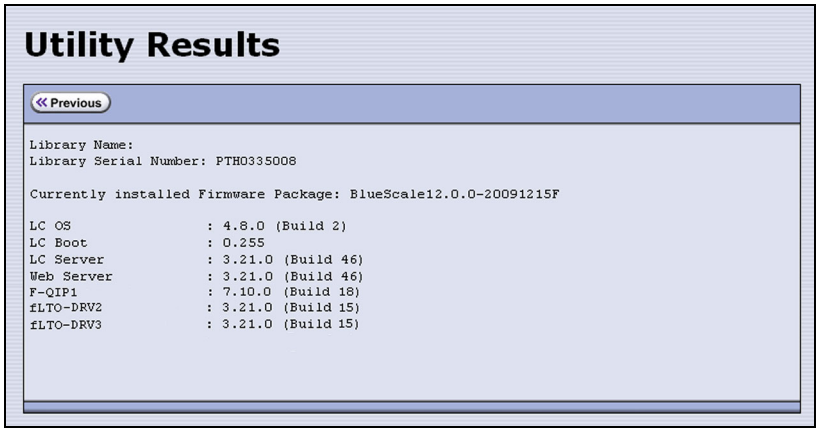


Figure 221 The Firmware Levels Utility Results screen.

8. If requested to do so, send this information to Spectra Logic Technical Support (see Contacting Spectra Logic on page 7) for advanced troubleshooting.

Check the Currently Released BlueScale Version

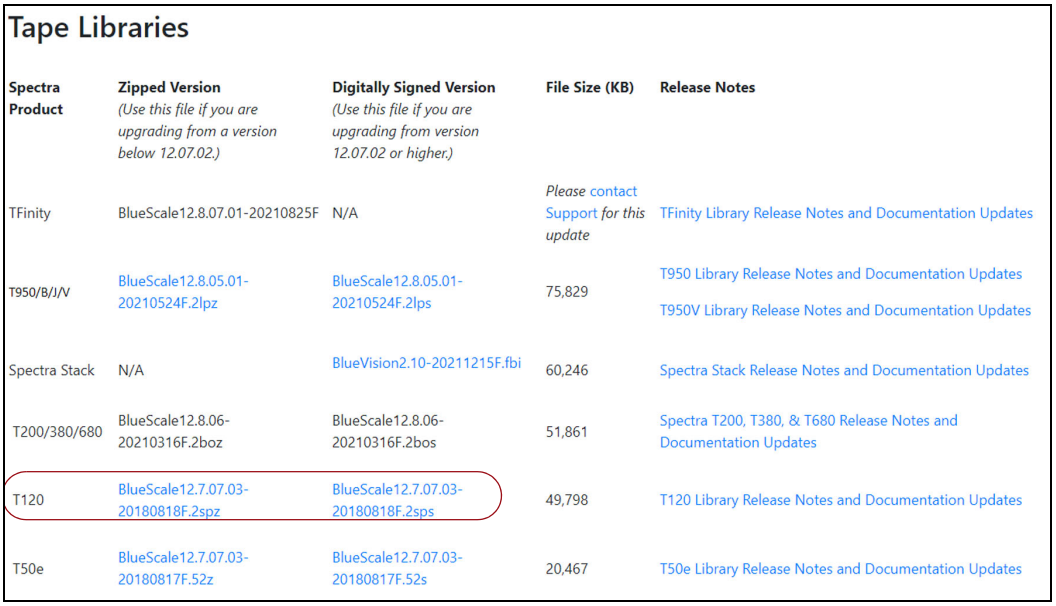
Follow these steps to check the currently recommended BlueScale version.

1. Log into your user account on the Technical Support portal at support.spectralogic.com.

   Note: See Accessing the Technical Support Portal on page 435 for information about creating an account and accessing the Technical Support portal.

2. Select **Downloads** ⋯ **Product Software**.

3. On the Product Software page, locate your library type in the **Spectra Product** column. The currently released BlueScale version is listed in the **Current Version** column.



Tape Libraries

Spectra Product	Zipped Version *(Use this file if you are upgrading from a version below 12.07.02.)*	Digitally Signed Version *(Use this file if you are upgrading from version 12.07.02 or higher.)*	File Size (KB)	Release Notes
TFinity	BlueScale12.8.07.01-20210825F	N/A	*Please contact Support for this update*	TFinity Library Release Notes and Documentation Updates
T950/B/J/V	BlueScale12.8.05.01-20210524F.2lpz	BlueScale12.8.05.01-20210524F.2lps	75,829	T950 Library Release Notes and Documentation Updates T950V Library Release Notes and Documentation Updates
Spectra Stack	N/A	BlueVision2.10-20211215F.fbi	60,246	Spectra Stack Release Notes and Documentation Updates
T200/380/680	BlueScale12.8.06-20210316F.2boz	BlueScale12.8.06-20210316F.2bos	51,861	Spectra T200, T380, & T680 Release Notes and Documentation Updates
T120	BlueScale12.7.07.03-20180818F.2spz	BlueScale12.7.07.03-20180818F.2sps	49,798	T120 Library Release Notes and Documentation Updates
T50e	BlueScale12.7.07.03-20180817F.52z	BlueScale12.7.07.03-20180817F.52s	20,467	T50e Library Release Notes and Documentation Updates

Figure 222 The Product Software screen.

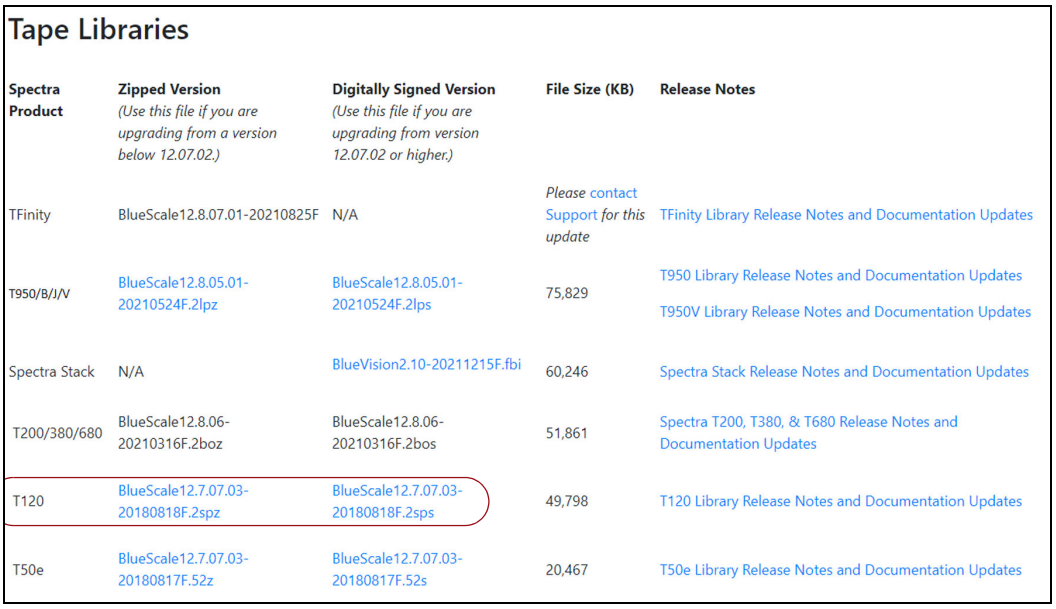
4. Compare the Current Version available for the library to the version installed on the library.

Download the BlueScale Package

If Auto Download is configured (see Configure a Package Server on page 118) or your library has Internet access and you plan to download the BlueScale package directly to the library from the Spectra Logic package server, skip to Prepare for the BlueScale Package Update on page 388.

If your library cannot access an outside website because of security or firewall restrictions, use the following steps to download the BlueScale package from the Technical Support portal. You can save the BlueScale package to a USB device or a previously configured package server.

1. Log into your account on the Technical Support portal at support.spectralogic.com.
2. Select Downloads > Product Software. The Product Software page displays.



Tape Libraries

Spectra Product	Zipped Version (Use this file if you are upgrading from a version below 12.07.02.)	Digitally Signed Version (Use this file if you are upgrading from version 12.07.02 or higher.)	File Size (KB)	Release Notes
TFinity	BlueScale12.8.07.01-20210825F	N/A	*Please contact Support for this update*	TFinity Library Release Notes and Documentation Updates
T950/B/J/V	BlueScale12.8.05.01-20210524F.2lpz	BlueScale12.8.05.01-20210524F.2lps	75,829	T950 Library Release Notes and Documentation Updates T950V Library Release Notes and Documentation Updates
Spectra Stack	N/A	BlueVision2.10-20211215F.fbi	60,246	Spectra Stack Release Notes and Documentation Updates
T200/380/680	BlueScale12.8.06-20210316F.2boz	BlueScale12.8.06-20210316F.2bos	51,861	Spectra T200, T380, & T680 Release Notes and Documentation Updates
T120	BlueScale12.7.07.03-20180818F.2spz	BlueScale12.7.07.03-20180818F.2sps	49,798	T120 Library Release Notes and Documentation Updates
T50e	BlueScale12.7.07.03-20180817F.52z	BlueScale12.7.07.03-20180817F.52s	20,467	T50e Library Release Notes and Documentation Updates

Figure 223 The Product Software screen.

3. Locate your library type in the Spectra Product column. The currently released BlueScale version is listed in the Current Version column.

   Note: If you are updating a library running BlueScale12.7.03 or later, select a package ending with the letter "s", which indicates a digitally signed package. If you are updating a library running a BlueScale version prior to 12.7.03, select a package ending with the letter "z", which indicates an unsigned zip package.

4. Click the name of the BlueScale package next to your library type. The BlueScale package begins downloading through your web browser.
5. When the download completes, do not unzip the downloaded file. Copy the file to one of the following locations:
   - A previously configured package server.
   - The root directory of a USB device.

   Notes:
   - The library only recognizes FAT-formatted, not NTFS-formatted, USB devices.
   - Not all USB devices are compatible with the library. If you are unable to access a USB device from the library, remove it and use a different one.

Prepare for the BlueScale Package Update

Use the following sections to prepare to update the BlueScale software and library component firmware.

Make Sure Your BlueScale Software Support Key Is Current

Updating the BlueScale software and the firmware for the library components requires a current service contract with Spectra Logic Technical Support. If your service contract expires, renew it as described in Renewing the BlueScale Software Support Key on page 380.

Prepare the Library

- Stop all library- and host-based operations.

Important

Confirm that all of the following conditions are met before beginning the update process:

- All backup processes are complete
- All storage management software daemons are stopped
- All drives are empty

To ensure that no commands are sent to the controllers, Spectra Logic suggests disconnecting the cables to the F-QIPs (if present) and any tape drives used as a robotic exporter.

Notes:

- If you are updating a library running BlueScale 12.7.03 at the start of an update that includes LCM or QIP updates, the library shuts down all exporters (QIP and drives) so that they do not accept additional moves, and then waits for any moves in progress to complete before starting to update the selected components. The exporters are re-enabled to accept moves when the package update completes.
- If you are updating a library running BlueScale 12.7.07 or later, at the start of a package update that includes LCM updates, the library shuts down all exporters (QIP and drives) so that they do not accept additional moves and then waits for any moves in progress to complete before starting to update the selected components. At the start of a package update that includes QIP updates only, the library shuts down the exporters needing an update so that they do not accept additional moves and then waits for any moves in progress to complete before starting to update the selected components. The exporters are re-enabled to accept moves when the package update completes.

- Back up your MLM database (see Back Up the MLM and DLM Databases on page 274).

  Note: Backing up the MLM database also backs up the DLM database.

- Back up all of your BlueScale encryption keys (see the *Spectra Tape Libraries Encryption User Guide*).
- Download and read the *Spectra T120 Library Release Notes and Documentation Updates* for the most current information about updated BlueScale packages.

Important If the release notes provide special requirements or procedures for updating the library, make sure that you follow them.

Select the BlueScale Package and Update Options

1. Log into the library as a user with superuser or administrator privileges.
2. If you downloaded the BlueScale package to a USB device plug it into the LCM's USB port and allow time for the device to mount **before** continuing (see Using a USB Device on page 145).
3. If you receive an error message stating that your disk is full when the library attempts to unzip a BlueScale package, you need to delete downlevel packages before you can continue. See Manage Update Packages on page 397.
4. Select **Maintenance** ⋯⁘ **Package Update**. The Package Update screen displays.

   Note: If the library notifies you that your BlueScale Software Support key expired, see Renewing the BlueScale Software Support Key on page 380.

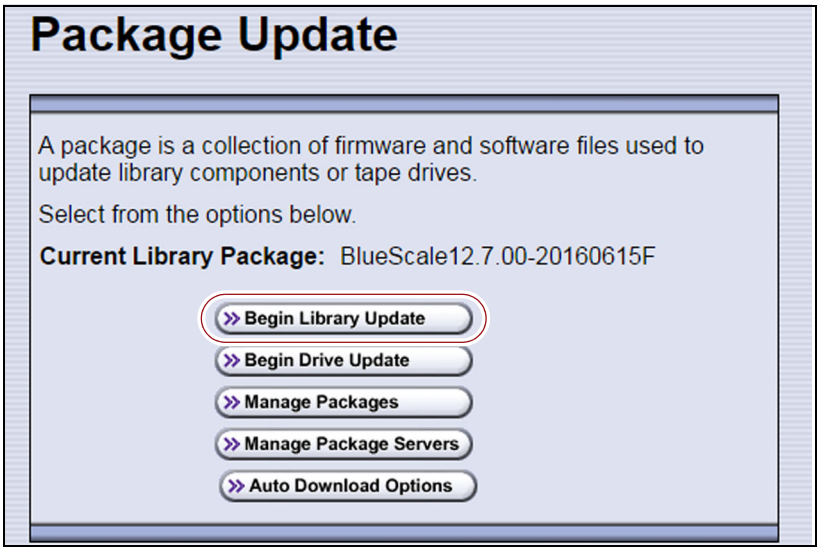


Figure 224 Click **Begin Library Update** to start the process.

5. Click **Begin Library Update**. If the License Agreement screen displays, read the license agreement, then click **Accept**.

   Note: If you decline the agreement, you are not able to update the library.

6. The Select Library Package screen displays, listing the file names for the available BlueScale packages.

   Note: The file names begin with the BlueScale version number, followed by the date of release in YYYYMMDD format.



Figure 225 Select the BlueScale package.

7. Select the BlueScale package.

   Notes:
   - If the Package does NOT display in the USB or Package server section, you may have downloaded the package for the wrong library type or the wrong signed/unsigned package type.
   - BlueScale packages may be found on the sources described in the table below.

Source	Description
Spectra Logic	Select and download the desired BlueScale package from Spectra Logic's package server to the memory card in the LCM and then install it. **Notes:** ▪ The library must have a connection to the Internet before you can use this option (see Configure Network Settings on page 96). ▪ If directed to do so by Spectra Logic Technical Support, update the IP address and package directory for the Spectra Logic package server (see Configure a Package Server on page 118).
Memory Card	Select the desired BlueScale package from packages already stored on the memory card in the LCM.

Source	Description
USB Device	Select the desired BlueScale package from packages stored on a USB device. There is a brief delay while the library accesses the USB device when you select this option. **Notes:** ▪ The **USB Device** option is only available if you connected a USB device containing the BlueScale package in Step 2 on page 389. ▪ The BlueScale package must be stored in the root directory of the USB device.
Configured Package Server (server name varies)	Select the desired BlueScale package stored on a previously configured package server, if you have one available. **Note:** This option is only available if you previously configured a package server. See Configure a Package Server on page 118 for more information.

8. Click **Next**. The Library Package Update Options screen displays.

   The Library Package Update Options screen only lists options that were enabled by your previous selections while configuring the library.

   Note: Clicking **Update** immediately starts the update process.

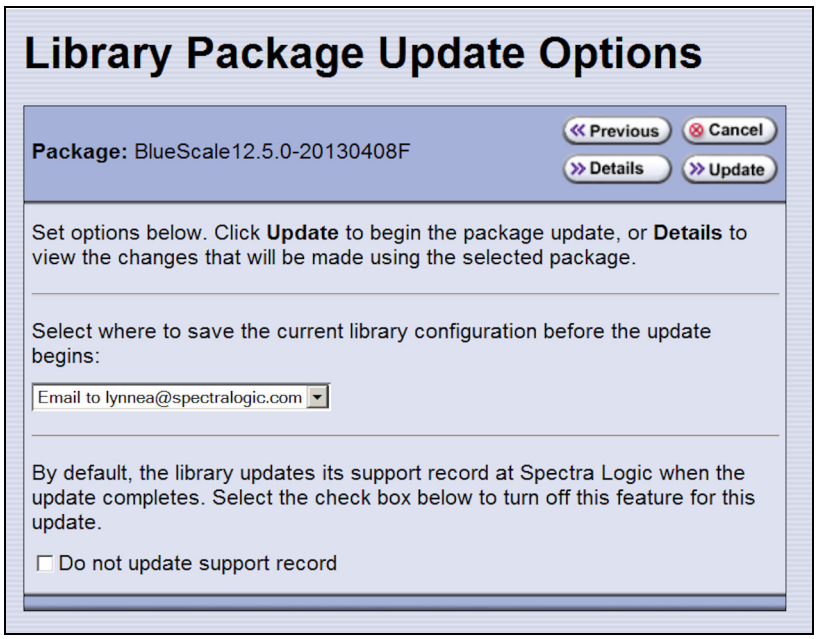


Figure 226 The Library Package Update Options screen.

9. On the Library Package Update Options screen, select whether and where you want to backup the library configuration before performing the update.

   Notes:
   - Spectra Logic highly recommends that you save the library configuration before updating.
   - The backup of the library configuration does not include the MLM or DLM databases.

Choice	Action
Save to USB device	Saves a backup of the library configuration to a USB device. Using this option is highly recommended to ensure that you can easily restore the library if necessary. **Notes:** ▪ The **Save to USB device** option is only available if you connected a USB device in Step 2 on page 389. ▪ The library only recognizes FAT-formatted, not NTFS-formatted, USB devices.
Email to...	Emails a backup of the library configuration file to an already-configured mail recipient. **Note:** The **Email to** option is only available if you previously configured mail recipients (see Configure Mail Users on page 99).
Do not save	Updates the library without saving a backup of the library configuration. This is not recommended unless you backed up the library configuration right before starting the package update procedure.

10. On the Library Package Update Options screen, select whether or not an email is sent to Spectra Logic Technical Support to update the library's support records.

    Notes:
    - Sending a notification to Spectra Logic Technical Support is highly recommended.
    - This notification does not include the configuration backup file.
    - This option is only available if you previously configured the *autosupport@spectralogic.com* mail user's SMTP IP address (see Create or Modify a Profile on page 294).

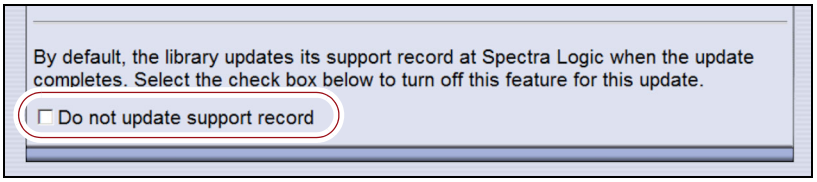


Figure 227 Select whether or not you want to send an update to Technical Support.

11. (**Optional**) To view a list of components affected by the BlueScale package, click **Details** to view the Library Package Details screen. A Library Package Details screen, similar to the one shown, displays.

    Any items that need to be upgraded or downgraded to match the BlueScale package you chose are automatically selected. Components with auto-staged firmware are marked with an asterisk (*).

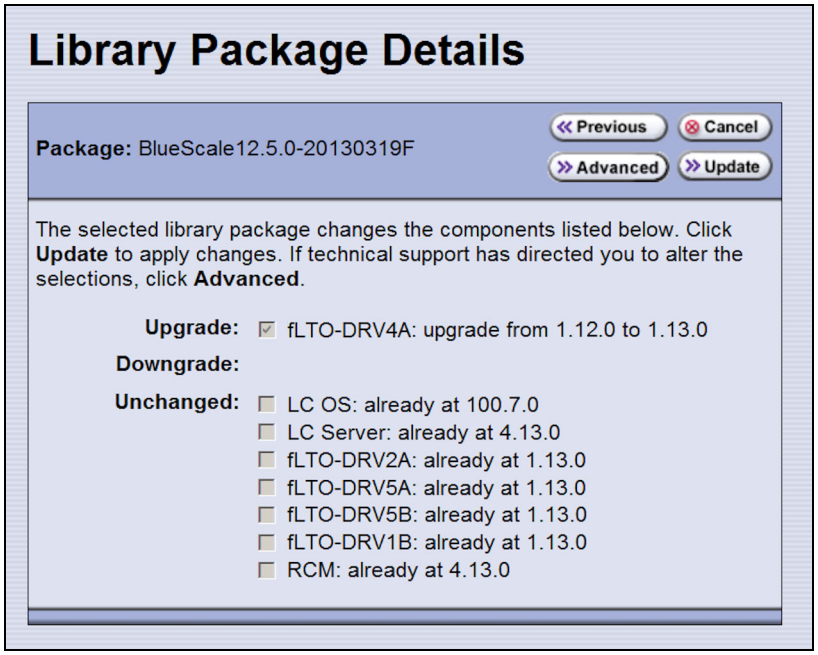


Figure 228 The Library Package Details screen.

12. (**Optional**) Use the advanced firmware update procedure to limit which components get upgraded or downgraded.

Important Use the advanced firmware update procedure only when directed to do so by Spectra Logic Technical Support.

    a. Click **Advanced** on the Library Package Details screen. An Advanced Package Update screen, similar to the one shown, displays.

b. Select or clear the check box next to the library components:

- Clear the check box to prevent the component from upgrading or downgrading.
- Select the check box to force a component to update to the firmware level supplied by the BlueScale package. Depending on the firmware, this could be an upgrade, downgrade, or reapplying the current firmware.

For example, clear everything except **LC Server** to update just the LC Server firmware.

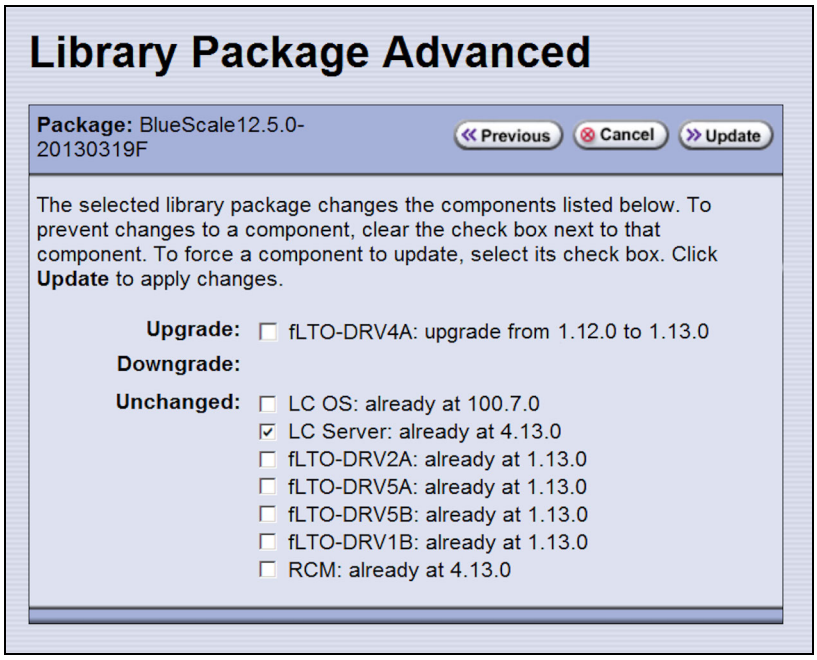


Figure 229 The Library Package Advanced screen.

Notes:

- Updating all of the automatically selected components is highly recommended.
- Occasionally, Spectra Logic Technical Support may instruct you to update a firmware component even if it is already at the same level as the component in the selected BlueScale package.
- Components with auto-staged firmware are marked with an asterisk (*).

Begin the Update

1. Click **Update** to begin the update process.

Important Once the update process starts, it cannot be canceled.

Important Do not turn off power to the library or power-down any component being updated during the update process.

2. The library begins the update process and displays a progress screen, which remains for the duration of the update. Depending on what components are updated, the process can take from several minutes to an hour or more.
3. When complete, the Package Update Results screen displays, showing that the update completed successfully or that a component failed to update.

   Note: If the update fails, examine any system messages and the package update log to determine the cause of the failure. Resolve the problems and perform the update again. For further information, see Troubleshooting on page 396.
4. If you used a USB device during the update process, disconnect it from the LCM.
5. Click **Finish** to complete the update. Updates do not take effect until the library completes the update process.

Important Always click **Finish** to complete the BlueScale update process. **Do not** manually reboot the LCM, power-cycle the library, or perform any other operations on the library when you see the Package Results screen. Doing so may cause the update process to fail.

   Note: If you are using the BlueScale web interface to perform the update, the connection to the library is lost when the LCM reboots. Allow sufficient time for the LCM to complete its initialization, then enter the library's IP address in your web browser to reconnect.
6. When the update completes, the library automatically sends an email to Spectra Logic Technical Support if it is configured as a mail recipient and you selected this option in Step 10 on page 392.
7. After the update is complete, use your storage management software to restart any backup processes.

Troubleshooting

If you encounter problems while performing a package update, examine any system messages and the package update log to determine the cause of the failure. Resolve the problems and retry the update.

LCM does not automatically reboot If the update package includes updates to software running on the LCM (LC server, WebServer, etc.), the LCM reboots when you click **Finish**. Wait at least five minutes for the LCM to complete its initialization. If the LCM does not reboot correctly, reseat the LCM and perform the Package Update process again.

Component failed to update Click **Finish** to complete the update. When the LCM resets, perform the Package Update process again.

Library configuration is corrupted during the update process Use the following steps to restore the library's configuration if it becomes corrupted during the package update process.

Caution

The **Restore Configuration from Checkpoint** utility should only be used immediately after a package update is performed.

Any library configuration or inventory changes made between the time that the package update is performed and the utility is run are lost.

Note: The library automatically saves a Checkpoint Configuration Backup file prior to beginning a package update.

1. From the toolbar menu, select **Maintenance** ⋯⁘ **Tools**. The Maintenance Tools screen displays.
2. Select **Utilities**. The Utilities screen displays.
3. Click **Show Advanced**. The Advanced Utilities Confirmation screen displays.
4. Click **Next**. The Utilities screen refreshes to show a list of the advanced utilities.

5. Scroll through the list of advanced utilities and select **Restore Configuration from Checkpoint**. The screen refreshes to show the details for the utility.

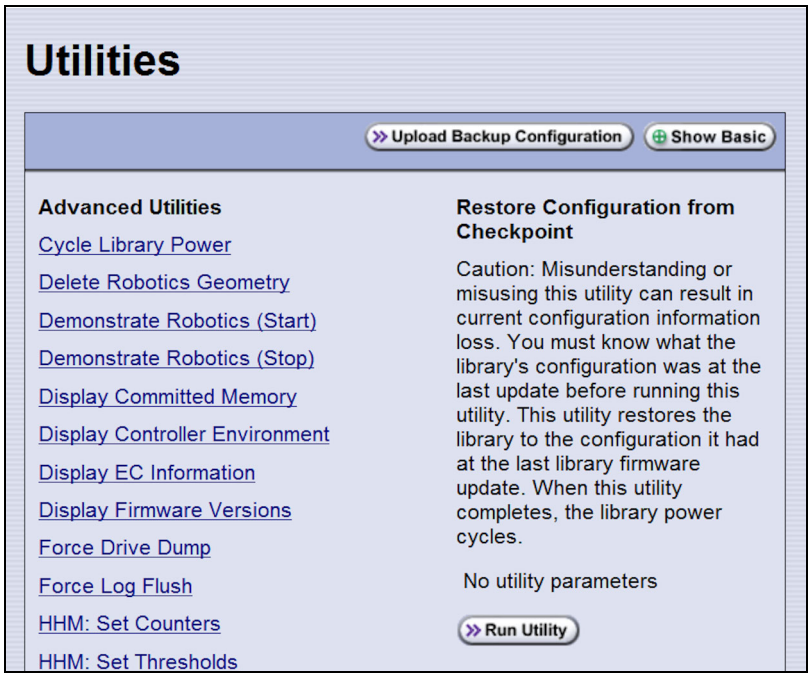


Figure 230 The Advanced Utilities screen.

6. Click **Run Utility** to restore the library to the Checkpoint library configuration.
7. After the library configuration restores, perform the Package Update process again.

Manage Update Packages

The BlueScale packages downloaded to the library reside on the memory card in the LCM. Over time, the packages (one per update) accumulate on the card and the library may post an error message notifying you that the memory card is full. You must delete downlevel packages before you can continue; you can also choose to delete downlevel packages at other times.

Deleting a package file *does not* delete the BlueScale software or component firmware already applied to the library; it simply removes the package file from local storage on the LCM.

Note: There is no confirmation request before the selected package is deleted. Make sure that you no longer need access to a package file before you delete it.

The following steps describe how to delete unwanted BlueScale packages from the memory card in the LCM.

1. Log into the library as a user with superuser or administrator privileges.

2. From the toolbar menu, select **Maintenance ⋯⁘ Package Update**. The Package Update screen displays (see Figure 224 on page 389).
3. Click **Manage Packages**. The Manage Packages screen displays with a list of all the package files currently stored on the memory card in the LCM.

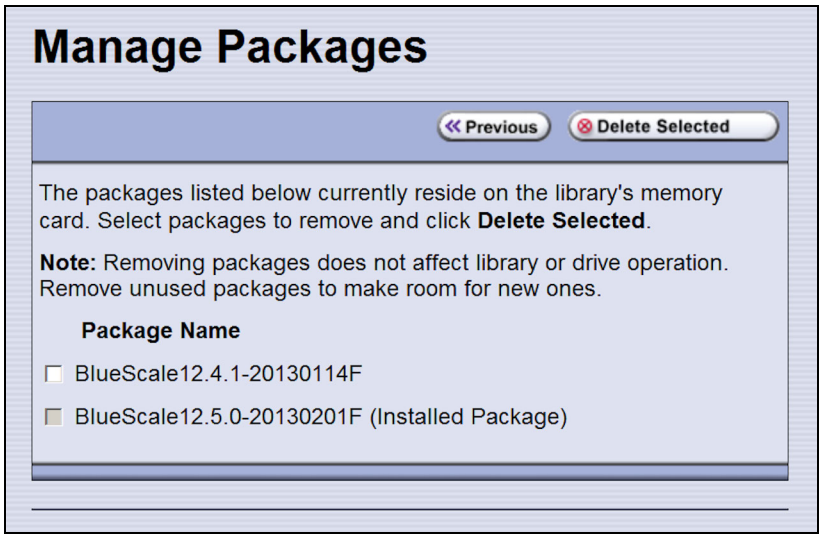


Figure 231 Select the BlueScale packages you want to delete.

4. Select the package(s) that you want to delete, then click **Delete Selected**. The package delete process begins.

REPLACING THE AIR FILTER

An air filter mounted in the lower front of the library ensures that the air pulled into the library is free of contaminants. The air circulates inside the library to maintain the temperature within an acceptable range. A clogged air filter can cause operational problems due to excessive temperatures inside the library.

You should inspect the filter at least once every three months as part of your preventive maintenance procedures. If a filter appears to be clogged, continue with the steps in this section.

Caution Some environments may require more frequent filter inspection and replacement. If an air filter gets clogged quickly, consider moving the library to a more dust-free location or improve the environment where it is located.

Spectra Logic recommends keeping one or more new air filters on site to use for replacement as often as is necessary. To purchase replacement air filters, contact your sales representative (see Spectra Logic Sales on page 7).

Before You Begin...

Confirm that the filter needs to be replaced Because dust primarily collects at the bottom of the air filter, it can be rotated 180°, top to bottom, one time before it needs to be replaced.

Gather the following tools and supplies Gather these supplies before beginning the procedure.

- A new filter from Spectra Logic
- A #2 Phillips screwdriver

Continue Library Operations While Replacing the Filter It is safe to continue normal library operations, such as backups, while replacing the air filter.

Replace the Filter

1. Access the front of the library, unlock and open the front door.



Figure 232 The filter location.

2. Remove the fan filter cover by removing the top screw with a #2 Phillips screwdriver.

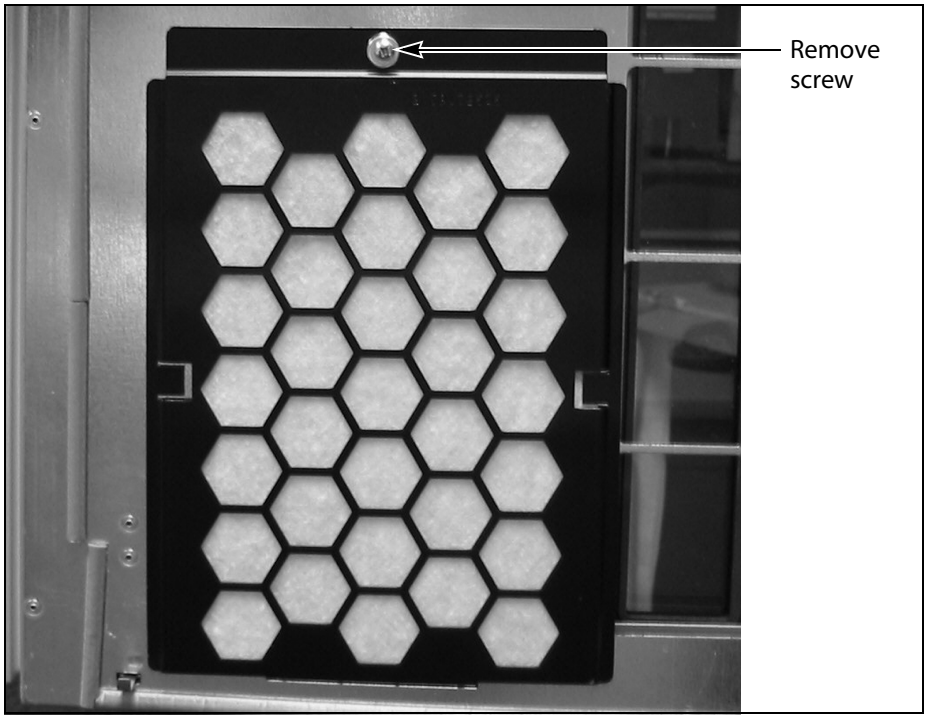


Figure 233 The fan filter cover.

3. Lift the old filter out of the tray and replace it with a new one.

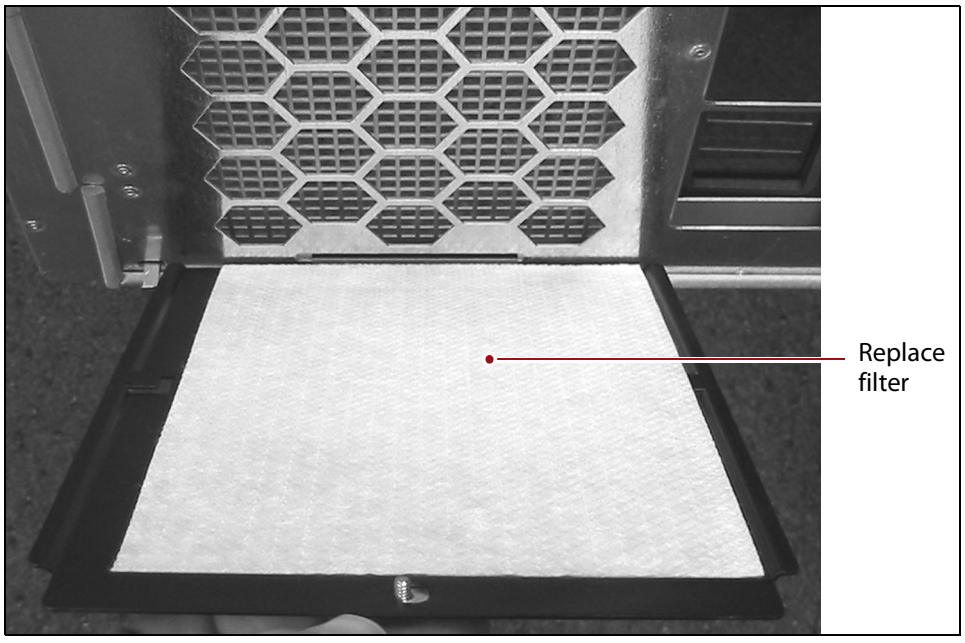


Figure 234 The filter.

4. Re-attach the screen. Close and lock the front door.

CALIBRATING THE TOUCH SCREEN

If the touch points on the library's touch screen do not properly align with the user interface graphics, perform the following procedure to recalibrate the position of the touch points.

Note: You must perform this procedure while standing in front of the touch screen. The utility is not available when accessing the library through the BlueScale web interface (RLC).

1. Log into the library as a user with superuser or administrator privileges.
2. From the toolbar menu, select **Maintenance** ···⁘ **Tools** to display the Maintenance Tools screen (Figure 219 on page 384).
3. Select **Utilities**. The Utilities screen displays.
4. Select **Calibrate Touch Screen**.
5. Click **Run Utility**. The touch screen displays a series of calibration target points.
6. Touch each point as it displays with either the stylus or your finger to recalibrate the touch points on the screen.

   Note: Touch each point at a straight-on angle as close to the center of the target as possible.
7. When the calibration routine is complete, the Utilities screen redisplays.

CHAPTER 14

Maintaining the Drives

This chapter describes the common maintenance tasks for drives in the Spectra T120. See Chapter 13 – Maintaining the Library, beginning on page 378 for information about maintaining the library.

Topic	
Cleaning a Drive	page 403
Determine Whether Cleaning is Required	page 404
Prepare the Library for Drive Cleaning	page 405
Determine the Cleaning Method	page 406
Manually Cleaning a Drive	page 407
Track Cleaning Cartridge Use	page 409
Updating Drive Firmware	page 409
Prepare for the Update Process	page 411
Update Using ITDT	page 414
Update through Package Update	page 417
Update Using the Drive Firmware Update Wizard	page 426
Update Using the Update Drive Firmware Utility	page 429
Updating Drive Device Drivers	page 432
Adding or Replacing a Drive	page 433
Add a Drive to the Library	page 433
Replace a Drive	page 434

CLEANING A DRIVE

Overview Whenever a tape is loaded or unloaded, the read/write heads are physically cleaned by a brush located within the drive. However, after reading and writing a large amount of data (the exact amount varies by drive type and generation) or if read or write errors occur, the drive requests to be cleaned with a cleaning cartridge. The request is made by sending a Tape Alert message to the host, and displaying a **C** on the SCD The notification is also posted to the library's Drive Details screen (Figure 236 on page 405) and the DLM drive health icon for the drive changes to yellow (see Using the Drive Health Icons on page 283 for additional information).

Using drives with dirty heads can reduce drive performance, decrease usable tape capacity, and result in read/write failures which eventually interrupt data storage.

If you have Auto Drive Clean enabled and the drive is in a partition with an associated cleaning partition, these cleanings are performed automatically. See Creating a Cleaning Partition on page 154 for information about configuring a cleaning partition.

It may also be possible to configure the host software to automatically clean the drives, with a cleaning tape stored in the partition, when the software is notified that drive cleaning is necessary.

If no automatic cleaning process is configured, you must manually clean the drive. If you ignore a cleaning request for too long, the library generates a warning system message.

User Privilege Requirements When Auto Drive Clean is enabled for the storage partition and a cleaning cartridge is available in the cleaning partition, cleanings are performed automatically and do not require user intervention.

If Auto Drive Clean is not enabled, any user with operator privileges who is assigned to the partition and all users with superuser or administrator privileges can manually clean a drive without an associated cleaning partition by loading a cleaning cartridge into the E/E port and using the Inventory screen to manually move the cleaning cartridge to the drive (see No Cleaning Partition Present on page 408).

Only a user with superuser or administrator privileges can move a cleaning cartridge stored in the partition using the BlueScale web interface (RLC).

See Configuring Library Users on page 80 for information about the three types of user groups and what types of privileges each has.

Determine Whether Cleaning is Required

Clean a drive when any of the following occurs:

- The drive indicates that it needs cleaning (see Chapter 12 – Drive Troubleshooting, beginning on page 346) by sending a message to the storage management software.
- The SCD information on the Drive Details screen for an LTO drive displays a **C**.
- The Cleaning Status on the Drive Details screen indicates that the drive requires cleaning (see Figure 236 on page 405).

  Note: In order for the library to monitor a drive's status, the drive must be configured in a partition.

Use the following steps to use the Drives screen to determine whether a drive requires cleaning.

1. Log into the library as a user with superuser or administrator privileges.
2. Select **Configuration** ···⁘ **Drives** or **Configuration** ···⁘ **DLM** if MLM is enabled. The Drives screen displays.

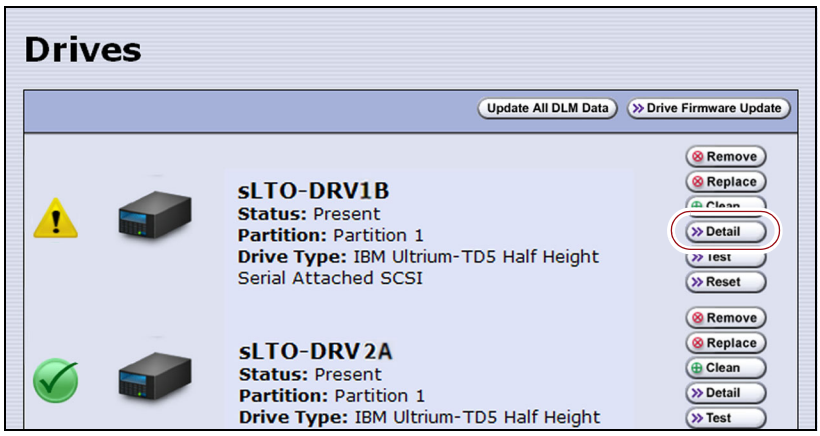


Figure 235 Click **Detail** on the Drives screen.

3. Click **Detail** next to the drive you want to check. The Drive Details screen displays.

   If the Cleaning Status displays **Drive Cleaning Required**, clean the drive as described in the following sections.

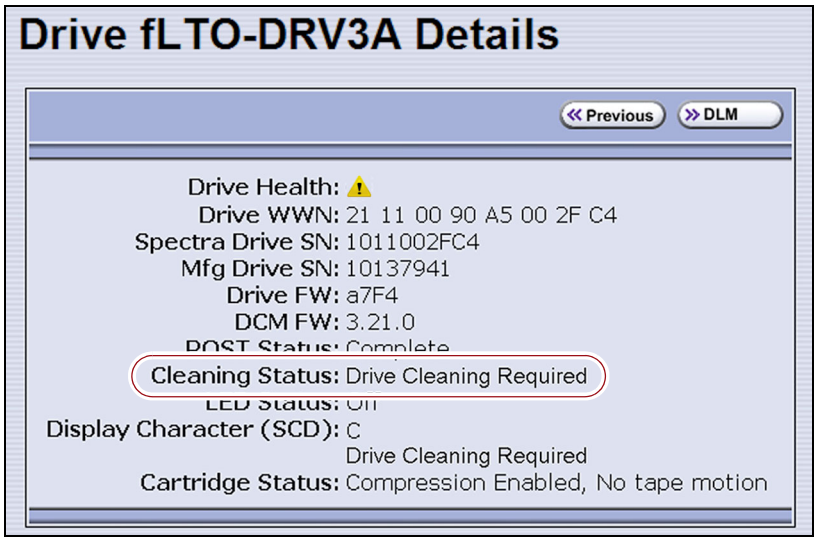


Figure 236 The Drive Details screen, cleaning required.

Prepare the Library for Drive Cleaning

Before you can clean the drive, you must address the following requirements:

Required Tools and Materials You must have a cleaning cartridge for the type of drive(s) that need to be cleaned. Cleaning cartridges can be purchased from Spectra Logic. If the cartridge has a barcode label, be sure to note the barcode, including any leading zeros. This information helps you locate the cleaning cartridge after it is loaded into the library.

Caution

Using only Spectra Certified cleaning cartridges to clean your drives is highly recommended. For information on ordering these cartridges, see Media and Media Accessories on page 456.

Carefully follow all instructions and recommendations provided with the cleaning cartridge. Do not rewind and reuse the material in a cleaning cartridge. Reusing the material may redistribute contaminants previously removed from the tape path. If all of the cleaning material is used, discard the cartridge and use a new cleaning cartridge.

Continuing Backups A drive is unavailable for use while it is being cleaned. However, the library's other drives remain available for use.

Determine the Cleaning Method

The method you use to clean the drive depends on the following factors:

If...	Then...
Auto Drive Clean is enabled and a cleaning partition is associated with the storage partition,	The library automatically cleans the drives, including any Global Spares, as needed. See Chapter 6 – Partition Management, beginning on page 147 for information about configuring a cleaning partition and associating it with one or more storage partitions. You can also clean the drive manually using a cleaning cartridge in the cleaning partition (see Cleaning Partition Present on page 407).
A cleaning partition is not associated with the storage partition; your software package includes features that allow for scheduled drive cleanings,	Use your storage management software to perform regularly scheduled drive cleanings. Refer to your storage management software user manual or vendor for instructions on how to set up scheduled automatic cleanings. You may choose to leave a cleaning cartridge in each storage partition, particularly if you can configure your storage management software to perform regular automated cleanings. **CAUTION!** Make sure that the cleaning cartridge has a barcode label. Your software must be able to identify the cleaning cartridge and use it only for cleaning drives. Any attempts to use a cleaning cartridge for data storage causes backup failures.
A cleaning partition is not associated with the storage partition and your software package does not have features that allow for scheduled drive cleanings,	Import a cleaning cartridge into the partition and clean the drive manually as described in No Cleaning Partition Present on page 408. You may choose to leave a cleaning cartridge in each storage partition so that it is available whenever you need it. **CAUTION!** Make sure that the cleaning cartridge has a barcode label. Your software must be able to identify the cleaning cartridge and use it only for cleaning drives. Any attempts to use a cleaning cartridge for data storage causes backup failures.
A Global Spare drive requires cleaning and a cleaning partition is not present,	Prepare and clean the drive as follows: **1.** Pause the PostScan operation if it is using the Global Spare drive that needs cleaning (see Pause the PostScan Process on page 265). **2.** Temporarily substitute the Global Spare drive for a drive in a partition that is associated with the Global Spare drive (see Use the Global Spare Drive on page 349). **3.** Clean the drive manually (see No Cleaning Partition Present on page 408). **4.** Reclaim the Global Spare drive so that it is again available for use as a spare (see Undo the Global Spare Drive on page 352).

Manually Cleaning a Drive

The process for loading a cleaning cartridge into the drive depends on whether or not a cleaning partition is associated with the storage partition containing the drive you need to clean.

Cleaning Partition Present

If a cleaning partition is present and contains a cleaning cartridge, you can use the **Clean** feature on the Drives screen to manually clean a drive. See Creating a Cleaning Partition on page 154 for information about configuring a cleaning partition.

1. Log into the library as a user with superuser or administrator privileges or an operator assigned to the partition.
2. If necessary, import a cleaning cartridge into the cleaning partition (see Import a Cartridge into a Specific Slot on page 208).
3. Select **Configuration** ···⁘ **Drives** or **Configuration** ···⁘ **DLM** if MLM is enabled. The Drives screen displays.

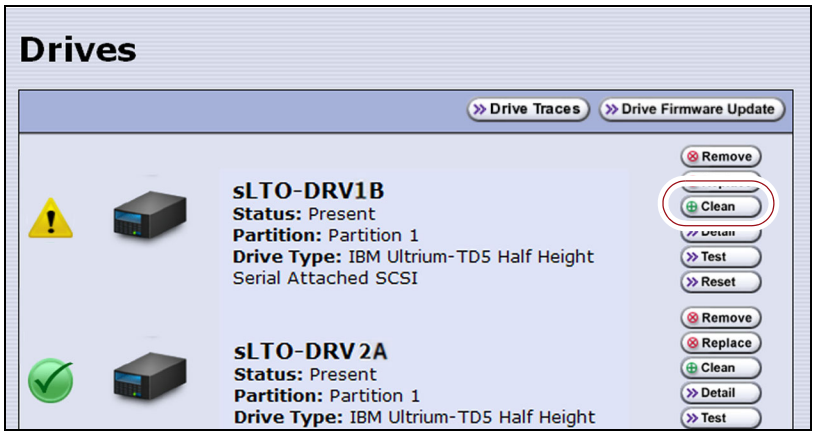


Figure 237 The Drives screen.

4. Click **Clean** next to the drive that needs cleaning.

   The library retrieves a cleaning cartridge from the cleaning partition and inserts it into the drive. The Drive Cleaning Progress screen displays while the cleaning is in progress.

5. When the cleaning is complete, the library returns the cleaning cartridge to the cleaning partition and displays a status message.

   If the cleaning cartridge is MLM-enabled, the cartridge health and Cleans Remaining are updated in the MLM database.

No Cleaning Partition Present

If a cleaning partition is not associated with the storage partition containing the drive you need to clean, a cleaning cartridge must be present in either the storage partition or the E/E port. If you do not permanently store a cleaning cartridge in the storage partition or the E/E port, you must import one in order to clean a drive.

Use the following steps to clean the drive.

1. Log into the library.
2. Locate a cleaning cartridge, using its barcode label information to determine its location, as described in Locating a Specific Cartridge on page 222.

   If necessary, load a cleaning cartridge into the E/E port, making sure that it is correctly oriented.
3. Move the cleaning cartridge to the drive needing cleaning, as described in Moving Cartridges Within a Partition on page 223.

   The drive automatically performs the cleaning, which takes approximately one minute, and ejects the cartridge when finished.
4. Move the cleaning cartridge from the drive back to the slot from which it came.
5. Check the Drive Details screen to confirm that the cleaning was successful.

   If the cleaning cartridge is expired, the drive automatically ejects the cartridge and does not perform the cleaning. The Drive Details screen still indicates that the drive needs cleaning. If so, perform the following steps:

   a. Export the expired cleaning cartridge.
   b. Import an unexpired cleaning cartridge.
   c. Repeat Step 3 through Step 5 to clean the drive.
6. If you have additional drives to clean, repeat Step 3 through Step 5 for each drive.
7. If you do not store the cleaning cartridge in the library, export the cartridge, as described in Export Specific Cartridges from the Library on page 210.
8. Make sure that you track the number of times the cleaning cartridge is used (see Track Cleaning Cartridge Use).

   Note: If you used an MLM-enabled LTO cleaning cartridge, the cartridge usage is tracked in the MLM database.

Track Cleaning Cartridge Use

Cleaning cartridges are valid for a minimum of 50 uses. If you enabled MLM and use MLM-enabled cleaning cartridges, the library tracks the number of cleanings remaining on the cartridge and notifies you when a cleaning cartridge is nearing the end of its useful life. See Chapter 8 – Configuring and Using Media Lifecycle Management, beginning on page 234 for detailed information about using MLM-enabled cleaning cartridges.

If you are not using a Spectra certified cleaning cartridge with MLM enabled in your library, Spectra Logic recommends marking the cleaning cartridge label after each use so that you know when it is near the end of its life cycle.

To purchase MLM-enabled Spectra Certified cleaning cartridges, contact your sales representative or visit the Spectra Logic website at www.spectralogic.com/shop.

UPDATING DRIVE FIRMWARE

Overview Whenever you update your library software, confirm that your drives are using the correct firmware version. Drive firmware updates are also occasionally required to resolve drive issues. When updated drive firmware is available, schedule a drive firmware update at your earliest convenience

The method you use to update the drives depends on the type of drives you are updating and your operating environment.

Notes:
- If Auto Download is configured (see Configure a Package Server on page 118) and a system message indicates that the library downloaded a new drive firmware package, use Update through Package Update on page 417 to install the firmware.
- If you cannot use any of the methods described in the following sections, contact Spectra Logic Technical Support for assistance (see Contacting Spectra Logic on page 7).

	LTO-2 through LTO-4	LTO-5 and Later Generations
IBM Tape Diagnostic Tool (ITDT) To use, install the ITDT utility on a Solaris, Linux, or Windows host connected to the drives to be updated. The update takes 1-2 minutes per drive.	Recommended	Recommended
Drive Update through Package Update Firmware stages in the background (with no impact to library operations) for up to 8 hours; then, when initiated by the user, the drives are updated in parallel. The actual update takes up to 30 minutes for all drives.	Not Recommended [a]	Available Recommended if you cannot use ITDT or if the firmware was auto downloaded.
Drive Firmware Update Wizard Requires one or more firmware update tapes. The update takes about 5 minutes per drive. Multiple drives can be updated in parallel if multiple firmware tapes are used.	Available	Available
Update Drive Firmware Utility Requires a firmware update tape. The update takes about 5 minutes per drive. Updates are performed serially.	Available	Available

a. Contact Technical Support before using this wizard to update LTO-2 through LTO-4 drives. These drives must remain empty and idle during the update, which may take up to 8 hours per drive.

User Privilege Requirements The user privileges required to perform a drive firmware update depend on the method used.

- **ITDT**—Any user with permissions to use the host computer on which ITDT is installed.
- **Drive Update through Package Update**—Only a library user with superuser or administrator privileges.
- **Drive Firmware Update wizard**—Only a library user with superuser or administrator privileges.
- **Drive Update Firmware utility**—Only a library user with superuser or administrator privileges.

Important Always download drive firmware from the Spectra Logic Technical Support portal to ensure that the latest firmware posted by the drive manufacturer was qualified by Spectra Logic.

Important After the drive firmware update is complete, you may need to reset the hosts accessing the drives.

Important Some operating environments require you to install device drivers before the application software can correctly communicate with the drives. When you update the drive firmware, you may also need to update the device driver for the drive (see Updating Drive Device Drivers on page 432 for further instructions).

Important DO NOT downgrade the firmware on a drive unless specifically instructed to do so by Spectra Logic Technical Support.

Important If you update a drive to firmware level D2A0 through D2A5, you may need to manually reboot the drive at the end of the update process. If you update multiple drives, you can save time by rebooting the library instead of each individual drive.

Prepare for the Update Process

Before you begin the update procedure, make sure you fulfill the prerequisites described in this section.

Determine the Drive Generation and Firmware Version

Use the following steps to determine the generation and current firmware version for each drive you plan to update.

1. Log into the library as a user with superuser or administrator privileges.
2. Select **Configuration ···⁘ Drives**—OR—**Configuration ···⁘ DLM** to view a list of all the drives currently installed in the library.

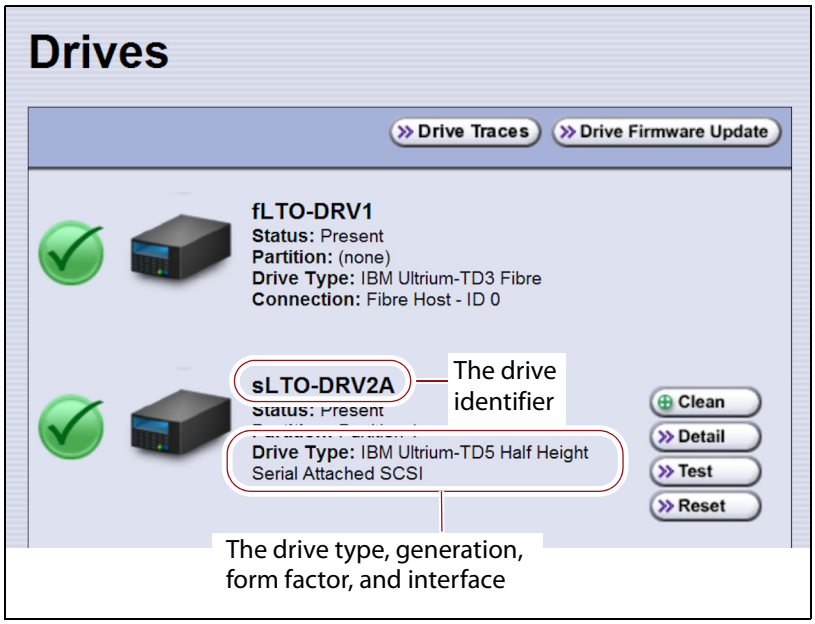


Figure 238 Determine the drive type, generation, form factor, and interface.

3. For each drive, make a note of the following information:

   Note: If the library contains many drives, it may be easier to use the `drivelist.xml?action=list` command to obtain this information. See the *Spectra Tape Libraries XML Command Reference* for more information.

   - **Drive type and generation**—LTO-2 and later generation drives are listed as IBM Ultrium-TD***n***, where ***n*** is the generation.
   - **Form factor**—Full-height or half-height
   - **Interface**—

     This is listed as **[type]**LTO in the drive identifier, where [type] is:

     - f = Fibre Channel
     - s = SAS
     - (blank) = SCSI

     The interface is also shown as the last part of the Drive Type descriptor.

4. For each drive, click **Detail** to view information about the current status of the selected drive, including its firmware version.

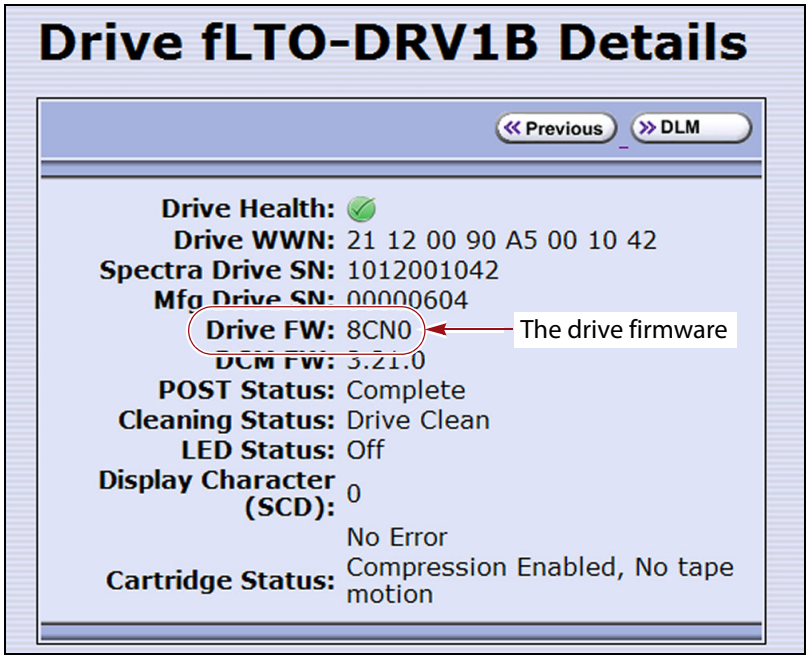


Figure 239 Locate the drive firmware version on the Drive Details screen.

5. Make a note of the firmware version the drive is currently using.

Determine Whether an Update is Available

Use the Spectra Logic Technical Support portal to check the currently recommended firmware version for the drives in your library and download updated firmware if it is available.

Important Always download drive firmware from the Spectra Logic Technical Support portal to ensure that the firmware was qualified by Spectra Logic.

1. Log into your account on the Technical Support portal at support.spectralogic.com.

   Note: See Accessing the Technical Support Portal on page 435 for information about accessing the Technical Support portal and setting up an account associated with your library.

2. Select **Downloads ⋯⁘ Tape Drive Firmware**.

3. On the Tape Drive Firmware page, locate the appropriate drive firmware with respect to drive type (LTO) and generation (for example, LTO-4) and then interface type (SCSI or Fibre) and form factor (full-height or half-height).

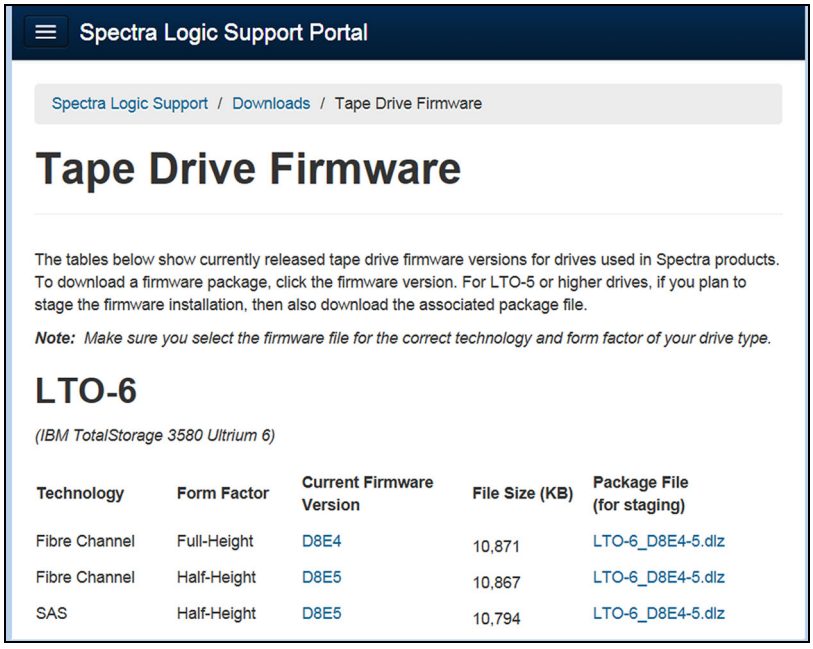


Figure 240 A portion of the Tape Drive Firmware page.

4. Compare the recommended drive firmware version for each of the drives in your library with the version currently in use (see Determine the Drive Generation and Firmware Version on page 412).

Update Using ITDT

The easiest way to update your LTO tape drive firmware is with the IBM Tape Diagnostic Tool (ITDT).

Note: If your operating system is not supported by ITDT, or you cannot use ITDT in your environment, choose another firmware update method:

- Update through Package Update on page 417
- Update Using the Drive Firmware Update Wizard on page 426
- Update Using the Update Drive Firmware Utility on page 429

After you check the firmware on the Technical Support portal for the currently recommended firmware version (see Determine Whether an Update is Available on page 413), follow the instructions in this section to update your drive firmware using ITDT.

Download and Install ITDT

Download ITDT and its related documentation directly from IBM's Fix Central website. For information about navigating IBM's website and downloading the version of ITDT that is appropriate for your operating system, log on to the portal (see Accessing the Technical Support Portal on page 435), open the Knowledge Base, and search for KBA-01768, *Downloading and installing ITDT (IBM Tape Diagnostic Tool).*

Important Use the latest version of ITDT to update the latest generation of drives.

Use the following steps to download and install ITDT on a computer that is connected to the same Fibre Channel arbitrated loop or fabric as the drives in the library.

1. Log into IBM's website (https://www-945.ibm.com/support/fixcentral/), using your individual IBM ID.
2. Select the **Select product** tab.
3. Select the following options:

- **Product Group** = System Storage
- **Select from System Storage** = Tape systems
- **Select from Tape Systems** = Tape drivers and software
- **Select from Tape drivers and software** = IBM Tape Diagnostic Tool (ITDT)
- **Platform** = Select your operating system from the drop-down list and click **Continue**.

4. On the next page, select the version of ITDT that you want to download. If desired, you can select multiple versions.

   Note: If you are unsure which version to select, click **Show Fix Details** to see additional information.

5. Click **Continue.** If you did not log into the website yet, it prompts you to do so now.
6. Choose one of the following methods to download the selected ITDT installation files:

   - **Download using your browser (HTTP)**
   - **Download using bulk FTP**
   - **Download using Download Director**

7. Refer to the ITDT documentation for information about using ITDT. Contact Spectra Logic Technical Support if you need assistance (see Contacting Spectra Logic on page 7).

Download the Drive Firmware

1. After installing ITDT, launch the program so that it creates the **Input** and **Output** folders required during the firmware update process.
2. Log into your account on the Spectra Logic Technical Support portal at support.spectralogic.com.
3. Select **Downloads ⋯⁘ Tape Drive Firmware**.
4. On the Tape Drive Firmware page (see Figure 240 on page 414), locate the appropriate drive firmware with respect to drive type (LTO) and generation (for example, LTO-4), interface type (SCSI or Fibre), and form factor (full-height or half-height).
5. Click the firmware version name in the column labeled **Current Firmware Version**.

   Note: The link in the column labeled **Package File (For Staging)** is for using Package Update to update the drive firmware (see Update through Package Update on page 417) do not select this file if you are updating drive firmware using ITDT.
6. Use your web browser to save the file to the ITDT **Input** folder on the computer where ITDT is installed.

Discontinue Background Operations

You cannot update drive firmware if the library is actively running any background operations, including Media Auto Discovery, PreScan, and PostScan.

If you do not want to wait for a Media Auto Discovery, PreScan, or PostScan operation to complete, you can stop the Media Auto Discovery or PreScan operation, or pause the PostScan operation. For other background operations, you must wait for the process to complete.

- Click **Stop Discovery** on the Media Lifecycle Management Tools screen to stop a Media Auto Discovery or PreScan operation (see Stop the Discovery Process on page 256).
- Click **Pause PostScan** on the Media Lifecycle Management Tools screen to pause the PostScan operation for one hour (see Pause the PostScan Process on page 265).

Discontinue Backups and Empty the Drives

Before beginning the drive firmware update process, discontinue all backup operations and remove any cartridges from the drives.

Caution Attempting to update the firmware while the library is busy or when the drives contain tapes may result in the update failing, failed backup jobs, or permanent damage to the drives. If you did not already do so, stop all backup operations and remove all tapes from the drives you are updating.

- If possible, use your storage management software to move any cartridges that are currently in drives back to their storage locations.
- If you cannot use your storage management software, then move the cartridges as described in Moving Cartridges Within a Partition on page 223.

Update Drives Using ITDT

1. Follow the instructions in the ITDT documentation to update the drive firmware.
2. Reset the updated drives to restore their configuration settings.
3. After the update is complete, use your storage management software to restart any backup processes.

Update through Package Update

Important Your library must either be under warranty or you must have a current service contract with Spectra Logic Technical Support before you can update the drive firmware using Package Update. The BlueScale Software Service key associated with your service contract must be entered into the System Configuration screen before you can use Package Update.

- If you have questions about your service agreement, contact Technical Support (see Contacting Spectra Logic on page 7).
- For instructions on how to renew and enter your BlueScale Software Support key, refer to Service Contract Extension on page 458.

Drive firmware is downloaded and staged to each drive as a background process. The firmware staging process takes up to 8 hours for LTO -5 and later generations drives. This does not affect library operation. The update is then applied to all selected drives in parallel. This takes between 15 and 30 minutes, during which time the drives must be empty and idle.

Requirements

- The library must be running BlueScale12.3.1 or later generation software.
- The drives must be LTO-5 and later generation drives.

  Note: Contact Technical Support before using this wizard to update LTO-3 or LTO-4 drives. These drive types must remain empty and idle during the entire update, which may take up to 8 hours per drive.
- The drives to update must be configured in a storage partition.
- To update the firmware of a Global Spare, first substitute the Global Spare drive for a drive assigned to a partition. After the Global Spare drive completes the firmware update process, it can be removed from the partition and returned to the pool of spare drives (see Use the Global Spare Drive on page 349 for more information).

Download the Drive Firmware

If your library has Internet access, you can download the drive firmware update directly from the Spectra Logic package server. The drive firmware package is downloaded during the update process, and does not need to be downloaded beforehand.

— OR —

Download the recommended drive firmware from the Spectra Logic Technical Support portal, and save it to a USB device or a package server.

1. Connect to the Spectra Logic Technical Support portal.
2. Select **Downloads ⋯⁘ Tape Drive Firmware**.
3. On the Tape Drive Firmware page (see Figure 240 on page 414), locate the appropriate drive firmware with respect to drive type (LTO) and generation (for example, LTO-4), interface type (SCSI or Fibre), and form factor (full-height or half-height).
4. Click the firmware version name in the column labeled **Package File (For Staging)**.

   Notes:
   - The link in the column labeled **Current Firmware Version** is for updating the drive firmware using ITDT (Update Using ITDT on page 414) do not select this file if you are updating drive firmware using Package Update.
   - If you are updating a library running BlueScale12.7.03 or later, select a package ending with the letter “s”, which indicates a digitally signed package. If you are updating a library running a BlueScale version prior to 12.7.03, select a package ending with the letter “z”, which indicates an unsigned zip p

5. Use your web browser's download features to save the file to one of the following locations:
   - The root directory of a USB device.

   Notes:
   - The library only recognizes FAT-formatted, not NTFS-formatted, USB devices.
   - Not all USB devices are compatible with the library. If you are unable to access a USB device from the library, remove it and use a different one.
   - Do not unzip the downloaded file.

   —OR—

   - A previously configured package server.

   Note: The package server option is only available if you previously configured a package server. Refer to Configure a Package Server on page 118 for more information.

Stage the Firmware

1. Log into the library as a user with superuser or administrator privileges.
2. If you downloaded the drive firmware package to a USB device, connect the USB device to the LCM and allow time for the device to mount **before** continuing.
3. Select **Maintenance** ⋯ **Package Update** to display the Package Update screen.
4. Click **Begin Drive Update**.

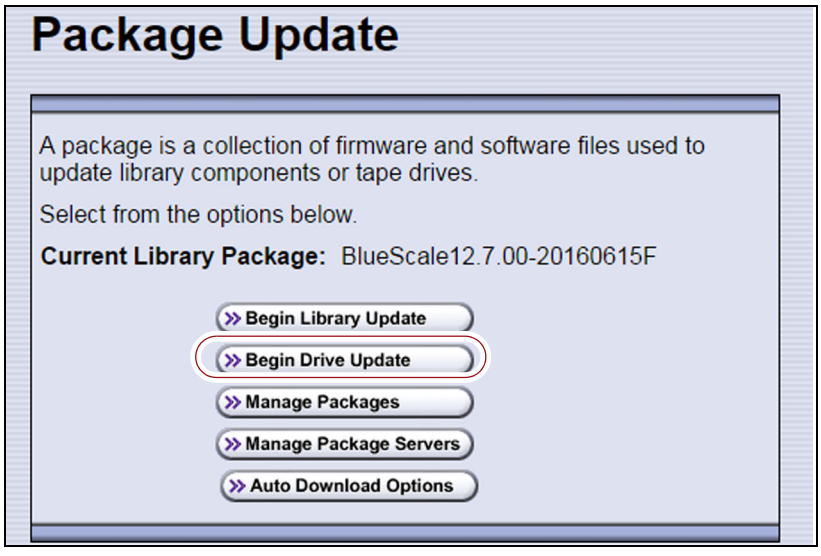


Figure 241 The Package Update screen.

5. If the License Agreement screen displays, read the license agreement, then click **Accept**.

   Note: If you decline the agreement, you are not able to update the drive firmware using this method.

6. The Select Package screen lists the filenames for the firmware update packages.



Figure 242 Select the package for the drive firmware update.

7. Select the firmware package.

   Note: If the package does NOT display in the USB or Package server section, you may have downloaded the wrong signed/unsigned package type.

Update packages may be found on the sources described in the table below. Each drive firmware package contains firmware for only one drive generation.

Source	Description
Spectra Logic	Select and download the desired drive firmware package from Spectra Logic's package server to the memory card in the LCM. **Notes:** ▪ The library must have a connection to the Internet before you can use this option (see Configure Network Settings on page 96 for instructions for configuring network settings). ▪ If directed to do so by Spectra Logic Technical Support, update the IP address and package directory for the Spectra Logic package server (see Configure a Package Server on page 118 for more information about configuring a package server).
Configured Package Server (server name varies)	Select the desired drive firmware package stored on a previously configured package server, if you have one available. **Note:** This option is only available if you previously configured a package server. (See Configure a Package Server on page 118 for instructions for configuring a package server).
Memory Card	Select the desired drive firmware package from packages already stored on the memory card in the LCM.
USB Device	Select the desired drive firmware package from packages stored on a USB device. There is a brief delay while the library accesses the USB device when you select this option. **Notes:** ▪ The **USB Device** option is only available if you connected a USB device containing the update package in Step 2 on page 419. ▪ The update package must be stored in the root directory of the USB device.

8. Click **Next**. The Drive Staging Details screen displays.

9. On the Drive Staging Details screen, each drive displays either in the Update or Unchanged section, depending on whether the drive firmware in the update package is different from the drive's current firmware.

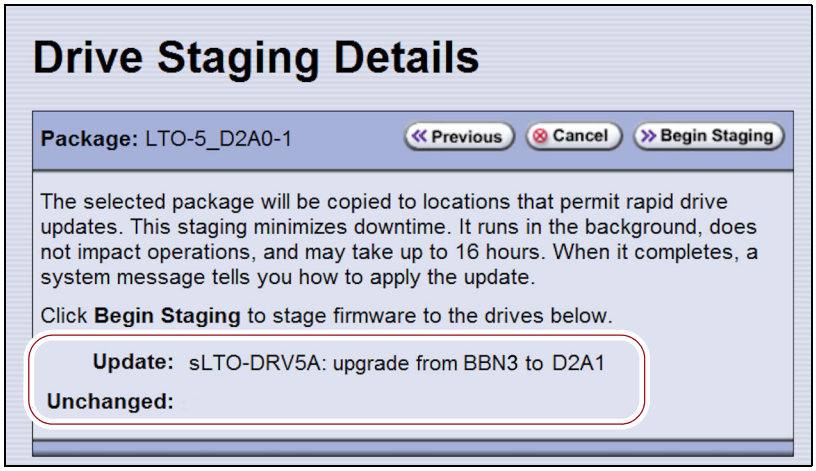


Figure 243 The Drive Staging Details screen.

Notes:
- Depending on the location of the file, there may be a few minutes of delay before the information displays.
- If no installed drives match the selected firmware, the Drive Package Details screen displays, instead of the Drive Staging Details screen.

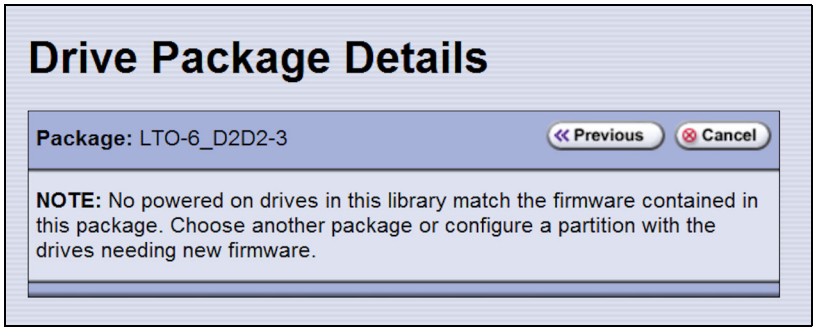


Figure 244 The Drive Package Details screen.

10. Click **Begin Staging**. The Package Update Results screen displays.

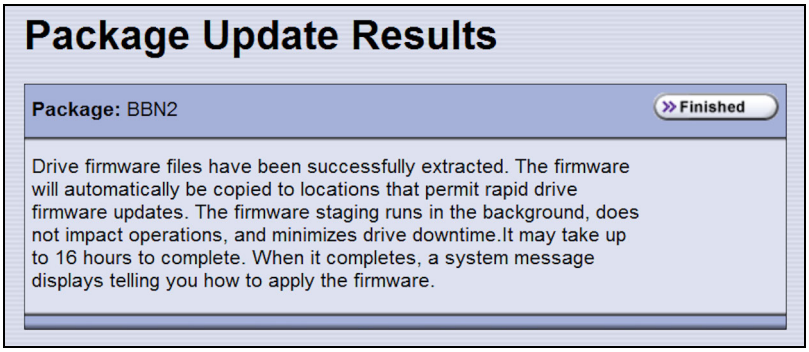


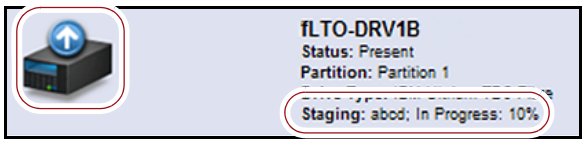
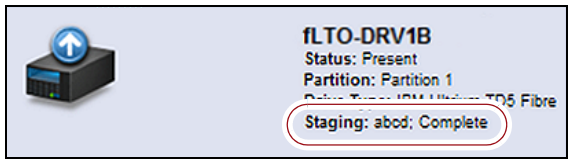
Figure 245 The Package Update Results screen.

All drives that require an update begin staging automatically. This can take up to eight hours for LTO drives.

Notes:
- Staging only prepares the drive for the update process. After staging is complete, you can choose which drives to update in Step on page 425.
- There may be a few minutes of delay before the Package Update Results screen displays.

11. Click **Finished** on the Package Update Results screen. The firmware staging runs in the background, allowing the library to perform other tasks.

The Drives screen displays the staging status while the process is active.

The Drives screen displays...	when...
	The drive firmware is staging to the drive. The drive icon changes to the staging drive icon, and the staging status line displays. **Note:** A Global Spare icon does not change to the Drive Staging icon while firmware is staging to it. However, the staging status line displays.
	The drive firmware is finished staging to the drive, and is available to be used to update the drive.

12. When the staging process completes, a system message displays.

Note: If there are any failures in staging the firmware to the drives, a system message informs you of the failure. Follow the remedy instructions on the system message and then reset the drive to restart the staging process.

Discontinue Background Operations

You cannot update drive firmware if the library is actively running any background operations, including Media Auto Discovery, PreScan, and PostScan.

If you do not want to wait for a Media Auto Discovery, PreScan, or PostScan operation to complete, you can stop the Media Auto Discovery or PreScan operation or pause the PostScan operation. For other background operations, wait for the process to complete.

- Click **Stop Discovery** on the Media Lifecycle Management Tools screen to stop a Media Auto Discovery or PreScan operation (see Stop the Discovery Process on page 256).
- Click **Pause PostScan** on the Media Lifecycle Management Tools screen to pause the PostScan operation for one hour (see Pause the PostScan Process on page 265).

Discontinue Backups and Empty the Drives

Before applying the drive firmware update, discontinue all backup operations and remove any cartridges from the drives.

Caution

Attempting to update the firmware while the library is busy or when the drives contain tapes may result in the update failing, failed backup jobs, or permanent damage to the drives. If you did not already do so, stop all backup operations and remove all tapes from the drives you are updating.

- If possible, use your storage management software to move any cartridges that are currently in drives back to their storage locations.
- If you cannot use your storage management software, then move the cartridges as described in Moving Cartridges Within a Partition on page 223.

Apply the Update

1. On the Drives screen, click **Staged Drive Firmware Update**. The Staged Drive Firmware Update screen displays.

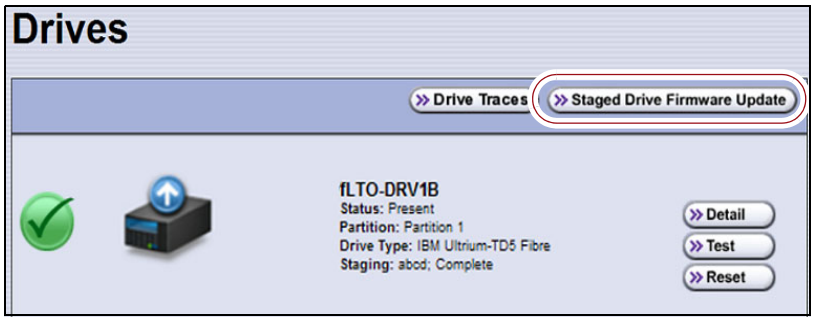


Figure 246 Click **Staged Drive Firmware Update**.

Select or clear each drive's check box to indicate whether or not to update the drive.

If a drive is not empty, it is still included in this list; however, its check box is disabled, with a note indicating that a tape is loaded in the drive.

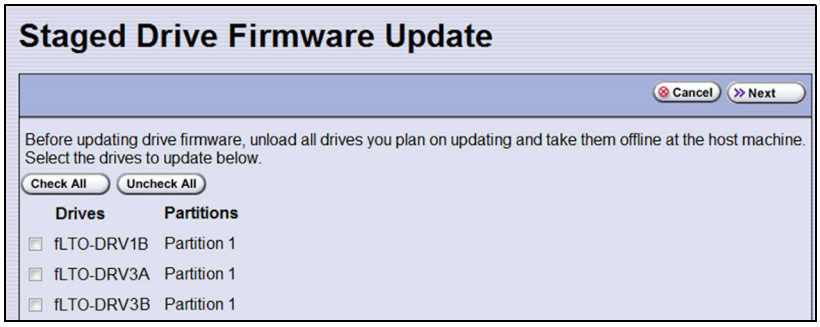
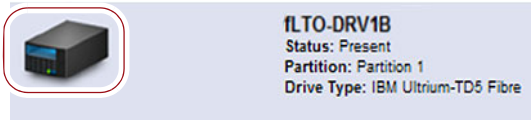


Figure 247 Select the drives to update.

2. Click **Next**. The drive firmware update process begins updating the selected drives in parallel. A progress screen displays until the process completes, in approximately 15 to 30 minutes.

The Drives screen displays...	when...
	The library starts the firmware update process. The staging status line changes to "Committing".
	The drive firmware update process is complete. The staging drive icon changes back to the drive icon, and the staging status line disappears.

3. After the drive firmware update completes, the Staged Firmware Update Result screen displays the results of the update process.

   Click **OK** to return to the Drives screen.

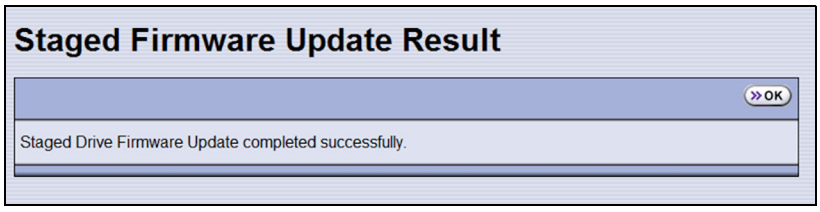


Figure 248 Click **OK** to return to the Drives screen.

4. After the update is complete, use your storage management software to restart any backup processes.

Update Using the Drive Firmware Update Wizard

The Drive Firmware Update wizard lets you use one or more firmware tapes to update multiple drives within a partition, without interrupting normal library operations in other partitions. The updates are performed as a background operation whenever the library determines that one of the drives selected for update is empty. However, the drives that are selected to be updated need to be offline to the host.

Note: You cannot use a Global Spare drive to replace a failed drive while the library is actively running the Drive Firmware Update wizard.

Requirements

- DLM must be enabled (see Enabling DLM on page 280).

  Note: Enabling MLM automatically enables DLM.
- The drives to be updated must be configured in a storage partition.
- The drives to be updated must be offline to the host.
- The firmware update tape must be in the entry/exit port.
- The drives are updated one partition at a time.
- To update the firmware of a Global Spare, first substitute the Global Spare drive for a drive assigned to a partition. After the Global Spare drive completes the firmware update process, it can be removed from the partition and returned to the pool of spare drives (see Use the Global Spare Drive on page 349 for more information).

Discontinue Backups and Empty the Drives

Before beginning the drive firmware update process, you must discontinue all backup operations and remove any cartridges from the drives you are updating.

Caution

Attempting to update the firmware when the drives contain tapes may result in the upgrade failing, failed backup jobs, or permanent damage to the drives. If you did not already do so, stop all backup operations and remove all tapes from the drives you are updating.

- If possible, use your storage management software to move any cartridges that are currently in drives back to their storage locations.
- If you cannot use your storage management software, then move the cartridges as described in Moving Cartridges Within a Partition on page 223.

Perform the Update

1. Log into the library as a user with superuser or administrator privileges.
2. Import one or more firmware update tapes into the entry/exit port (see Import the Firmware Update Tapes on page 430.
3. Select **Configuration** ···⁘ **DLM** to display the Drives screen.

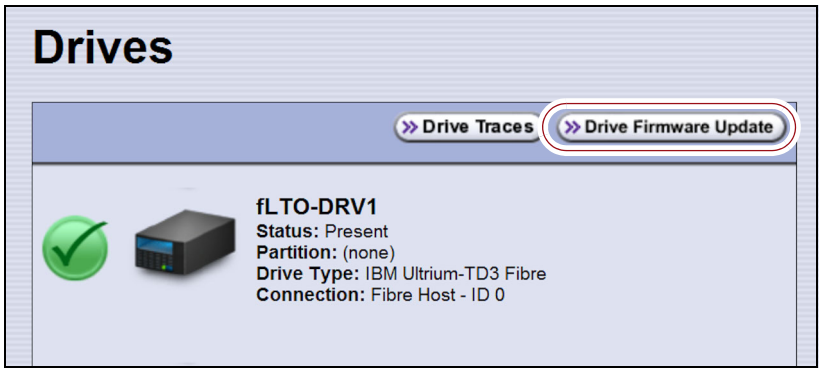


Figure 249 Click **Drive Firmware Update** on the Drives screen.

4. Click **Drive Firmware Update** to launch the update wizard. The Drive Firmware Update screen displays showing the information for the last partition that was viewed.
5. Select the partition containing the drives you want to update from the drop-down list, then click **Go**. The Drive Firmware Update screen refreshes to show the drives assigned to the selected partition.

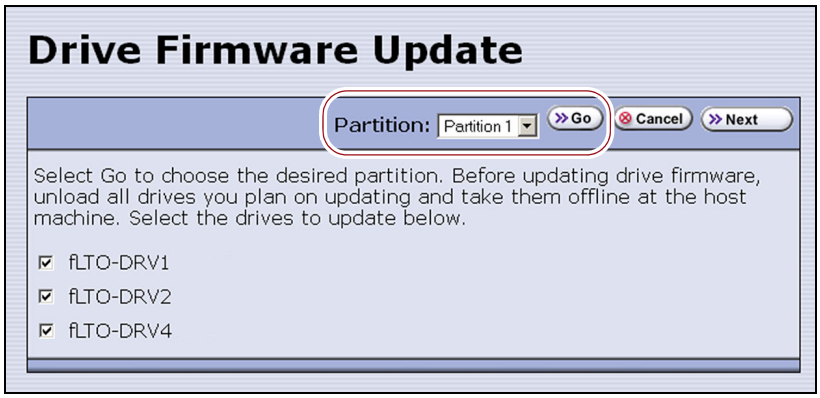


Figure 250 Select the partition for the drives you want to update.

6. Select the drives that you want to update.

Important If you have multiple drive generations in the same partition, make sure that you only select one generation at a time. Each drive generation uses different firmware.

7. Click **Next**. The Drive Firmware Update Tape Selection screen displays with a list of the cartridges currently in the entry/exit port. Select the firmware tapes you want to use for the update.

Important If you have firmware update tapes for multiple drive generations in the entry/exit port, make sure that you select the firmware update tapes that correspond to the generation of the drives you selected in Step 6 on page 427.

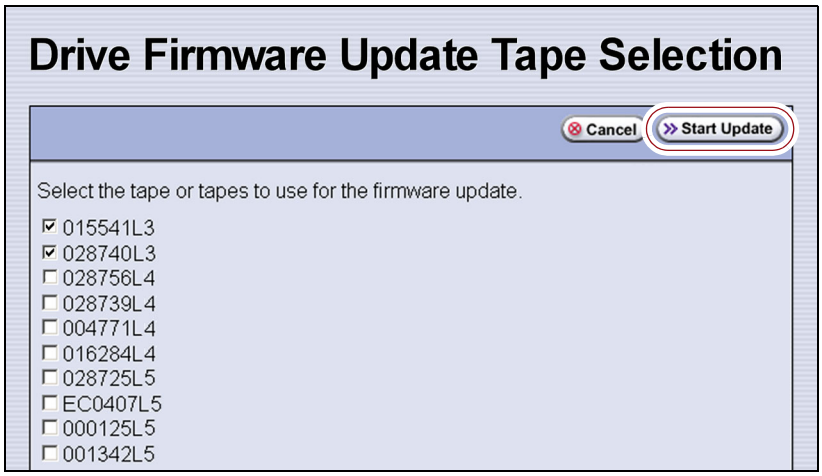


Figure 251 Select the firmware tapes you want to use for the update.

8. Click **Start Update** to begin the background operation to update the selected drives. The Drive Firmware Update screen refreshes to show that the update operation is running.

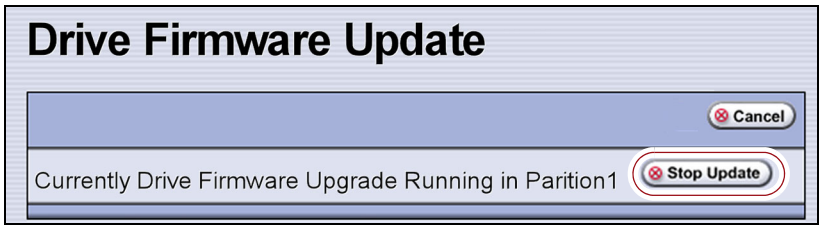


Figure 252 Drive Firmware Update screen showing an update running.

After each drive is updated, the library posts a system message indicating whether or not the update was successful.

Note: Once the update process begins, you cannot start any additional Drive Firmware Update operations until the currently running process either completes or is stopped.

9. If you need to change the library configuration, modify a partition, or make other changes that are restricted while background operations are running, click **Stop Update**. The library completes any updates that are currently in progress and then returns the firmware tape to the entry/exit port.
10. Use your storage management software to restart any backup processes.

Update Using the Update Drive Firmware Utility

The Update Drive Firmware utility uses a firmware tape to update a single drive or all of the drives in a single partition.

Requirements

- The drives to be updated must be configured in a storage partition.
- The firmware update tape must be in the entry/exit port.
- The drives are updated one partition at a time.
- To update the firmware of a Global Spare, first substitute the Global Spare drive for a drive assigned to a partition. After the Global Spare drive completes the firmware update process, it can be removed from the partition and returned to the pool of spare drives (see Use the Global Spare Drive on page 349 for more information).

Discontinue Background Operations

You cannot update drive firmware if the library is actively running any background operations, including Media Auto Discovery, PreScan, and PostScan.

If you do not want to wait for a Media Auto Discovery, PreScan, or PostScan operation to complete, you can stop the Media Auto Discovery or PreScan operation or pause the PostScan operation. For other background operations, wait for the process to complete.

- Click **Stop Discovery** on the Media Lifecycle Management Tools screen to stop a Media Auto Discovery or PreScan operation (see Stop the Discovery Process on page 256).
- Click **Pause PostScan** on the Media Lifecycle Management Tools screen to pause the PostScan operation for one hour (see Pause the PostScan Process on page 265).

Discontinue Backups and Empty the Drives

Before beginning the drive firmware update process, discontinue all backup operations and remove any cartridges from the drives.

Caution

Attempting to update the firmware while the library is busy or when the drives contain tapes may result in the update failing, failed backup jobs, or permanent damage to the drives. If you did not already do so, stop all backup operations and remove all tapes from the drives you are updating.

- If possible, use your storage management software to move any cartridges that are currently in drives back to their storage locations.
- If you cannot use your storage management software, then move the cartridges as described in Moving Cartridges Within a Partition on page 223.

Import the Firmware Update Tapes

1. Log into the library as a user with superuser or administrator privileges.
2. Insert a firmware update tape into the entry/exit port. Make a note of the barcode label on each cartridge so that you can identify it after it is imported.

   Note: If the cartridge is not labeled with a barcode, pay attention to which slot you use (slot 1 is the top slot; slot 8 is the bottom slot).

Perform the Update

1. From the toolbar menu, select **Maintenance** ⋯⁘ **Tools**. The Maintenance Tools screen displays.
2. Select **Utilities**. The Utilities screen displays.
3. Click **Show Advanced**. The Advanced Utilities Confirmation screen displays.
4. Click **Next**. The Utilities screen refreshes to show a list of the advanced utilities.
5. Scroll through the list of advanced utilities and select **Update Drive Firmware**. The screen refreshes to show the details for the utility.

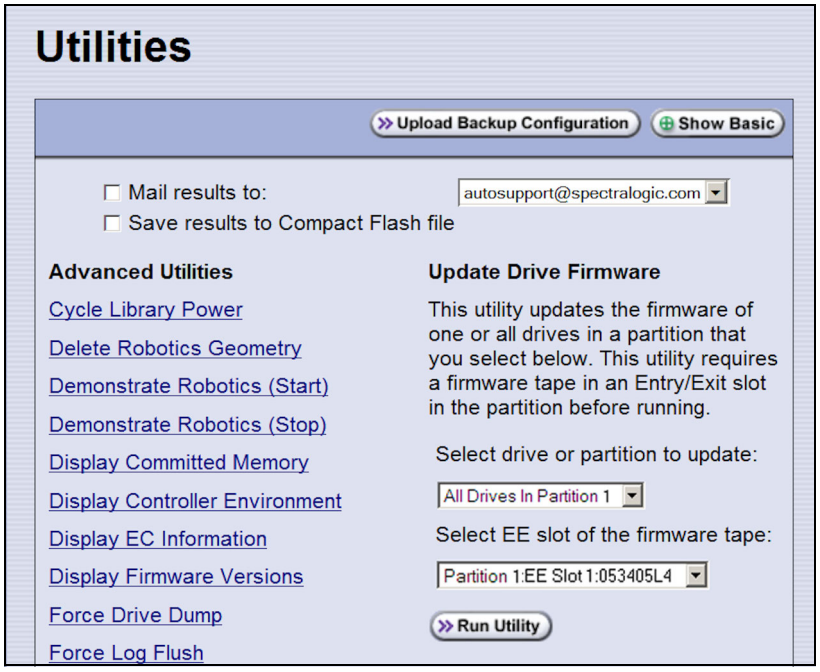


Figure 253 Select the drive to update and the location of the firmware tape.

6. Use the **Select drive or partition to update** drop-down list to select the drive(s) that you want to update. You can choose to:
   - Update all of the drives in a partition.

   –OR–

   - Update a single drive (selected by its BlueScale identifier).

   Note: Drives are identified according to their physical location in the library. For example: the component identifier for a SAS drive installed in the fourth half height drive bay from the top of the library is **sLTO-DRV4B**. See Drive Identifiers on page 45 for additional information about identifiers.
7. Use the **Select EE slot of the firmware tape** drop-down list to select the slot where the firmware update tape is located.
8. Click **Run Utility** to start the update process.

Important

- Once the firmware update process starts, it cannot be canceled.
- Do not power off the library or any component being updated during the firmware update process.
- If you use the wrong firmware tape or try to update a drive that is not compatible with the firmware tape, the update operation fails.

   - The library retrieves the firmware tape and inserts it into the drive. When the drive completes the update, it ejects the tape. The library then either returns the tape to the entry/exit pool or inserts it in the next drive to be updated.
   - A progress screen displays for the duration of the update. When completed, a Utility Results screen displays, showing the results of the update process.
9. Repeat the steps, as needed, for the remaining drives in the library.
10. Export the firmware update tape from the library (see Export Specific Cartridges from the Library on page 210) and store it for future use. You can use the tape to update the firmware in a replacement drive if it is at a lower firmware level.
11. Use your storage management software to restart backup processes.

UPDATING DRIVE DEVICE DRIVERS

Overview Some operating environments require you to install device drivers before the application software can correctly communicate with the drives. When you update the drive firmware, you may also need to update the device driver for the drive.

Use the following instructions to locate and download the IBM LTO drive device driver on the IBM Support Fix Central website.

Notes:
- You must have an IBM account to log in and download the drivers.
- You can connect to the Fix Central website either from the Spectra Logic Technical Support portal or directly at http://www.ibm.com/support/fixcentral. If you connect directly, skip to Step 5 in the following instructions.

1. Log into your account on the Technical Support portal at support.spectralogic.com

   Note: See Accessing the Technical Support Portal on page 435 for information about accessing the Technical Support portal.

2. Select **Downloads ⋯⁘ Device Drivers**.
3. On the Device Drivers page, click **IBM LTO-2, -3, -4, -5, -6, and -7 (IBM TotalStorage 3580 Ultrium 2, 3, 4, 5, 6, and 7)** to open IBM Fix Central in a new web page.
4. Click the **Select Product** tab.
5. Select the following options:
   - **Product Group** = System Storage
   - **Select from System Storage** = Tape systems
   - **Select from Tape Systems** = Tape drivers and software
   - **Select from Tape drivers and software** = Tape device drivers
   - **Platform** = Select your operating system from the drop-down list and click **Continue**.
6. Click **Continue** to display a list of the available drivers on the Select fixes page.
7. Click **Show Fix Details** to view information about each driver.
8. Select the driver you want to download and click **Continue**. If required by your IT department, select the WHQL certified driver, if available.
9. Complete the remaining pages to begin the download process.
10. Save the file containing the driver to a known location on the server that is using the drive.
11. Install the device driver following the instructions in the documentation for your operating environment.

ADDING OR REPLACING A DRIVE

Only use drives obtained from Spectra Logic in the library. When replacing a drive that is assigned to a partition, the new drive must be the same technology and generation as the one you replace.

Add a Drive to the Library

Important Adding drives to an existing partition can cause the library to reassign element addresses. To avoid errors, make sure that when you install a new drive, you reconfigure the element addresses your storage management software uses to access the drives (refer to your software documentation for instructions).

If your library has unused drive bays, you can purchase additional drives from Spectra Logic and add them to the library.

1. Log into the library as either a superuser or administrator.
2. Select **Configuration ···⁘ Drives** —OR—**Configuration ···⁘ DLM** to view a list of all the drives currently installed in the library.

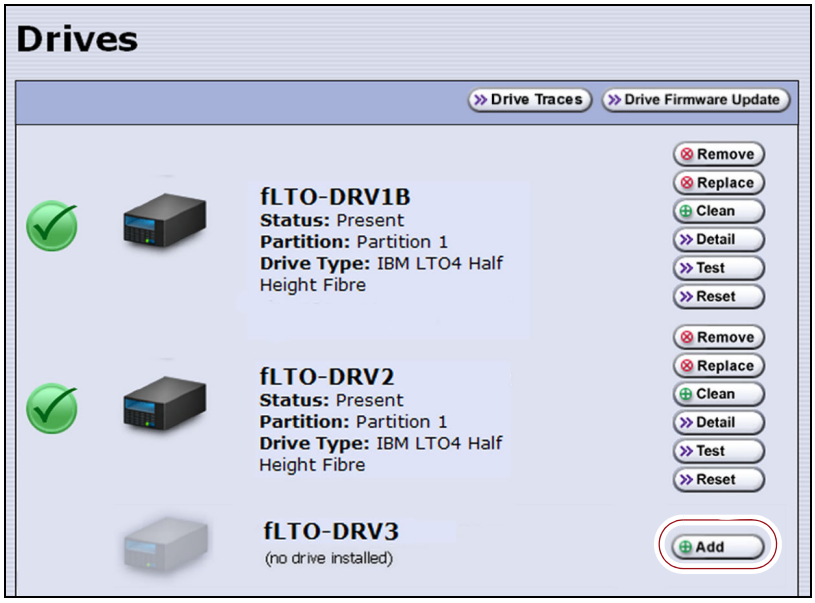


Figure 254 The Drives screen.

3. Click **Add** next to a drive location that does not have a drive installed.
4. Follow the *Spectra T200, T380, T680, T950, and TFinity Drive Installation or Replacement* procedure to install the drive.
5. If the drive has a Fibre Channel interface, connect it to an arbitrated loop or fabric where the hosts reside.
6. After you add the drive to the library, you must assign it to a partition or configure it as a Global Spare drive before you can use it. See Chapter 6 – Partition Management, beginning on page 147 for information about creating and modifying partitions.

Replace a Drive

To replace a drive that failed, follow the instructions in the *Spectra T120 Tape Drive Installation or Replacement*. If the drive has a Fibre Channel interface, connect it to an arbitrated loop or fabric where the hosts that use the drives reside.

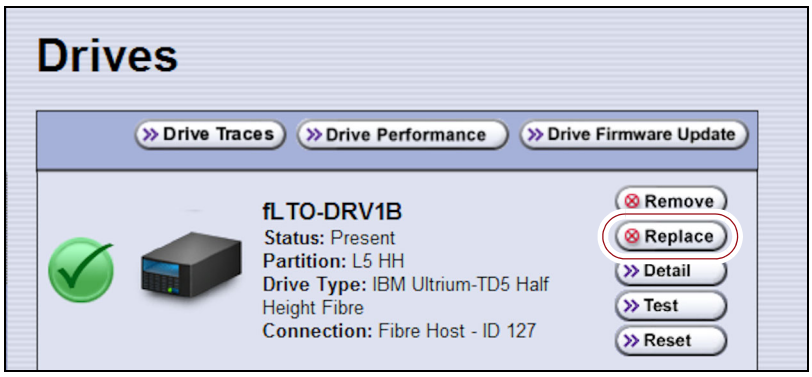


Figure 255 The Drives screen.

Important

Do not click **Remove**. This option removes the drive from the partition. When the replacement drive is installed, it is not assigned to the partition from which the malfunctioning drive was removed.

If you click **Remove** and the selected drive is the only drive in the partition, the partition is deleted.

After you replace the drive, do the following to resume operation:

- If you used the Global Spare option to temporarily replace the malfunctioning drive, you can now reclaim the Global Spare drive so that it is again available for use (see Undo the Global Spare Drive on page 352). The library automatically switches all incoming communications to the new drive.
- If you did not use the Global Spare option, use your storage management software to restart any backup processes that were running to the replaced drive. This restart ensures that the software recognizes the drive as working and available.

CHAPTER 15

Technical Support

Spectra Logic Technical Support provides a worldwide service and maintenance structure, refined over many years to provide timely, professional service.

Important A valid warranty or support contract is required in order to obtain technical support (see Service Contract Extension on page 458).

Topic	
Accessing the Technical Support Portal	this page
Create an Account	page 436
Log Into the Portal	page 437
Opening a Support Ticket	page 437
Returns	page 442

ACCESSING THE TECHNICAL SUPPORT PORTAL

The Spectra Logic Technical Support portal provides access to the Knowledge Base, the current version of BlueVision software for the library, drive firmware, drive device drivers, and additional service and support tools. You can also open or update a support incident.

Create an Account

Access to User Guides and compatibility matrices does not require you to create an account. You must create a user account and log in to access Release Notes or repair documents, to download the latest version of BlueVision software, or to open a support incident.

1. Access the Technical Support portal login page at support.spectralogic.com.
2. On the home page, click **Register Now**.

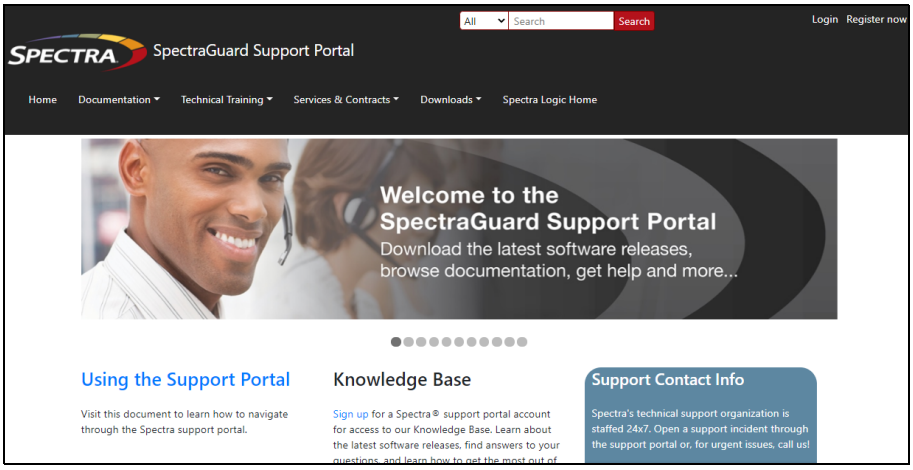


Figure 256 The Spectra Logic Technical Support portal home page.

3. Enter your registration information. Your account is automatically associated with the serial numbers of all Spectra Logic products owned by your site.
   - If you have an invitation, follow the link and enter the invitation code.

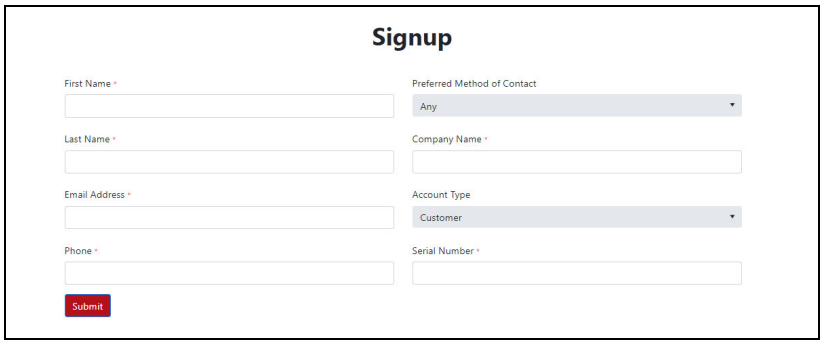


Figure 257 The Signup screen.

   - If you do not have an invitation, enter the requested information to create your account. When you are finished, click **Submit**.

When the account is approved, you receive an email with an initial password. Use your email address and the password provided in the email to log in to your account. After you log in, you can change your password if desired.

Log Into the Portal

Use your email address and password to log into the Technical Support Portal.

OPENING A SUPPORT TICKET

You can open a support incident using the Spectra Logic Technical Support portal or telephone.

- Use the following instructions to open a support incident through the portal, or skip to Contact Spectra Logic Technical Support by Phone on page 441.

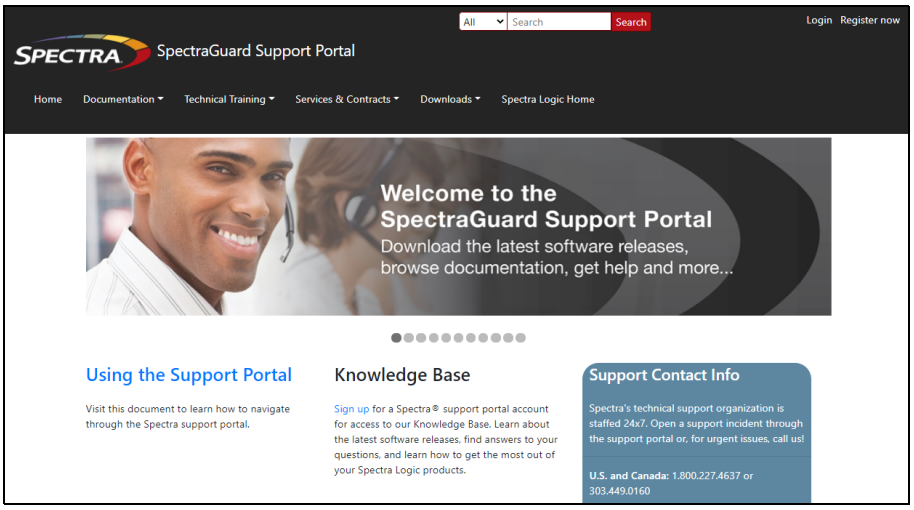


Figure 258 The Spectra Logic Technical Support portal home page.

1. Make notes about the problem, including what happened just before the problem occurred.
2. Gather the following information:
   - Your Spectra Logic customer number
   - Company name, contact name, phone number, and email address
   - The library serial number (see Determine the Library Serial Number on page 89)
   - Type of host system being used
   - Type and version of host operating system being used
   - Type and version of host storage management software being used
3. If necessary, log in to the Support Portal by clicking **Login**, enter your **email address** and **password**, and click **Log in**.

   Note: See Accessing the Technical Support Portal on page 435 if you have not previously created an account on the Technical Support portal.

4. Submit a support incident.

   - Use the following instructions to search for help before submitting a ticket, or skip to Submit an Incident Directly on page 440.

     a. From any page, select **Incident⋯⁘Incidents & Inventory**.

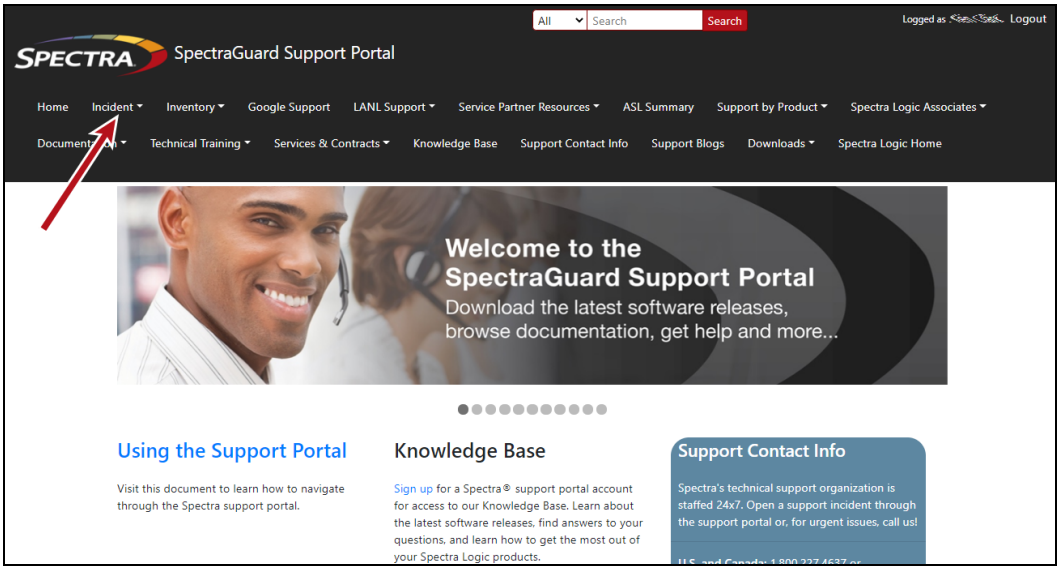


Figure 259 Select **Incidents⋯⁘Incidents & Inventory**.

     b. Select **Open or View Incidents**.

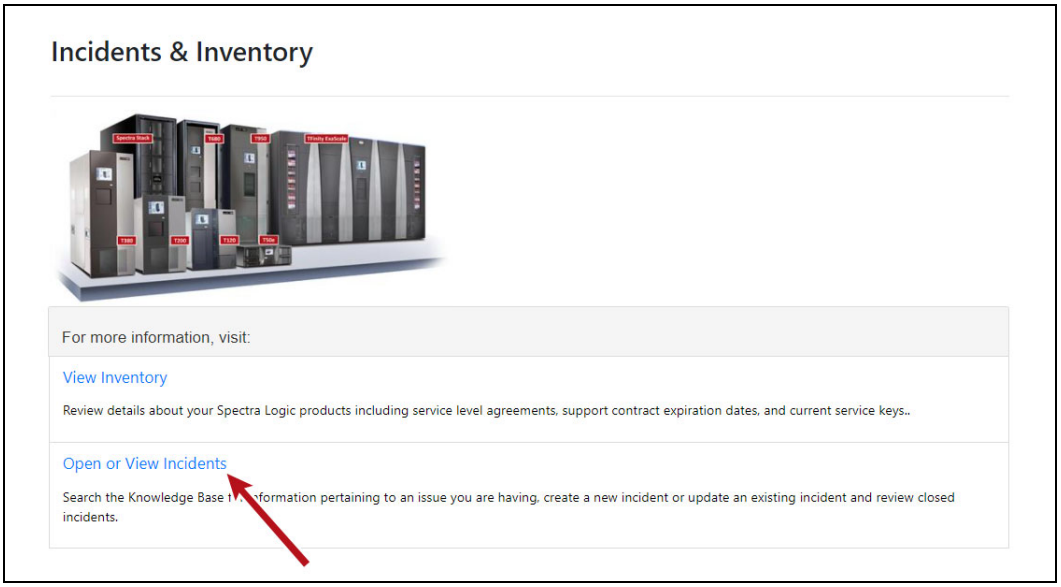


Figure 260 Select **Open or View Incidents**.

c. In the Search dialog box, enter a term or phrase about your problem (**1**) and click **Search** (**2**).

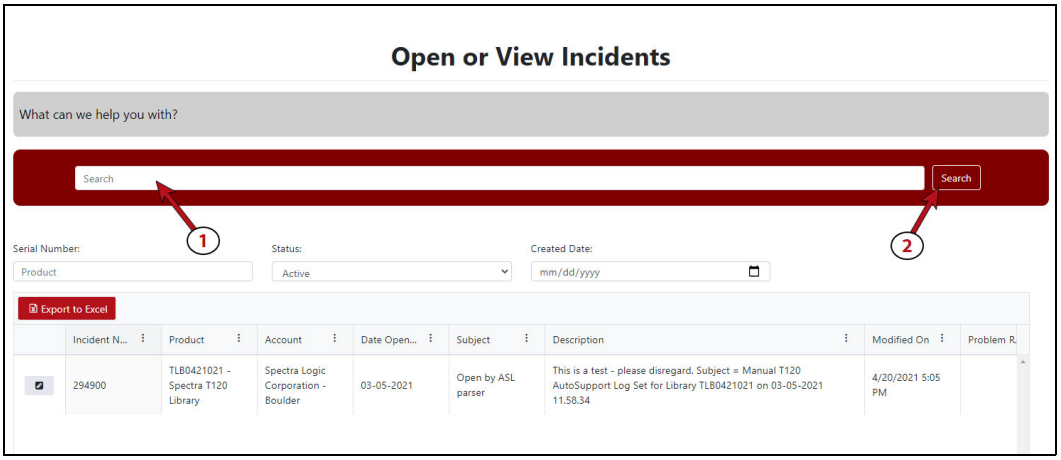


Figure 261 Enter a search phrase and click **Search**.

d. If the search does not provide an answer, click **Open a New Incident**.

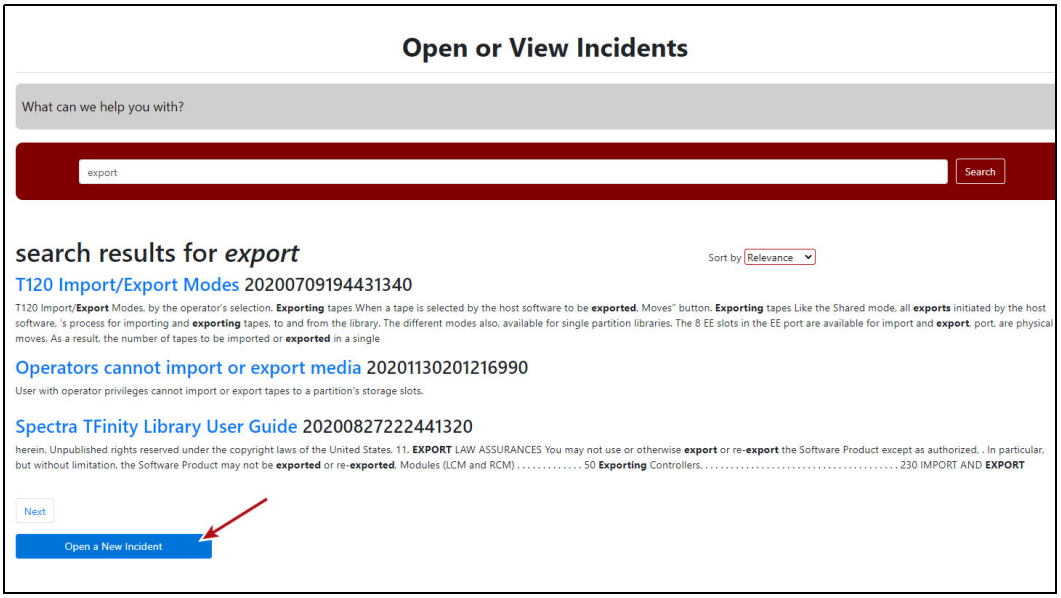


Figure 262 Click **Open a New Incident**.

e. Continue with Step 5 on page 441.

- Submit an Incident Directly

  a. From any page, select **Inventory⋯My Inventory**.

  b. Locate the row of the product for which you want to submit an incident and click **Create Incident**.

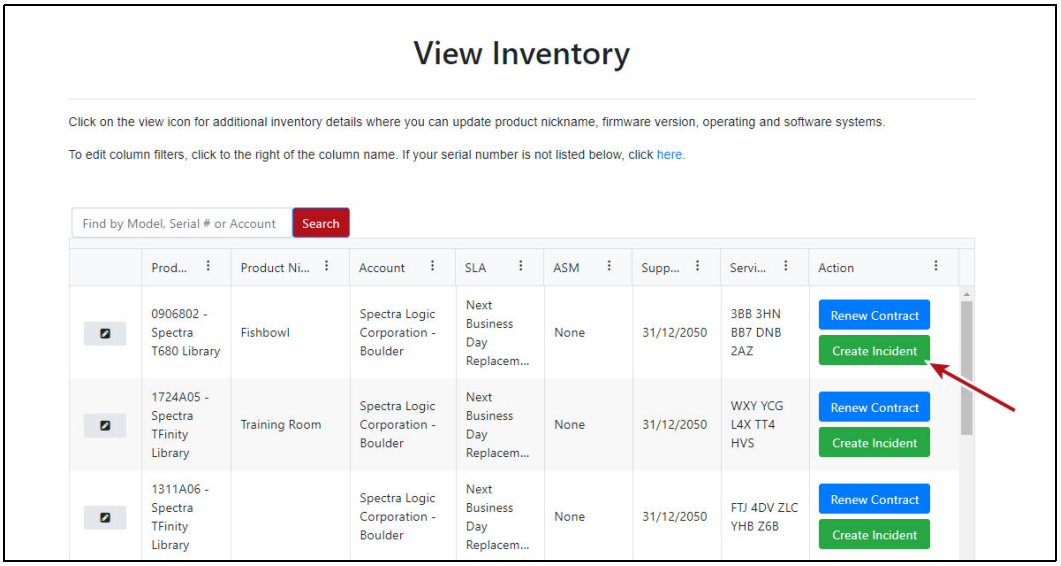


Figure 263 Click **Create Incident**.

c. Continue with Step 5 on page 441.

5. On the Create Incident page, enter the requested information providing as much detail as possible. When you are finished, click **Submit**.

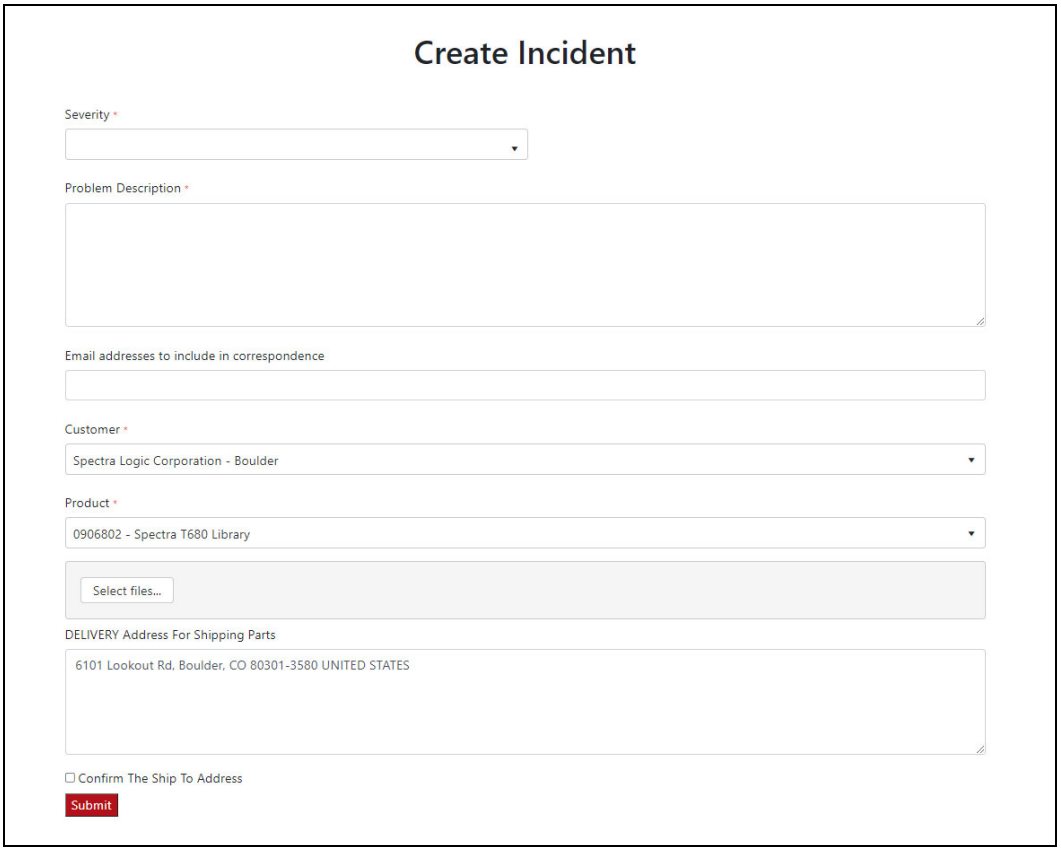


Figure 264 Enter information about your incident and click **Submit**.

Notes:
- If you have multiple libraries and need to determine the serial number of the affected library, see Determine the Library Serial Number on page 89.
- If the serial number of the affected library is not listed, contact Technical Support (see Contacting Spectra Logic on page 7).

- Contact Spectra Logic Technical Support by Phone

To contact Spectra Logic Technical Support by telephone, see Contacting Spectra Logic on page 7.

RETURNS

Your Technical Support representative may ask you to return a problem component to Spectra Logic for analysis and servicing. After you complete a replacement procedure, return the defective part using ALL of the packaging that the replacement part arrived in (including any anti-static bags or foam inserts).

Caution Severe damage can occur if the component is not packaged correctly. You may be invoiced if it is damaged due to improper or insufficient packaging.

Use the return label and instructions that were included with the replacement part when preparing to ship the component you are returning. If you cannot locate these, contact Spectra Logic for another copy (see Contacting Spectra Logic on page 7). The return label and Return Merchandise Authorization (RMA) printed on it are used to associate the returned component with your account. To avoid being invoiced for failure to return the component, do not ship the component back to Spectra Logic without the RMA return label.

APPENDIX A

Best Practices

This appendix reviews best practices for using Media Lifecycle Management, protecting library configuration data, and working with media.

Topic	
MLM Best Practices	page 444
Implementation Guidelines	page 444
Usage Policy Guidelines	page 444
Disaster Recovery Planning	page 447
Back Up and Protect the Spectra Library Metadata	page 448
Back Up the Library Metadata	page 448
Verify and Protect the Metadata Backup	page 450
Using Cartridges	page 452
Labeling Cartridges	page 452
Handling Cartridges	page 453
Storing Cartridges	page 454
Using Cartridges in the Library	page 455

MLM Best Practices

To effectively use MLM and ensure MLM and DLM data protection, plan a strategy based on your data center needs and develop policies and procedures to support that strategy. Having sound management policies and procedures for media rotation and management is essential for consistent, effective implementation.

Implementation Guidelines

Consider the following best practice guidelines as you prepare to implement MLM in your environment.

Guideline	Description
Identify the people responsible for backing up data	The people who perform data backup at your site are typically the ones who are responsible for implementing and following MLM backup procedures.
Identify the users who have responsibilities that involve MLM	It may be wise to have more than a single user familiar with policies, depending on the size of your organization, so that if one person is not available, another can take over.
Be consistent with partition names	Using consistent naming simplifies identifying a specific partition. Spectra's suggested naming practice is to list the location, followed by the library name, followed by the storage management software. For example, Dallas/T120/Netbackup.
On an organizational level, determine the level of management your media requires	The level of media management depends on the requirements for your environment. For example, you may choose to use Spectra's guidelines for retirement for all media, or you may choose to retire tapes that hold financial or legal data sooner than recommended. See the Error and Warning health scores in Generate MLM Reports on page 266 for information on when cartridges should be retired.

Usage Policy Guidelines

Consider the following guidelines when establishing your Media Lifecycle Management policies.

Guideline	Description
Select a retirement guideline	When implementing MLM, decide at the beginning on the criteria to be used when determining when to retire a cartridge. Spectra suggests using the Media Lifecycle Management health icon, visible on the MLM Reports screen and on the Details screen (Figure 145 on page 268) for each tape, to assess the overall health of individual tapes. See Generate MLM Reports on page 266 for information about using the health icon to assess media health.

Guideline	Description
Only use MLM-enabled media and cleaning cartridges in MLM-compatible libraries and drives	For the most accurate tracking, do not import your MLM-enabled media into non-Spectra Logic libraries or drive generations lower than LTO-4. The cartridge MAM is not updated with information about usage in those locations. As a result, the information about usage in those locations are not recorded in the MLM database when the cartridge is returned to your library.
Use only Spectra Certified Media with MLM support (both data and cleaning cartridges) in the library	To ensure the best possible performance, use Spectra Certified Media. Check the Spectra Logic website for the most up-to-date media availability. Do not use any media that is not approved by Spectra Logic for use in the library. The library uses information in the MLM database to monitor the health of the media in the library. For MLM-enabled media, the detailed health reports let you determine whether a particular data cartridge is past its useful threshold or determine whether a particular cartridge is experiencing high errors rates or retries. For MLM-enabled cleaning cartridges, you are notified when a cartridge is approaching the end of its useful life. Although MLM tracks the general health of media that is not MLM-enabled, detailed health information is not available for this media.
Do not routinely share LTO-4 media between LTO-4 and LTO-5 or later generation drives	Beginning with BlueScale12.0.7, after an LTO-4 cartridge is loaded into an LTO-5 or later generation drive, the algorithm used to calculate the media health score whenever the cartridge is subsequently loaded in an LTO-4 drive is adjusted to maintain consistent media health reporting regardless of the generation drive used with the cartridge. As a best practice for your LTO-4 media, Spectra Logic recommends that you configure LTO-4 drives in separate partitions from LTO-5 and later generation drives and that you do not routinely share LTO-4 media between LTO-4 and LTO-5 or later generation drives.
Always operate the library with Media Lifecycle Management enabled	If you disable and then re-enable Media Lifecycle Management, any loads, reads, writes, errors, and any other tape related events that occur while MLM is disabled are not recorded in the MLM database.

Guideline	Description
Enable load count alerts	Load count alerts, used in combination with the media health icon, let you monitor the health of individual tapes. Tapes with low load counts, but with a yellow or red health icon are vulnerable to high errors rates or retries. For higher levels of notification, configure a threshold for the maximum number of times a data cartridge can be loaded before an alert is generated (see Enable MLM and Configure Settings on page 244). When the number of loads exceeds this threshold, MLM generates a system message listing the barcode of the tape. You can also enable an alert to notify you when the load count recorded on the cartridge MAM differs from the load count stored in the MLM database but none of the other data changes. This type of discrepancy can indicate that the tape was loaded into a non-Spectra Logic library. Use this alert as a security feature to let you know when a tape was removed and loaded into a drive in a different library.
Regularly back up your MLM database	Determine how frequently to export the MLM database for storage. You can save the MLM database to a USB device or email it to a previously configured mail recipient. The database can be loaded back into the library in the event of an error. See Disaster Recovery Planning on page 447 and Restore the MLM and DLM Databases on page 342 for detailed information. See Configure Mail Users on page 99 for information about configuring mail recipients. Backing up the MLM database produces a point-in-time snapshot of the MLM database. Based on the number of tapes you routinely import into and export from the library, determine how frequently backups are needed to ensure that you can easily restore the MLM database.
Enable non-MLM media alerts	Alerts for non-MLM-enabled media notify you when a cartridge that is not MLM-enabled is loaded into a drive.
Track exported cartridges	When a cartridge is exported from the library, an asterisk (*) next to the barcode indicates that it is currently out of the library. However, all of the MLM data for the cartridge is still available. Define the frequency with which you export the complete MLM report and make a note of all exported tapes.
Select relevant information for saved reports	When you save an MLM report (see Generate MLM Reports on page 266), you can select between saving all MLM data or just the data from the most recently viewed report. You can save a copy of the MLM report as a comma-separated text file (*.rpt) to a USB device, mail the saved report to previously configured email recipient, or both. If desired, you can zip the file before saving it (see Save an MLM Report on page 271).

Disaster Recovery Planning

As a part of best disaster recovery planning and practices, Spectra Logic strongly recommends backing up the MLM database to a USB device or emailing it to a preconfigured mail recipient automatically after using MLM for some period of time. In the event of a disaster, you can use the backup to restore the MLM database information for the media in your library instead of rebuilding it by loading each cartridge into a drive (see Restore the MLM and DLM Databases on page 342).

Important

The automatic weekly auto-save file reflects the state of the MLM database at the time the backup was created. If MLM-enabled media is imported into or exported from the library during the period between the automatic weekly auto-save operations, the backup of the MLM database may not accurately reflect the library's inventory.

If you plan to import or export a large number of MLM-enabled cartridges, back up the MLM database using the procedure described in Back Up the MLM and DLM Databases on page 274 when you are finished to ensure that you have a backup that accurately reflects the information in the database.

Notes:

- Backing up the MLM database also backs up the DLM database.
- For extra security, the library's Auto Configuration Save feature automatically backs up its configuration and the MLM and DLM databases to the LCM memory card once a week and whenever a partition is created or modified (see Use Automatic Backup of the Library Configuration on page 123).
- If email for the auto-save backup is configured, the backups are emailed to the designated recipient (see Enable Email for the Auto Configuration Save File on page 101).
- See Back Up and Protect the Spectra Library Metadata on page 448 for additional disaster planning information.

BACK UP AND PROTECT THE SPECTRA LIBRARY METADATA

To ensure the availability of your library and encrypted data, protect library metadata by following the procedures described in this section. Library metadata includes library configuration data, the MLM and DLM databases, and all BlueScale encryption key-related data.

Note: The DLM database is included in any operations that backup or restore the MLM database.

Having reliable backups of the library metadata is *very* important in the case of disaster recovery and other situations where you need to restore the library.

Caution

Losing your library's metadata has catastrophic effects—as can losing keys in any encryption key management system, especially when related to encrypted data. If you lose all copies of all metadata:

- Your encrypted data is lost—you are unable to decrypt encrypted data without the encryption keys.
- You need to completely reconfigure your library.
- You lose stored data about your media that is time-consuming to recover.

Back Up the Library Metadata

Use the following methods to create backup copies of all of your library's metadata. The following table shows the file names and locations of the data saved during each type of backup operation.

This backup method...	Creates...
Auto Configuration Save Option	A time-stamped zip file containing the library configuration, the MLM database, and the DLM database. The file is stored on the memory card in the LCM and can be sent as an email attachment to a previously configured mail recipient. The zip file is named `<date-time>cfg.zip`, where `<date-time>` is the time stamp for when the zip file was created. ▪ See Enable Email for the Auto Configuration Save File on page 101 for information about configuring the Auto Configuration Save feature so that the library automatically sends an email with the current auto-save configuration file to a pre-configured mail recipient once a week and whenever you create or modify a library partition. ▪ See Use Automatic Backup of the Library Configuration on page 123 for information about using this method to back up the library configuration and the MLM and DLM databases. **Note:** The Auto Configuration Save feature does not automatically create a backup when you make other configuration changes to the library.

This backup method...	Creates...
Save MLM Database Advanced Utility	A time-stamped file containing the current MLM and DLM databases. The file is saved to a USB device or emailed to a previously configured mail recipient. The filename depends on whether the LCM is a Spectra PC or a Spectra LS and includes the time stamp `<date-time>` to indicate when the backup was created. If the backup file was saved to a USB device, it is located in a folder called \SavedMLMDB. ▪ **Spectra PC** — `cminfo_<date-time>.dat` ▪ **Spectra LS** — `xmlinfo_<date-time>.db` ▪ **Zipped file** — `cminfo_<date-time>.zdt` (The zip filename is the same for both the Spectra PC and the Spectra LS.) Back Up the MLM and DLM Databases on page 274 provides instructions for using the utility. **Important:** To ensure that you always have a current backup of the MLM and DLM databases, back them up regularly.
Partition Wizard and **Save Library Configuration Utility**	Multiple configuration files with the format `cnnnnnn.cfg`, where *n* is a number between 0 and 9. You can select to save the library configuration data to a USB device or email it to a previously configured mail recipient. ▪ If the backup files are saved to a USB device, they are located in a folder called `SavedConfigs\<date-time>`, where `<date-time>` is the time stamp for when the backup was created. ▪ If the backup was sent as an email attachment, the files are in a file named `<date-time>cfg.zip`, where `<date-time>` is the time stamp for when the zip file was created. **Important:** The backup file of the library configuration does not include the MLM and DLM databases. **Important:** Backing up the library configuration also backs up any BlueScale encryption keys that are stored in the library at the time the file is created. ▪ **Partition Wizard** — The partition wizard prompts you to save the library configuration whenever you create or modify a partition. See Chapter 6 – Partition Management, beginning on page 147 for detailed information about creating and modifying partitions. ▪ **Save Library Configuration Utility** — Use the Save Library Configuration utility to back up the updated library configuration whenever you make a configuration change to the library. This is especially important when you make configuration changes that do not result in an auto-save configuration file. See Use Manual Backup of the Library Configuration on page 124 for instructions.

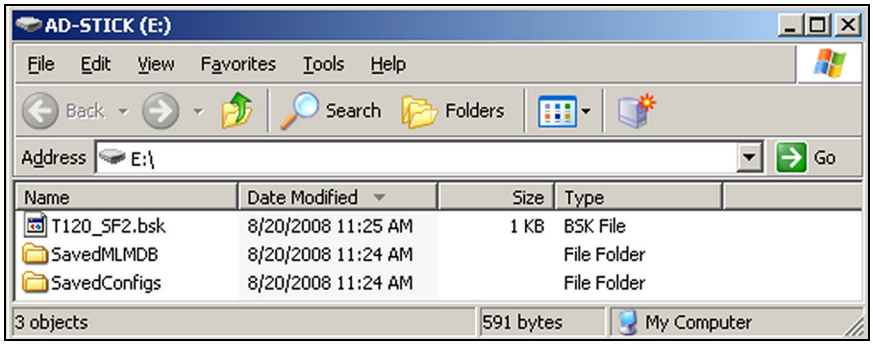
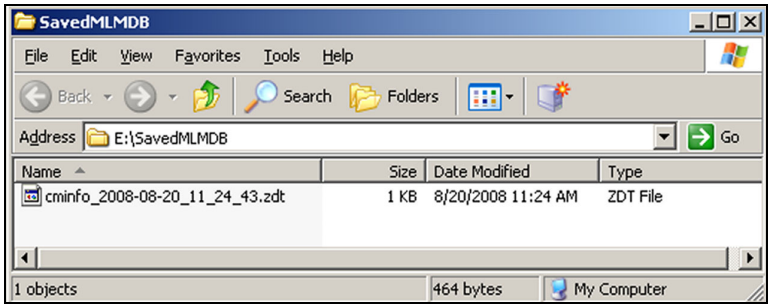
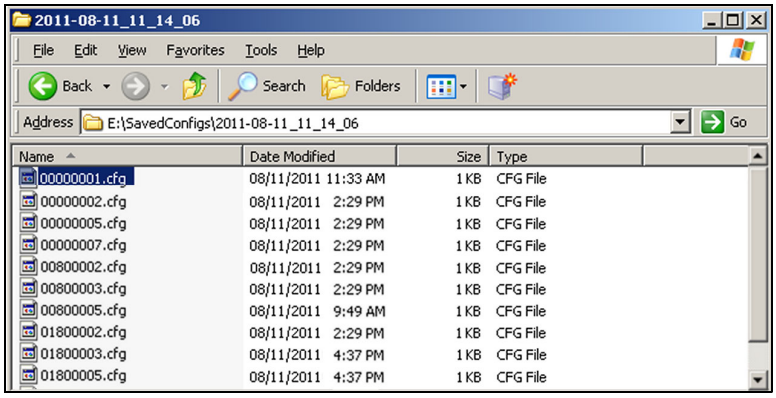
This backup method...	Creates...
Export Key Option	A key file containing the exported BlueScale encryption key. The file is named *name*.bsk or *name*.bss, where *name* is the moniker you assigned to the key when you created it. You can select to save the exported key file to a USB device or email it to a previously configured mail recipient. Use the BlueScale **Export Key** option to export BlueScale encryption keys to a USB device as soon as you create them. The exported keys are encrypted and password protected. See the *Spectra Encryption User Guide* for instructions. **CAUTION!** As a matter of best practice, Spectra Logic recommends exporting BlueScale encryption keys to a USB device instead of using email. Although emailing encryption keys is supported by the library, doing so presents security issues, including the following: ▪ Copies of encryption keys may be left on the email servers used for sending and receiving email and are thus subject to compromise. ▪ The difficulty in verifying where all the copies of emailed encryption keys may be located can make security audits more challenging.

Verify and Protect the Metadata Backup

Do the following to ensure that your metadata is protected and available when you need it:

1. As soon as you create and export the backup files, check the exported data to make sure the correct files are present and accessible.
   - Plug the USB device into a computer or laptop.
   - If you emailed the metadata (the data is sent as an attachment), save the data to a USB device, and then check the data in the email attachment and the data on the USB device.

Examples The following figures show examples of the files that display when you check your USB device or the email attachment.

Saved Data	Details
BlueScale encryption key (T120_SF2.bsk)	 **Note:** The screen shown here also includes the SavedMLMDB and SavedConfigs folders.
MLM and DLM data	 **Note:** In this example the file has a .zdt extension because you chose to zip the file when you created it.
Configuration data	 **Note:** The files are located in the `\SavedConfigs\<date-time>` folder, where `<date-time>` in this example is 2011-08-11_11_14_06.

2. Store at least one USB device containing the backup files off-site. After you have several weeks of backups stored off-site, rotate back through them.
3. When you run through disaster recovery exercises, test restoring the library using the backup files from both your USB devices and your saved email attachments. See Restoring the Library Configuration on page 334 for instructions.

USING CARTRIDGES

Note: See MLM Best Practices on page 444 for additional guidance when using Spectra Certified Media with MLM support.

The following sections describe best practices for using LTO media and for managing your media inventory. All library user groups have privileges that allow them to use the library's user interface to perform the cartridge handling and media management operations described in this section. Because handling cartridges requires physical interaction with the library, much of the information in this section is not applicable when you are accessing the library using the BlueScale web interface.

Labeling Cartridges

If you are not using pre-labeled Spectra Certified Media (both data and cleaning cartridges), be sure to label all cartridges with the appropriate barcode labels. Position each label in the indented area on the cartridge, as illustrated in Figure 265. See Barcode Label Specifications for Half-Inch Media on page 479 for detailed information about preparing and using barcode labels.

Caution Do not place labels on any surface of the cartridge except the area shown in Figure 265. A loose label can become dislodged and damage the drive.

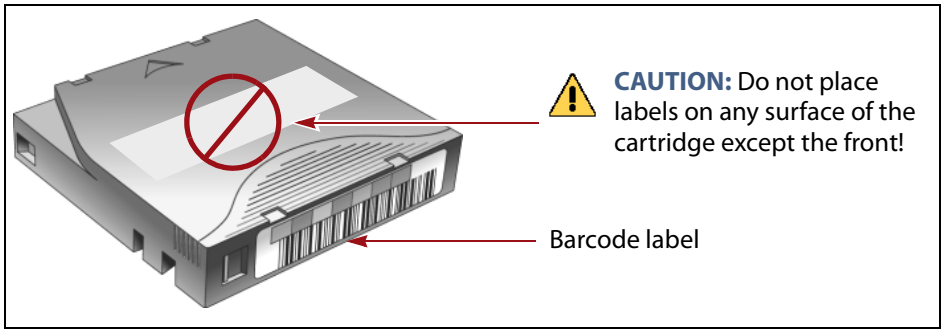


Figure 265 Properly barcode label all cartridges.

Handling Cartridges

Incorrect handling or an incorrect environment can damage the LTO cartridge or the magnetic tape inside it. To avoid damage to your cartridges and to ensure the continued high reliability of your drives, use the following guidelines:

- Do not drop the cartridge. If the cartridge drops, slide the cartridge door back and ensure that the leader pin is properly seated in the pin-retaining spring clips. Inspect the rear of the cartridge (the part that you load into the tape drive first) and ensure that there are no gaps in the seam of the cartridge case.
- Do not open any part of the cartridge other than the cartridge door. Do not open any other part of the cartridge case. The upper and lower parts of the case are held together with screws; separating them destroys the usefulness of the cartridge.
- Do not handle tape that is outside of the cartridge. Handling the tape can damage the tape's surface or edges, which may interfere with read or write reliability. Pulling on tape that is outside of the cartridge can damage the tape and the brake mechanism in the cartridge.
- If tape is outside of the cartridge, slide the cartridge door back and turn the hub to gently spool the tape back into the cartridge. Test the tape by using your storage management software to write to the tape and then run a PostScan.
- Before you use a cartridge, let it acclimate for at least 24 hours to the normal operating environment.
- Ensure that all surfaces of a cartridge are dry before use.
- Do not stack more than six cartridges.
- Do not expose the tape cartridge to moisture or direct sunlight.
- Do not degauss a tape cartridge that you intend to use/reuse. Degaussing makes the tape unusable.
- Do not expose recorded or blank tape cartridges to stray magnetic fields (such as terminals, motors, video equipment, X-ray equipment, or high-current cables or power supplies). Such exposure can cause the loss of recorded data or make the blank cartridge unusable.
- Maintain the environmental conditions specified in Tape Media Specifications on page 476.

Storing Cartridges

When the cartridges are outside of the library, Spectra Logic recommends storing them in TeraPack magazines with dust covers.

Storing and handling cartridges in magazines helps to eliminate errors resulting from mishandling individual cartridges, which is the leading cause of cartridge damage. An optional clear plastic dust cover snaps onto the magazine to protect the cartridges.

Whenever you remove cartridges from your library, be sure to store them properly to maximize archival life and ensure data integrity. Follow these guidelines for proper cartridge storage:

- Store cartridges in a suitable environment (see Tape Media Specifications on page 476).
- Keep the storage location as free of airborne particulates as possible. To eliminate obvious sources of particulates, do not permit anyone to smoke, eat, or drink near the storage area, and do not store cartridges near a copier or printer that may emit toner and paper dust.
- Store cartridges with the write-protect switch in the protected position (see Preparing Cartridges for Use on page 214).
- Store cartridges as soon as possible after you remove them from the library. Immediate storage helps avoid many of the conditions that can damage tapes, such as temperature and humidity fluctuations, particulate contamination, and excessive handling.
- If you plan to ship a TeraPack magazine, make sure that you have a proper shipping container and that you use adequate packing material. The TeraPack carrying cases available from Spectra Logic are designed for safely transporting TeraPack magazines off site and are compatible with Iron Mountain.

Using Cartridges in the Library

This section describes the best practices for using tape media in the library.

- Use only cartridges from approved vendors in the library. See Media and Upgrades on page 456 for more information about Spectra Certified Media.
- During an import or export operation, do not leave the library unattended for more than a few minutes. If you do, the import or export operation times out so that the library can continue automated backup tasks. To continue, restart the operation when you are ready.
- Enable Auto Drive Clean and configure a cleaning partition to clean drives whenever required to help ensure optimal performance. If you do not use the Auto Drive Clean feature, periodically check the Drives screen to determine whether the drives require cleaning (see Cleaning a Drive on page 403).
- Confirm the quality of your media and verify data integrity by occasionally running restores using different drives.
- Confirm the quality of both media and drives by running periodic disaster recovery drills. These drills test the overall ability to recover all of your data using your backups.

APPENDIX B

Media and Upgrades

This appendix describes media, accessories, and upgrades that can be purchased for use with the Spectra T120. It also describes how to renew or extend the service contract for the library.

Topic	
Media and Media Accessories	page 456
Spectra Certified Media	page 456
Media and Accessories	page 457
How To Order	page 458
Library Support and Upgrades	page 458
Service Contract Extension	page 458
BlueScale Software Updates	page 459
Library Upgrades	page 459
Replaceable Components	page 461

MEDIA AND MEDIA ACCESSORIES

Spectra Logic offers a variety of media and media accessories for the library.

Spectra Certified Media

The library supports LTO-2 and later generation tape media.

Media formulations There are two distinct formulations for LTO media: Metal Particle (MP) and Barium Ferrite (BaFe). LTO-2 through LTO-5 media are only available in the Metal Particle formulation. LTO-6 media can be purchased in either the Metal Particle or the Barium Ferrite formulation. LTO-6 drives are designed to run both MP and BaFe media. The two formulations can be used in the same partition. LTO-7 and later media are only available in the Barium Ferrite formulation.

Certification process Spectra Certified Media begins with the highest quality data cartridges received directly from the manufacturer. During certification, each LTO cartridge is MLM-enabled. In addition, LTO data cartridges undergo the unique CarbideClean process, which removes embedded particles and smooths the imperfections in the tape surface that are a result of the manufacturing process. By cleaning the tape of the debris that exists on all new media, CarbideClean reduces signal loss and excessive tape head wear, thereby increasing the reliability, availability, and longevity of the drives and media.

Barcode labels For your convenience, all Spectra Certified Media is available pre-labeled with sequential barcode labels. Optional custom barcode sequences can be ordered, if desired. Using Spectra sequential pre-labeled media ensures that you never have to deal with the problem of duplicate barcodes. Spectra Logic's barcode labels carry the same lifetime guarantee that protects each Spectra Certified Media cartridge.

Media Storage Spectra Logic offers both TeraPack magazines and Maintenance TeraPack magazines pre-loaded with Spectra Certified Media data cartridges or cleaning cartridges, respectively. The magazines are available with or without a protective dust cover to protect the cartridges when they are not stored in the library. Empty magazines are also available.

Check the Spectra Logic website at www.spectralogic.com for the most up-to-date media availability.

Media and Accessories

Spectra Logic offers the following media and accessories:

Media or Accessory	Description
Certified Media Packs	Each pack contains one TeraPack magazine filled with Spectra Certified Media (8 LTO data cartridges) with standard barcode labels. The media packs are available with or without a protective dust cover. **Note:** With the exception of LTO-2 and WORM media, all Spectra Certified LTO media is MLM-enabled.
Certified Media Pack With Custom Barcode Labels	Each pack contains one TeraPack magazine filled with Spectra Certified Media (8 LTO data cartridges) with custom barcode labels. The media packs are available with or without a protective dust cover. You must order a minimum of four custom-labeled packs at a time.
Cleaning cartridges	Spectra Certified cleaning cartridges are available individually. The cleaning cartridges have "CLN" at the beginning of the barcode sequence on their labels. **Note:** All Spectra Certified LTO cleaning cartridges are MLM-enabled.

Media or Accessory	Description
Barcode Labels (In Series Of 300)	High-contrast, high-resolution labels for reliable operation. Labels are available either with a standard barcode numbering sequence or with a custom barcode numbering sequence. Barcode labels for cleaning cartridges are also available. The barcode labels for cleaning cartridges have "CLN" at the beginning of the barcode sequence.
TeraPack magazines	Empty 8-slot TeraPack magazines for LTO tapes are available, with or without a protective dust cover.
TeraPack magazine carrying cases	Carrying cases are designed for safely carrying TeraPack magazines off site. Cases are compatible with Iron Mountain.

How To Order

Check the Spectra Logic website at www.spectralogic.com for the most up-to-date media availability.

To purchase Spectra Certified Media and media accessories, contact your sales representative (see Contacting Spectra Logic on page 7) or use the Spectra Logic online store at www.spectralogic.com/shop.

Library Support and Upgrades

The library ships with the service contract and options purchased with the library. You can renew your service contract or purchase more capacity or additional options described in this section at a later date.

Service Contract Extension

Your initial library purchase includes a BlueScale Software Support key that is valid for the duration of the warranty period, or for the duration of any uplifted or extended service contract you purchased with the library, whichever is longer. A valid BlueScale Software Support key is required in order to update the library's BlueScale software and the firmware for library components, and to obtain technical support.

Important

When you renew or extend your service contract, you must generate a new BlueScale Software Support key and enter the new key into the library to allow continued access to upgrades (see Enabling BlueScale Software Support, Options, and Upgrades on page 85). If you have questions about your service agreement, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).

When the original warranty or service contract expires, a renewal contract can be purchased to continue service. Contact Spectra Logic to purchase a renewal contract (see Contacting Spectra Logic on page 7).

BlueScale Software Updates

Updates to the library's BlueScale software are free of cost to customers who have a current service contract with Spectra Logic Technical Support. When a service contract is renewed, you must generate a new BlueScale Software Support key and enter it into the library to allow continued access to updates. See Enabling BlueScale Software Support, Options, and Upgrades on page 85 for information.

Important

Updating the BlueScale software and the firmware for the library components requires a current service contract with Spectra Logic Technical Support. The BlueScale Software Support key associated with your service contract must be stored in the library by entering it into the System Configuration screen. See Enabling BlueScale Software Support, Options, and Upgrades on page 85 for additional information.

If you have questions about your service agreement, contact Spectra Logic Technical Support (see Contacting Spectra Logic on page 7).

See Updating the BlueScale Software and Library Firmware on page 382 for upgrade instructions.

Library Upgrades

Upgrades available for purchase include BlueScale software options and library hardware upgrades. You can purchase options and upgrades from your sales representative (see Contacting Spectra Logic on page 7).

Options

The following table describes the BlueScale software options that are available. See Enabling BlueScale Software Support, Options, and Upgrades on page 85 for information about enabling these options.

Library Option	Description
Spectra SKLM Encryption Key Management System	Spectra Tivoli Key Lifecycle Manager (Spectra SKLM) is a centralized key management system that allows you to manage the lifecycle of the encryption keys and security certificates for your library. Spectra SKLM provides role-based access control, based on user privileges, for tasks that range from creating and assigning encryption keys to the backup and restoration of data. See the *Spectra Encryption User Guide* for more information about the Spectra SKLM Encryption key management system.
BlueScale Encryption Key Management Standard Edition	BlueScale Encryption Standard Edition, included free with the library, provides a strong, easy to use method of encrypting data using a single key on the library, letting you add encryption without adding complexity. See the *Spectra Encryption User Guide* for more information about BlueScale Encryption key management.

Library Option	Description
BlueScale Encryption Key Management Professional Edition	In addition to the features of the standard edition, BlueScale Encryption Professional Edition supports multiple keys on a library and additional security features so that you can implement more customized data encryption regimens. See the *Spectra Encryption User Guide* for more information about BlueScale Encryption key management.
Capacity On Demand (CoD)	The Capacity-On-Demand (CoD) feature lets you purchase a library that meets your current storage needs and then purchase additional capacity later as required. CoD reduces up-front costs, because users only pay for what they currently need. As more capacity is required, it can be added in increments by purchasing activation codes to license additional slots in the library and additional cartridge to fill the added slots.
Shared Library Services (SLS)	Shared Library Services (SLS) partitioning logically divides the library into multiple virtual libraries. With SLS, one library can support multiple media types and provide dedicated library services to multiple user groups. The default library configuration includes support for a single storage partition. If you need additional storage partitions, you must purchase a Shared Library Services (SLS) key. See Library Partitions on page 40 for more information about using partitioning in the library using SLS.

Hardware Expansion and Upgrades

The Spectra T120 is designed to expand to meet changing storage requirements, as well as to achieve storage consolidation goals. These expansion and upgrade options can be purchased through a sales representative (see Contacting Spectra Logic on page 7).

The following table describes the types of hardware expansion and upgrades that are available.

Hardware	Description
Drives	The library holds up to six full-height tape drives or ten half-height tape drives. Drives are sled-mounted and physically install in under two minutes. **Important:** Do not attempt to install drives purchased from other vendors in the library. The drives used in the library are specifically configured for use in the library and must be purchased from Spectra Logic.
Power Supplies	The library requires a minimum of one 5/12 VDC power supply module. Optionally, you can purchase an additional power supply, which provides redundancy and failover protection. The power supply module needed for the power redundancy configuration is an option you can purchase separately or when you order the library.
USB Device	You can use a USB device for saving backups of the library configuration and MLM database, when you are upgrading the library's BlueScale package, or as a troubleshooting tool for use as instructed by Spectra Logic Technical Support. USB devices are available for purchase from Spectra Logic for a nominal charge.

REPLACEABLE COMPONENTS

Most library components are extremely easy to remove and install. They are classified as customer-replaceable units (CRUs) and they are available for purchase based on your service contract with Spectra Logic Technical Support (see Chapter 15 – Technical Support, beginning on page 435). CRUs include:

- Air Filter
- Drives
- Library Control Module (LCM)
- Power supply modules

APPENDIX C

Specifications

This appendix provides specifications for the Spectra T120 library, as well as the drives and media used in the library.

Topic	
Library Specifications	page 462
Data Storage Capacity	page 463
Size and Weight	page 463
Service Access Requirements	page 464
Shipping and Storage Size and Weight	page 464
Power Specifications	page 465
Environmental Specifications	page 467
Shock and Vibration	page 468
Interoperability and Software Compatibility	page 468
Interface Specifications	page 469
Component Interface Connectors	page 469
Network Interface Cable Requirements	page 470
Universal Serial Bus (USB) Support	page 470
NDMP Support	page 471
Tape Drive and Media Specifications	page 471
LTO Tape Drive Specifications	page 471
Tape Media Specifications	page 476
Barcode Label Specifications for Half-Inch Media	page 479

Notes:
- The specifications in this chapter are subject to change without notice.
- Discontinued components are not included in this chapter. See Discontinued Components on page 38 for additional information.

LIBRARY SPECIFICATIONS

This section provides detailed specifications for the library.

Data Storage Capacity

The T120 library provides flexible storage capacity that expands from a minimum of 10 slots to a maximum of 120 slots. The following table shows the uncompressed capacity for the library. See Tape Media Specifications on page 476 for information about the capacity of individual tapes.

Number of Storage Slots [a]	Native Capacity (TB)						
	LTO-4	LTO-5	LTO-6	LTO-7	M8	LTO-8	LTO-9
10 (minimum)	8	15	25	60	90	120	180
120 (maximum)	96	180	300	720	1080	1440	2160

a. Media in the E/E port cannot be used for data storage until it is moved to a data storage slot.

Size and Weight

The following table shows the physical specifications of the T120 library.

Notes:
- All dimensions and weights are approximate and rounded to the nearest tenth.
- When calculating the space requirements, be sure to include the service access requirements described in Service Access Requirements on page 464.

Physical Specifications for a Spectra T120 Library	
Height	24.5 in. (62.2 cm)
Width	17.5 in. (44.5 cm)
Depth	35 in. (88.9 cm)
Depth (with LTO drive)	37.5 in. (95.3 cm)
Weight (base chassis) [a]	160 lb (72.6 kg)
Weight (fully loaded with LTO drives, power supplies, and cartridges) [b]	305 lb (138.4 kg)
LTO Drives ▪ Full-Height—LTO-2 through LTO-5 ▪ Half-Height—LTO-4 through LTO-9	 10.5 lb (4.8 kg) [c] 7.3 lb (3.3 kg) [c]
LCM	5.4 lb (2.4 kg)
Each F-QIP	5 lb (2.3 kg)
Each power supply	4 lb (1.8 kg)
TeraPack Magazine filled with cartridges	5 lb (2.3 kg)

a. Includes the chassis, LCM, and one power supply.
b. Does not include the weight of any F-QIPs.
c. Each drive.

Service Access Requirements

Important A minimum of 24 inches (61 cm) of clearance is required at the front and back of the library to provide service access. Providing 36 inches (91 cm) of clearance on all sides of the library is highly recommended.

Shipping and Storage Size and Weight

The following table provides the approximate dimensions and weights of the pallet and boxes used to ship the library.

Parameter	Specification [a]
Library Pallet	
▪ Height	34.5 in. (87.6 cm)
▪ Width	29 in. (73.7 cm)
▪ Depth	45 in. (114.3 cm)
▪ Weight	
▪ Library (base chassis with pallet and box) [b]	200 lb (91 kg)
▪ Accessory box [c]	**Approximately** 50 lb (23 kg)
▪ Components Boxes [d]	**Up to** 140 lb (64 kg)

a. All dimensions are rounded to the nearest tenth; weights are rounded to the nearest unit.
b. Includes the chassis, LCM, and one power supply.
c. The accessory box contains some or all of the following items: the rackmounting kit, the protective back cover, a tool kit, and product documentation.
d. The size and weight depends on the number and type of components in the box. To calculate the approximate weight of all the components, add 12 lb (5.4 kg) for each drive, 5 lb (1.8 kg) for each TeraPack magazine full of media, and 4 lb (1.5 kg) for each power supply.

Power Specifications

This section describes the power specifications for the library.

Power Consumption and Cooling Requirements

The power and cooling requirements for the library depend on the number and type of components installed. The following table provides the maximum power consumption and heat load for the base library and for each additional component added to the base library. Use this information to calculate the total maximum power consumption and heat load values, which can be used to build a power budget for the library.

All values are measured at the AC input and include power supply efficiency. The values are averages of observed hardware. In general, the lighter the load on the power supplies, the less efficient they are. The power supply efficiency in turn affects the power draw of all components.

Component	Power Consumption (watts)	Heat Load, Continuous (BTU/hour)
Base Library [a]	52	178
5/12 VDC Power Supply	33	113
F-QIP	17	58
LTO-3 full-height drive, SCSI [b]	▪ **Read/write:** 37 ▪ **Idle:** 18	**Read/write:** 126
LTO-4 half-height drive, Fibre Channel or SAS [b]	▪ **Read/write:** 39 ▪ **Idle:** 19	**Read/write:** 133
LTO-4 half-height drive, SCSI [b]	▪ **Read/write:** 37 ▪ **Idle:** 18	**Read/write:** 126
LTO-5 half-height drive, Fibre Channel or SAS [b]	▪ **Read/write:** 24 ▪ **Idle:** 6	**Read/write:** 82
LTO-6 half-height drive, Fibre Channel or SAS [b]	▪ **Read/write:** 24 ▪ **Idle:** 6	**Read/write:** 82
LTO-7 half-height drive, Fibre Channel or SAS [b]	▪ **Read/write:** 31 ▪ **Idle:** 20 [b]	**Read/write:** 106
LTO-8 Fibre Channel or SAS Half-Height	▪ **Read/write:** 43 ▪ **Idle:** 14 [b]	**Read/write:** 164
LTO-9 Fibre Channel or SAS Half-Height	▪ **Read/write:** 35	**Read/write:** 119

a. Assumes one 5/12 volt power supply; no drives or F-QIPs installed.
b. Includes the drive sled used to mount the drive in the library.

Power Specifications

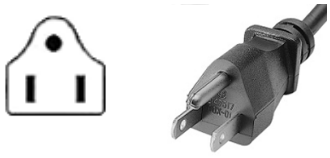
The following table shows the power specifications for the library.

Power Specifications	
Input Voltage	100-240 VAC, single phase
Frequency	50/60 Hz
Circuit Breaker (Maximum)	10 Amps

Power Cord Specifications

The power cord included with the library is considered part of the library and is not intended for use with any other equipment.

- The supply-end connector is considered the disconnect for the unit. Make sure that the socket-outlet for the AC connections is in an accessible location near the library.
- To use the library outside of North America, the power cord must meet the specifications for that country.

Part Number	Power Input Connector Style	Supply-end Connector Style	Supply-end Connector Appearance	Power Cordage
3136	IEC 60320-C13, female	Standard NEMA 5-15 110-120V (wall power connector)		Three-conductor, 18 AWG
8296	IEC 60320-C13, female	PDU Connection IEC-60320 C14 110-240V, 50-60Hz (library power connector)		Three-conductor, 16 AWG

Environmental Specifications

This section describes environmental specifications for the library. The library is equipped with internal fans to keep the library's internal temperature within specifications as long as the operating environment is within specifications.

Caution When the library is moved from a cold environment to a warm environment, it should not be used for at least 24 hours. This adjustment period prevents condensation damage.

The following table shows the general environmental specifications for the library.

Mode	Dry-bulb Temperature	Maximum Temperature Rate of Change [a]	Relative Humidity (non-condensing)	Maximum Humidity Rate of Change	Maximum Altitude
Allowable Environment	16° C to 32° C (60° F to 90° F)	5° C per hour 9° F per hour	20% to 80% 22° C dew point max (72° F)	5% per hour with no condensation	3048 m (10,000 ft)
Recommended Environment	16° C to 25° C (60° F to 77° F)	5° C per hour 9° F per hour	20% to 50% 22° C dew point max (72° F)	5% per hour with no condensation	3048 m (10,000 ft)

a. The temperature and humidity must be allowed to stabilize in the specified ambient environment for 24 hours.

Storing [a] and Shipping (Non-Operating) Environment Specification	
Humidity	10% to 95% (non-condensing)
Temperature	–40° F to 149° F (–40° C to 65° C)
Altitude	Sea level to 40,000 ft (12,192 m)

a. The library is in its original packaging. The packaging is designed to protect the library from condensation caused by extreme temperature variations of 27° F (15° C) or more. When the library is moved from a cold storage environment to a warm operating environment, it must be acclimated in its packaging for at least 24 hours before opening to prevent serious condensation damage from occurring.

Shock and Vibration

The library operates normally after experiencing shock loads as specified in the following table. The operating shock levels indicate how much shock the library can withstand while the enclosed tape drives are reading and writing data. The non-operating and storage shock levels indicate how much shock the library can withstand when it is not operating. After experiencing this amount of shock, the library continues to operate normally.

Operating Shock and Vibration Specifications	**Shock**	2 G pk 1/2 sine wave for 10 msec (Three axes, two shocks per axis minimum)
	Vibration (Swept Sine)	5-500 Hz 5-22 Hz 0.01-inch DA displacement 22-500 Hz 0.25G pk @ 1 octave (minimum three axes)
	Vibration (Random)	.21 G rms 5-300 Hz 0.00015 g^2/Hz 350-500 Hz -6dB/Octave 500 Hz 0.0001 g^2/Hz
Storing and Shipping (Non-Operating) Shock and Vibration Specifications [a]	**Shock**	10 G pk 1/2 sine wave for 10 msec (Three axes, three shocks per axis)
	Vibration (Swept Sine)	5 to 500 Hz 0.5 G pk @ 1 octave/minute (minimum three axes)
	Vibration (Random)	2.1 G rms 5-100 Hz 0.02 g^2/Hz 100-137 Hz -6dB/Octave

a. Library is in its original packaging.

INTEROPERABILITY AND SOFTWARE COMPATIBILITY

You can find complete interoperability listings, as well as a list of the types of software that were tested and proven compatible with the library on the Spectra Logic website at www.spectralogic.com/compatibility.

INTERFACE SPECIFICATIONS

This section provides information about the interfaces used to connect the library and tape drives to the host systems. It also provides information about the Ethernet interface used to access the library's BlueScale web interface.

The F-QIP supports a Fibre Channel host interface. Direct-attached tape drives have a native Fibre Channel interface.

Important QIPs (both F-QIPs and E-QIPs) are no longer available for purchase.

Important The option to connect SCSI drives through an F-QIP is no longer available for purchase with new libraries. The library continues to support partitions configured to use F-QIP-attached SCSI drives.

For information about how LTO Ultrium tape drives support Fibre Channel communications, refer to the tape drive documentation, available from IBM at www.storage.ibm.com/tape/lto/oem/index.html.

Component Interface Connectors

Component	Physical Interface
Drive, Fibre Channel	Two dual port multimode optical LC sockets [a]
Drive, SCSI [a,b]	▪ Full-height drives: Two Ultra-3 SCSI "LVD" 68-pin Micro D female connector. ▪ Half-height drives (LTO-4 only): Two VHDCI SCSI connectors. **Note:** One wide Ultra320 SCSI Active SCSI terminator is provided with each SCSI tape drive.
Drive, SAS	Two dual-port, 6 Gb/second connectors that conform to the Device Free (Plug) connector form of the SFF-8088 standard "Unshielded Dual Port Serial Attachment Connector" as defined by the SFF standards body.
F-QIP	Two dual-port optical LC SFPs

a. Only one port at a time can be used to connect the drive to a Fibre Channel network. If desired, the two ports can be used to create a failover configuration.

b. Can either be direct-attached to a host SCSI HBA or use an F-QIP to provide Fibre Channel or Gigabit Ethernet network connectivity.

Network Interface Cable Requirements

The type of cables required to connect the library and its drives to the network depend on the type of interface being used.s.

Interface Type	Cable Requirements
SCSI Bus [a]	LTO-3 or LTO-4 Full-height SCSI tape drive: Ultra-3 SCSI "LVD" Fast & Wide, 68-pin Micro D male connectors.
Fibre Channel (F-QIPs and direct-attached drives)	The Fibre Channel interface in the F-QIPs and direct-attached Fibre Channel tape drives support the Fibre Channel Protocol (FCP). Connecting these components to the host network requires multimode optical cables with dual LC connectors. Depending on the wavelength, the cables must comply with the following specifications in the Fibre Channel standard (FC-PI-2): ▪ **50 micron**—400-M5-SN-I classification ▪ **62.5 micron**—400-M6-SN-I classification (not supported for LTO-6 or later generation drives)
Serial Attached SCSI (SAS)	SAS tape drives support the point-to-point Serial Attached SCSI protocol. ▪ **LTO-3 through LTO-8** - Connecting these drives to the host network requires an SFF-8088 SAS cable rated for 6 Gb/second that does not exceed 13 feet (4 m). ▪ **LTO-9** - Connecting these drives to the host network requires an SFF-8644 SAS cable rated for 12 Gb/second that does not exceed 13 feet (4 m).
Ethernet	The Ethernet port on the LCM provides the connection to an Ethernet network for accessing the library using a standard web browser on a remote computer. Each Ethernet port is a pin-through-hole RJ-45 shielded connector. To comply with EMC requirements, use shielded Category 5 data-grade cables or a similar Category 5 cable for all Ethernet connections. ▪ The Spectra PC has a 10/100BaseT connection. ▪ The Spectra LS has a 10/100/1000BaseT connection.

a. Spectra Logic does not support operating SCSI LTO tape drives on an SE bus.

Universal Serial Bus (USB) Support

Important The library only recognizes FAT-formatted, not NTFS-formatted, USB devices. If you are unable to access a USB device from the library, remove it and use a different one.

The USB ports on the LCM support:

- External Drives (HD, CD, DVD, and Flash) with a USB interface
- Keyboards
- Pointer devices (for example, a computer mouse)

NDMP Support

Spectra Logic tape libraries are compatible with local, remote, and three-way NDMP (Network Data Management Protocol) topologies, where the tape library is connected to the NDMP data mover host over Fibre Channel.

TAPE DRIVE AND MEDIA SPECIFICATIONS

This section provides the basic specifications for the tape drives and media supported by the library. See Tape Media Specifications on page 476 for information about the media used in the library.

Notes:
- LTO-2 and LTO-3 drives are discontinued and are no longer available for purchase. If your library includes these drives, refer to the documentation that accompanied your library when you received it for specification information.
- The specifications in this section are subject to change without notice.

LTO Tape Drive Specifications

This section provides specifications for the LTO drives and media supported by the library. See Tape Media Specifications on page 476 for information about the media used in the library.

Notes:
- The specifications in this section are provided for convenience only. Refer to the tape drive documentation for the most current specifications (see Drive Technology on page 36).
- LTO drives and media are also referred to as Ultrium or LTO Ultrium drives and media.

LTO-9 Drive

When connecting to a Fibre Channel network, LTO-9 Fibre Channel drives will attempt to connect at 8 Gb/second, but will auto-negotiate down to 4 Gb/second, or 2 Gb/second, depending on the requirements of the port to which the drive is connected.

LTO-9 SAS drives attempt to connect at 12 Gb/second, but auto-negotiate down to 6 Gb/second or 3 Gb/second, depending on the requirements of the port to which the drive is connected.

Parameter	Specification
Maximum sustained transfer rate [a, b]	400 MB/second, native 900 MB/second, compressed SAS 700 MB/second, compressed Fibre
Speed matching range	177 MB/second to 400 MB/second

Parameter	Specification
Average space record time	TBD
Encryption capability	AES 256-GCM
WORM capability	Yes
MTBF	250,000 hours at 100% duty cycle
Uncorrected error rate, calculated	1 x 10^{-20} bits
Power consumption	Read/write: 34 watts typical Idle: TBD

a. Assuming a 2.5:1 compression ratio. Compression throughput depends on the type of data.
b. This is a per-drive value. Total sustained transfer rate for the library depends on the number of drives installed in the library.

LTO-9 Tape Drive Environmental Specifications

	Dry-bulb Temperature	Maximum Temp Rate of Change	Relative Humidity (non-condensing)	Maximum Humidity Rate of Change	Maximum Altitude
Recommended Environment	59° F to 77° F 15° C to 25° C	9° F / hour 5° C / hour	20% to 50%	5% / hour with no condensation	10000 ft 3048 m
Allowable Environment	59° F to 95° F 15° C to 35° C	9° F / hour 5° C / hour	20% to 50% 72° F (22° C) dew point max	5% / hour with no condensation	10000 ft 3048 m
Shipping Environment	-40° F to 140° F -40° C to 60° C		10% to 90% non-condensing		40000 ft 12192 m

LTO-8 Drive

When connecting to a Fibre Channel network, LTO-8 Fibre Channel drives will attempt to connect at 8 Gb/second, but will auto-negotiate down to 4 Gb/second, or 2 Gb/second, depending on the requirements of the port to which the drive is connected.

LTO-8 SAS drives attempt to connect at 6 Gb/second, but auto-negotiate down to 3 Gb/second or 1.5 Gb/second, depending on the requirements of the port to which the drive is connected.

Parameter	Specification
Maximum sustained transfer rate [a, b]	360 MB/second, native 750 MB/second, compressed
Speed matching range	112 MB/second to 360 MB/second

Parameter	Specification
Average space record time	59 seconds
Encryption capability	AES 256-GCM
WORM capability	Yes
MTBF	250,000 hours at 100% duty cycle
Uncorrected error rate, calculated	1 x 10^{-19} bits
Power consumption	Full Height Read/write: 40 watts typical Idle: 15 watts Half Height Read/write: 43 watts typical Idle: 14 watts

a. Assuming a 2.5:1 compression ratio. Compression throughput depends on the type of data.
b. This is a per-drive value. Total sustained transfer rate for the library depends on the number of drives installed in the library.

LTO-7 Drive

When connecting to a Fibre Channel network, LTO-7 Fibre Channel drives attempt to connect at 8 Gb/second, but auto-negotiate down to 4 Gb/second, or 2 Gb/second, depending on the requirements of the port to which the drive is connected.

LTO-7 SAS drives attempt to connect at 6 Gb/second, but auto-negotiate down to 3 Gb/second or 1.5 Gb/second, depending on the requirements of the port to which the drive is connected.

Parameter	Specification
Maximum sustained transfer rate [a, b]	300 MB/second, native 750 MB/second, compressed
Speed matching range	100 MB/second to 300 MB/second
Average space record time	60 seconds
Encryption capability	AES 256-GCM
WORM capability	Yes
MTBF	250,000 hours at 100% duty cycle
Uncorrected error rate, calculated	1 x 10^{-19} bits
Power consumption	Read/write: 31 watts typical Idle: 20 watts

a. Assuming a 2.5:1 compression ratio. Compression throughput depends on the type of data.
b. This is a per-drive value. Total sustained transfer rate for the library depends on the number of drives installed in the library.

LTO-6 Drive

When connecting to a Fibre Channel network, LTO-6 Fibre Channel drives attempt to connect at 8 Gb/second, but auto-negotiate down to 4 Gb/second, 2 Gb/second, or 1 Gb/second, depending on the requirements of the port to which the drive is connected.

LTO-6 SAS drives attempt to connect at 6 Gb/second, but auto-negotiate down to 3 Gb/second or 1.5 Gb/second, depending on the requirements of the port to which the drive is connected.

Parameter	Specification
Maximum sustained transfer rate [a, b]	160 MB/second, native [c] 400 MB/second, compressed
Speed matching range	40 MB/second to 160 MB/second
Average space record time	77 seconds
Encryption capability	AES 256-bit
WORM capability	Yes
MTBF	250,000 hours at 100% duty cycle
Uncorrected error rate	1×10^{-17} bits
Power consumption	**Read/write:** 28 watts typical **Idle:** 8 watts

a. Assuming a 2.5:1 compression ratio. Compression throughput depends on the type of data.
b. This is a per-drive value. Total sustained transfer rate for the library depends on the number of drives installed in the library.
c. A 1.5 Gb interface speed does not stream an LTO-6 drive at 160 MB/second.

LTO-5 Drive

When connecting to a Fibre Channel network, LTO-5 Fibre Channel drives attempt to connect at 8 Gb/second, but auto-negotiate down to 4 Gb/second, 2 Gb/second, or 1 Gb/second, depending on the requirements of the port to which the drive is connected.

When connecting to a SAS network, LTO-5 SAS tape drives attempt to connect at 6 Gb/second, but auto-negotiate down to 3 Gb/second as needed.

Parameter	Specification
Maximum sustained transfer rate [a, b]	140 MB/second, native [c] 280 MB/second, compressed
Speed matching range	30 MB/second to 140 MB/second
Average space record time	75 seconds
Encryption capability	AES 256-bit
WORM capability	Yes

Parameter	Specification
MTBF	250,000 hours at 100% duty cycle
Uncorrected error rate	1 x 10^{-17} bits
Power consumption [b]	Read/write: 27 watts typical Idle: 7.5 watts

a. Assuming a 2:1 compression ratio. Compression throughput depends on the type of data.
b. This is a per-drive value.
c. A 1 Gb interface speed does not stream an LTO-5 drive at 140 MB/second.

LTO-4 Drive

When connecting to a Fibre Channel network, LTO-4 Fibre Channel drives attempt to connect at 4 Gb/second, but auto-negotiate down to 2 Gb/second or 1 Gb/second, depending on the requirements of the port to which the drive is connected.

Parameter	Specification
Sustained transfer rate [a, b]	120 MB/second native [c] 240 MB/second compressed
Average space record time	70 seconds
Encryption capability	AES 256-bit
WORM capability	Yes
MTBF	250,000 hours at 100% duty cycle
Uncorrected error rate	1 x 10^{-17} bits
Power consumption - Fibre Channel [b]	Read/write: 29.5 watts typical Idle: 12.5 watts
Power consumption - SCSI [b]	Read/write: 26.5 watts typical Idle: 9.5 watts

a. Assuming a 2:1 compression ratio. Compression throughput depends on the type of data.
b. This is a per-drive value.
c. A 1 Gb interface speed does not stream an LTO-4 drive at 120 MB/second.

LTO-3 Drives

Note: LTO-3 drive are no longer available for purchase.

Parameter	Specification
Sustained transfer rate [a, b]	80 MB/second native 160 MB/second compressed
Average file access time	54 seconds
Encryption capability	No

Parameter	Specification
WORM capability	Yes
MTBF	250,000 hours at 100% duty cycle
Uncorrected error rate	1 x 10^{-17} bits
Power consumption [b]	28 watts typical

a. Compression throughput depends on the type of data.
b. This is a per-drive value.

LTO-2 Drives

Note: LTO-2 drives are no longer available for purchase.

Parameter	Specification
Sustained transfer rate [a, b]	35 MB/second native 70 MB/second compressed
Average file access time	65 seconds
Encryption capability	No
WORM capability	No
MTBF	250,000 hours at 100% duty cycle
Uncorrected error rate	1 x 10^{-17} bits
Power consumption [b]	29 watts typical

a. Compression throughput depends on the type of data.
b. This is a per-drive value.

Tape Media Specifications

This section provides specifications for the tape media supported by the library. See Media and Accessories on page 457 for information about ordering media for your library.

Environmental Requirements

The following table lists the specifications for storage temperature and other environmental requirements for tape media. Do not allow the temperature and humidity in the storage environment to fluctuate.

Specification	Recommended Operating	LTO-9 Allowable Operating [a]	LTO-8 and Lower Allowable Operating [a]	Shipping [b]
Temperature	59° F to 77° F (15° C to 25° C)	59° F to 95° F (15° C to 35° C)	50° F to 113° F (10° C to 45° C)	–9° F to 120° F (–23° C to 49° C)
Relative humidity	20% to 50%	10% to 80%	10% to 80%	5% to 80%
Max dew point	72° F (22° C)	71.6° F (22° C)	79° F (26° C)	79° F (26° C)
Maximum humidity rate change	5% / hour with no condensation	5% / hour with no condensation	5% / hour with no condensation	
Maximum Altitude	10,000 ft 3048 m	10,000 ft 3048 m	10,000 ft 3048 m	40,000 ft 12192 m

a. The upper limit applies to the media, not the library. Be sure there is adequate air flow around the library at all times.

b. When media is moved from a cold shipping/storage environment to a warm operating environment, it must be acclimated in its packaging for at least 24 hours before opening to prevent condensation damage from occurring.

LTO Media Specifications

The following table shows the capacities of the different generations of LTO Ultrium data cartridges.

LTO Media Generation	Native Capacity (Compressed Capacity)
LTO-2	200 GB (400 GB [a])
LTO-3 and LTO-3 WORM	400 GB (800 GB [a])
LTO-4 and LTO-4 WORM	800 GB (1.6 TB [a])
LTO-5 and LTO-5 WORM	1.5 TB (3 TB [a])
LTO-6 and LTO-6 WORM	2.5 TB (6.25 TB [b])
LTO-7 and LTO-7 WORM	6 TB (15 TB [b])
LTO-M8 [c]	9 TB (22.5 TB [b])
LTO-8 and LTO-8 WORM	12 TB (30 TB [b])
LTO-9 and LTO-9 WORM	18 TB (45 TB [b])

a. Assuming a 2:1 compression ratio. The compressed capacity depends on the type of data.

b. Assuming a 2.5:1 compression ratio. The compressed capacity depends on the type of data.

c. See M8 Media on page 216 for more information.

LTO Read/Write Compatibility

The following table shows the media read/write compatibility for each LTO drive generation supported by the library.

Drive Gen	LTO-4 Media	LTO-5 Media	LTO-6 Media	LTO-7 Media	M8 Media	LTO-8 Media	LTO-9 Media
LTO-4	**Read/ write**	Not supported	Not supported	Not supported	Not supported	Not supported	Not supported
LTO-5	**Read/ write**	**Read/ write**	Not supported	Not supported	Not supported	Not supported	Not supported
LTO-6	*Read only*	**Read/ write**	**Read/ write**	Not supported	Not supported	Not supported	Not supported
LTO-7	Not supported	*Read only*	**Read/ write**	**Read/ write**	Not supported	Not supported	Not supported
LTO-8	Not supported	Not supported	Not supported	**Read/ write**	**Read/ write**	**Read/ write**	Not supported
LTO-9	Not supported	Not supported	Not supported	Not supported	Not supported	**Read/ write**	**Read/ write**

LTO Encryption Compatibility

Key AES-256 data encryption with a secret 256-bit encryption key is used to encrypt and decrypt data. The key is not retrievable from the encryption core and is automatically erased during the unload process; software is required to extract the key, keep it secure, and provide management tools to track, store, use, and delete keys as appropriate.

Notes:
- The encryption performed by encryption-enabled LTO-4 or later generation drives is not compatible with the encryption performed by an encryption-enabled F-QIP.
- Spectra SKLM key management and BlueScale encryption are not compatible with each other. Data encrypted using one type of encryption key management cannot be decrypted using another.

For more information about encryption, see the *Spectra Encryption User Guide*.

LTO WORM Media

Certain records retention and data security applications require a Write Once, Read Many (WORM) method for storing data on tape media. LTO-3 and later generation drives enable WORM support when a WORM tape cartridge is loaded into the drive.

WORM Media Requirements Because standard read/write media are incompatible with the WORM feature, a specially formatted WORM tape cartridge is required. Each WORM cartridge has a unique, worldwide cartridge identifier (WWCID), which comprises the unique CM chip serial number and the unique tape media serial number.

Data Security on WORM Media Certain built-in security measures help ensure that the data written on a WORM cartridge does not become compromised, for example:

- The format of a WORM tape cartridge is unlike that of standard read/write media. This unique format prevents a drive that lacks WORM-capable firmware from writing on a WORM tape cartridge.
- When the drive senses a WORM cartridge, the firmware prohibits the changing or altering of user data already written on the tape. The firmware keeps track of the last appendable point on the tape.

LTO Cleaning Cartridges

The LTO cleaning cartridges are valid for 50 uses. Do not rewind and reuse the material in a cleaning cartridge. Reusing the material may redistribute contaminants previously removed from the tape path. If all of the cleaning material is used, discard the cartridge and use a new cleaning cartridge.

Barcode Label Specifications for Half-Inch Media

Symbology The barcode labeling scheme used on Spectra Logic certified media uses the barcode symbology of USS-39. You can obtain a complete description and definition of this symbology from the *Automatic Identification Manufacturers (AIM)* specification, the *Uniform Symbol Specification (USS-39)*, and the *ANSI MH10.8M-1993 ANSI Barcode* specification.

Application and Orientation The barcode label must be applied to the cartridge so that it fits within the label recess on the edge of the cartridge without curling up on the sides or ends. The label must be oriented so that barcode characters are along the edge closest to the hub side of the cartridge.

Printed Characters The label supports human-readable alphanumeric characters printed along the top edge of the label, above the barcode. See Detailed Specifications on page 480 for specific information about label, the characters used on the label, and spacing.

Figure 266 shows the dimensional specifications for labels with the alphanumeric characters above the barcode.

Important The barcode label must only have one barcode on it. If multiple barcodes are present, the library's barcode scanner cannot determine which one to process when scanning the cartridge.

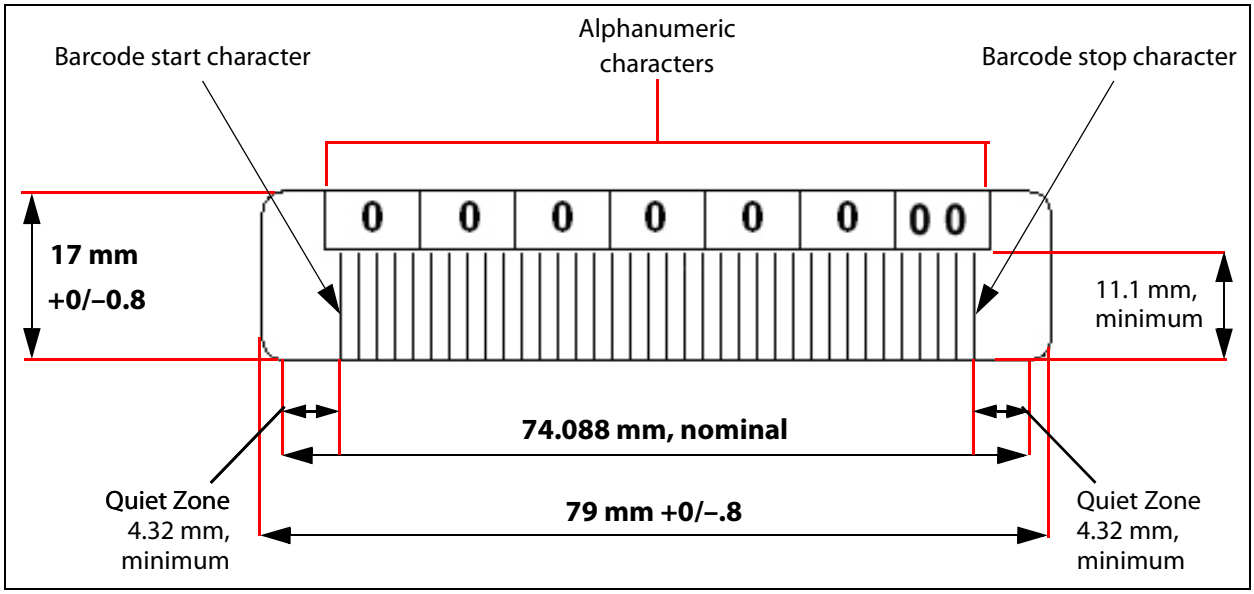


Figure 266 Barcode specifications for half-inch media; alphanumeric characters on top.

Note: When using barcode labels with alphanumeric characters along the bottom edge, the label must be positioned so that barcode is at least 13.72 mm below the top edge of the cartridge to ensure that the barcode reader can read the label.

Detailed Specifications

For the official IBM barcode label specification, see http://www-01.ibm.com/support/docview.wss?uid=ssg1S7000429. Unless otherwise specified, tolerances are X.XXX ± 0.127 mm, X.XXX ± 0.762 mm.

Barcode Element Specifications

- Minimum symbol height is 11.1 mm, measured to the inside of the label's edge.
- The wide-to-narrow ratio is 2.75.
- The narrow element width is 0.432 mm +0.03 mm or –0.076 mm.
- The nominal width of the wide spaces and bars is 1.188 mm.
- The inter-character gap is 0.432mm +0.03/–0.076 mm.
- The minimum quiet zone at the beginning and end of a printed barcode string is 4.32 mm (10 times the narrow element width).

- The total nominal barcode string length (including quiet zones) is 74.088 mm.
- The edge of the barcode is the edge of the printed area associated with the bar. The edge roughness is the transition encountered as a horizontal line is moved vertically from all black to all white. The edge roughness maximum is 0.038 mm.
- Variation between all bars, white and black, must be less than ±0.0381 mm.

Physical Label Specifications

- Label stock must fit within the label recess on the face of the cartridge without curling up on the sides or ends (79 mm X 17 mm +0/–0.8).
- Minimum length sufficient for the quiet zones, start-stop, and data characters (nominal 74.088 mm).
- Minimum width no less than 1.5 mm narrower than the tape label recess width. Corners are cut with a 1.5 mm radius.
- Maximum label thickness, including the RFID tag if present, together with any associated layers and adhesives cannot exceed 0.40 mm.
- The label and adhesive must have an environmental performance to match or exceed the environmental specifications of the cartridge to which it is applied.

Barcode Data

The library supports barcode data strings consisting of from 1 to 16 characters, including an optional checksum character. Quiet zones precede and follow the start and stop characters.

The barcode data string on standard Spectra Logic barcode labels consists of a start character, eight alphanumeric characters, a checksum character, and the stop character. Quiet zones precede and follow the start and stop characters.

- The first six (6) characters following the start character can be any combination of upper case A-Z or 0-9 (for example, ABC123) to identify the tape Volume Serial Number.
- The last two (2) characters are the media identifier and indicate the LTO cartridge Media Type (for example, “L” for LTO and “4” for an LTO-4 cartridge).The barcode string can be printed in either direction on the label and must begin and end with a valid start/stop character (*).
- The label must be printed so that barcode data is positioned along the edge of the label that is closest to the hub side of the cartridge.

The *AIM Uniform Symbol USS-39* specification provides detailed information about the format of the start character, the series of characters that make up the barcode data, and the stop character.

Human Readable Text

Human readable text is allowed provided there is no conflict or interference with the automation code. This text must include the barcode data, but can also include additional text. The format, colors, and location of the human readable characters is up to the customer and label vendor.

Volume Identifier Formats

- The volume identifier field consists of six (6) left justified alphanumeric characters as described in the *SCSI-3 Medium Changer Commands (SMC) ANSI NCITS 314-199X* specification. The volume identifier only uses ASCII characters A-Z and 0-9. The use of "CLN" and "DG{space}" at the beginning of the volume identifier is reserved.
- The volume identifier "CLN*vnn*" is reserved for cleaning cartridges. When a drive requires cleaning, it requests a specific type of cleaning cartridge.
  - The "*v*" field is an alphanumeric field to identify cleaning cartridge applications, "U" for Universal Cleaning Cartridges or a drive unique identifier.
  - The "*nn*" alphanumeric field is used to track individual cleaning tape activity (that is, usage and life).
- The volume identifier "DG{space}*vnn*" is reserved for diagnostic and service cartridges.
- The two character media identifier "L*g*" immediately follows the volume identifier.
  - The "L" identifies the tape as LTO
  - The "*g*" represents and alphanumeric character that indicates the generation and capacity of the LTO cartridge.

In IBM LTO tape drives, the value of the media identifier on cleaning cartridges is ignored, although a valid value must be present.

APPENDIX D

Regulatory and Safety Standards

The Spectra T120 complies with the safety and regulatory agency standards listed below when installed by a Spectra Logic Certified engineer or third-party provider.

EU DECLARATION OF CONFORMITY

We:

Spectra Logic Corporation
6101 Lookout Road
Boulder, CO 80301 USA

declare under sole responsibility that the

Spectra model T120 Library

to which this declaration relates, meets the essential health and safety requirements and is in conformity with the EU Directives listed below using the relevant section of the EU standards and other normative documents listed in the following table.



Matt Starr
Chief Technical Officer, Spectra Logic Corporation

The object of the declaration described above is in conformity with RoHS Recast Directive (2011/65/EU) Low Voltage Directive (2006/95/EC) Electromagnetic Compatibility Directive (2004/108/EC).

Standard	Specification Title
EN 55022: 2010	Information technology equipment. Radio disturbance characteristics. Limits and methods of measurement.
ANSI C63.4: 2003	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
CISPR 16-1: 2002	Specification for radio disturbance and immunity measuring apparatus and methods.

Standard	Specification Title
EN 55024: 2010	Information Technology Equipment – Immunity Characteristics Limits and Methods of Measurement ▪ Electrostatic Discharge: IEC 61000-4-2 ▪ Radiated RF Immunity: IEC 61000-4-3 ▪ Electrical Fast Transient/Burst: IEC 61000-4-4 ▪ Surge Immunity: IEC 61000-4-5 ▪ Conducted RF Immunity: IEC 61000-4-6 ▪ Power Frequency H-field Immunity: IEC 61000-4-8 ▪ Voltage Dips and Interrupts: IEC 61000-4-11 ▪ Power Line Harmonics, Class A: 61000-3-2 ▪ Power Line Flicker: 61000-3-3 ▪ Electromagnetic compatibility (EMC) for residential, commercial and light-industrial environments: 61000-6-3: 2001 ▪ Electromagnetic compatibility (EMC) for industrial environments: 61000-6-4: 2001
EN61326: 2002	Electrical equipment for measurement, control and laboratory use. EMC requirements.
Recast of RoHS directive 2011/65/ 2008	RoHS. Restriction of the use of certain hazardous substances in electrical and electronic equipment.
EN 50581:2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.
EU REACH Regulation (1907/ 2006)	This product contains less than 0.1% by weight of the substances on the EU SVHC Candidate List as of 18 June 2012.

EMISSION STANDARDS

Country	Standard
United States - FCC	CFR Title 47, FCC Part 15 (see FCC Notice)
Australia/New Zealand	AS/NZS CISPR 22
Canada	ICES-003
Korea	KN 22
Japan	VCCI
Taiwan	CNS 13438

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to CFR 47, Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

CE Marking

The CE marking has been affixed on this device according to Module A of decision 768/2008.

Note: To meet CE certification requirements, you must be running your library on an uninterruptable power supply.

Safety Standards and Compliance

Product Safety Standards The Spectra T120 complies with the following domestic and international product safety standards.

- IEC 60950-1:2005, IEC 60950-1:2005/AMD1:2009, IEC 60950-1:2005/AMD2:2013
- UL Std. No. 60950-1 2nd Edition - Information Technology Equipment – Safety – Part 1: General Requirements (Incl. AM 1:2011 and AM 2:2014)
- CAN/CSA-C22.2 No. 60950-1-07 incl. Amendment 1 (2011) and Amendment 2 (2014) - Information Technology Equipment – Safety – Part 1: General Requirements

Safety-relevant Provisions The Spectra T120 complies with all safety-relevant provisions referring to:

- Protection against electrical hazards
- Protection against hazards such as:
  - Mechanical hazards
  - Fire hazards
  - Noise
  - Vibration

Laser Warning

IBM Tape Drives

A Class 1 laser assembly, in the optical transceiver, is mounted on each IBM tape drive Fibre Channel electronics card. This laser assembly is registered with the DHHS and is in compliance with IEC825.

These products contain components that comply with performance standards that are set by the U.S. Food and Drug administration. This means that these products belong to a class of laser products that do not emit hazardous laser radiation. This classification was accomplished by providing the necessary protective housings and scanning safeguards to ensure that laser radiation is inaccessible during operation or is within Class 1 limits. External safety agencies have reviewed these products and have obtained approvals to the latest standards as they apply to this product type.

Nemko Accreditation

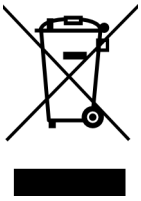
The safety issues of this information technology equipment type have been evaluated by a government-accredited European third-party organization, such as Nemko.

This Mass Storage Device has been evaluated and determined to comply with the Safety Requirements of the International Standard for Information Technology Equipment, IEC/EN 60950-1, Second Edition. The evaluation was conducted by Nemko. Nemko participates in the CB Scheme as a National Certification Body certified by the IECEE.

ENVIRONMENTAL REGULATIONS

The Spectra T120 complies with the following domestic and international environmental regulations directives.

Waste of Electronic and Electrical Equipment (WEEE) Directive



Note: For information on recycling your Spectra library, check the Spectra Logic website. European Union users should contact their local waste administration for WEEE collection instructions for this product.

The WEEE symbol on the back of this product indicates that this product meets the European Directive 2012/19/EU on Waste Electrical and Electronic Equipment, known as the WEEE directive. This directive, only applicable in European Union countries, indicates that this product should not be disposed of with normal unsorted municipal waste.

Within participating European Union countries, special collection, recycling, and disposal arrangement have been established for this product. At the end of life, the product user should dispose of this product using special WEEE collection systems. These special systems mitigate the potential affects on the environment and human health that can result from hazardous substances that may be contained in this product.

Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS)



The RoHS marking indicates that this product is in compliance with European Council Directive 2011/65/2008, on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Measures for the Administration of the Control of Pollution by Electronic Information Products (China)

	T120 有毒和有害物质及元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴联苯醚 (PBDE)
磁带库	X[1]	O	X[2]	O	O	O
磁带驱动器 IBM LTO-3	X[1,4]	O	O	O	O	O
磁带驱动器 IBM LTO-4	X[1,8]	O	O	O	O	O
磁带驱动器 IBM LTO-5	X[1]	O	O	O	O	O

1. 电路板焊料含有铅。服务器，存储器和存储阵列系统，用于转接、信号和传输的网络基础设施设备，以及电信网络管理设备的焊料都含有铅。
2. 电气触点和镉镀层，不包括 76/769/ECC 指令的修订指令 91/338/EE 所禁止的应用，此等指令对某些危险物质的营销和使用列有若干限制条款。
3. 柔性电缆含有十溴联苯醚（Deca-PBDE）。若干聚合物应用的 Deca-PBDE 用量超过最大浓度限定值（MCV）。
4. 铅含量可能高达 3.2 克。
5. 钢材中的铅含量为 0.35%，铝合金中为 0.4%，青铜等铜合金中为 4.0%。
6. 电子陶瓷零件（例如压电式装置）可能含有铅。
7. 电子部件可能含有铅玻璃。
8. 铅含量可能高达 5.0 克。

Recycling Your Library

For information on recycling your Spectra library, check the Spectra Logic website at: spectralogic.com/environment.

CONFLICT MINERALS POLICY

Spectra Logic is committed to complying with the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas, as well as the applicable requirements of Section 1502 of the Dodd-Frank Act, which aims to prevent the use of minerals that directly or indirectly finance or benefit armed groups in the Democratic Republic of the Congo (DRC) or in adjoining countries ("conflict minerals").

Affected suppliers to Spectra Logic will be required to commit to being or becoming "conflict-free" (which means that such supplier does not source conflict minerals) and sourcing, where possible, only from conflict-free smelters. Each affected supplier to Spectra Logic will be required to provide completed EICC-GeSI declarations evidencing such supplier's commitment to becoming conflict-free and documenting countries of origin for the tin, tantalum, tungsten, and gold that it purchases.

For more information on Spectra Logic's conflict minerals program contact *conflictminerals@spectralogic.com*.

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