



EXABYTE 221L AND 221L-FC LIBRARIES

PRODUCT MANUAL



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PART NUMBER 1014258 Revision B

REVISION HISTORY	Revision	Date	Description
	A	March 2005	Initial release. Replaces 1011610.
	B	August 2005	Added Appendix B and List of Figures.

NOTE: The most current information about this product is available at Exabyte's web site (www.exabyte.com).

PRODUCT WARRANTY CAUTION The Exabyte® 221L and 221L-FC libraries are warranted to be free from defects in materials, parts, and workmanship and will conform to the current product specification upon delivery. For the specific details of your warranty, refer to your sales contract or contact the company from which the library was purchased.

The warranty for the library shall not apply to failures caused by:

- ▶ Physical abuse or use not consistent with the operating instructions or product specifications.
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- ▶ Removal of the Exabyte identification label(s).
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Caution

Returning the library in unauthorized packaging may damage the equipment and void the warranty. If you are returning the library for repair, package it in its original packaging (or in replacement packaging obtained from your vendor).

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to 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 this 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 his own expense.

Shielded cables are required for this device to comply with FCC Rules. Use shielded cables when connecting this device to others.

**INDUSTRY
CANADIAN NOTICE
PER ICES-003**

English This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

French Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

EUROPEAN NOTICE

This equipment has been tested and complies with the following requirements:

- ▶ EN 55022/CISPR 22, Class A
- ▶ EN 55024
- ▶ EN 61000-3-2
- ▶ EN 61000-3-3

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STANDARDS,
METROLOGY, AND
INSPECTION (BSMI)
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This equipment has been tested and complies with CNS C 13438, Class A.

警告使用者：
這是甲類的資訊產品——在居住的環境中使用時——可能會造成射頻干擾——在這種情況下——使用者會被要求採取某些適當的對策——

**AUSTRALIA/NEW
ZEALAND**

This equipment has been tested and complies with AS/NZS 3548.

**CONTACTING
EXABYTE**

To obtain general information	
Exabyte Corporate Headquarters	Exabyte Corporation 2108 55th Street Boulder, CO USA 80301 (303) 442-4333
World Wide Web	www.exabyte.com
To obtain technical support	
Exabyte Technical Support	www.exabyte.com/products/hardwarewarranty.cfm
To order supplies and accessories	
Exabyte Sales Support	1-800-774-7172 1-800-392-8273 (Exabyte Media)
To return equipment for service (RMA Request)	
Exabyte Service	www.exabyte.com/company/about/contact.cfm



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ABOUT THIS MANUAL

This manual describes how to install, configure, operate, maintain, and troubleshoot the Exabyte® 221L and 221L-FC LTO™ Ultrium™ Libraries. It also provides library specifications.

WHERE TO LOOK FOR INFORMATION

Installation

If you are performing first-time installation:

- ▶ Read [Chapter 1, “Product Overview](#) for an overview of the library’s features and components.
- ▶ Read [Chapter 2, “Installing the Library](#) for hardware installation instructions, including obtaining the necessary accessories, installing cartridges, and connecting the library to a host system.
- ▶ Read [Chapter 3, “Configuring the Library](#) for configuration instructions, including how to use the operator panel to set library options. If you want to use the library’s Remote Management utility to set configuration options, refer to [Chapter 6, “Using the Remote Management Utility](#) for instructions for accessing the utility.

Operation

When you are ready to put the library into operation:

- ▶ Read [Chapter 4, “Operating the Library](#) to learn about adding and removing cartridges during operation, operating the library in sequential mode, cleaning the tape drive(s), and performing other basic library operations.
- ▶ Read [Chapter 5, “Viewing Library Information](#) to learn about viewing information such as code versions, statistics, sensor readings, and cartridge inventory data.
- ▶ Read [Chapter 6, “Using the Remote Management Utility](#) for information about using the library’s Remote Management utility to change configuration options, view information, issue commands, monitor, and manage library operation across an Ethernet network.

Maintenance, Troubleshooting, and Service

If you need to perform basic maintenance, troubleshoot problems, or return the library for service:

- ▶ Read [Chapter 7, “Maintenance”](#) for instructions for replacing tape drives, uploading new firmware, and creating diagnostic listings.
- ▶ Read [Chapter 8, “Troubleshooting and Error Codes”](#) for troubleshooting tips, definitions of library error codes, and corrective actions for each error situation.
- ▶ Read [Chapter 9, “Shipping the Library”](#) for packing and shipping instructions if you need to return the library for service.

Specifications and Write Once, Read Many (WORM)

To learn about specifications for the library:

- ▶ Read [Appendix A, Library Specifications](#) for physical, performance, reliability, power, environmental, and safety agency specifications.
- ▶ Read [Appendix B](#) for information about the WORM capability of the LTO-3 tape drive.

RELATED PUBLICATIONS

The following publications provide additional information about the library.

Exabyte 221L and 221L-FC Libraries

- ▶ *Exabyte 221L and 221L-FC Library Quick Start Guide*, 1014259
- ▶ *Exabyte 110L and 221L Libraries SCSI Reference*, 1014275
- ▶ *Installing an Exabyte 221L Library or 110L Autoloader into a Rack*, 1014257
- ▶ *Installing or Replacing a Tape Drive in an Exabyte 110L, 221L, or 221L-FC*, 1006159
- ▶ *Exabyte Bar Code Label Specification for LTO Ultrium Cartridges*, 1004080

IBM T400/T800 Ultrium Tape Drives

See the IBM web site at www.storage.ibm.com/tape/lto/oem/index.html to locate documentation and support information for IBM LTO Ultrium tape drives.

Standards

- ▶ *ANSI Information Technology — SCSI-3 Primary Commands 2 (SPC-2)*, ANSI INCITS 351-2001
- ▶ *ANSI Information Technology — SCSI-3 Medium Changer Commands (SMC)*, ANSI INCITS 314-1998
- ▶ *ANSI SCSI-3 Fast20 Parallel Interface (Fast-20)*, X3.277 – 1996
- ▶ *ANSI SCSI Parallel Interface-2 (SPI-2)*, X3T10/1142D, Rev. 11

-
- ▶ *ANSI High Performance Serial Bus*, ANSI/IEEE 1394 – 1995
 - ▶ *ANSI SCSI-3 Parallel Interface*, X3.253 – 1995
 - ▶ *ANSI SCSI-3 Fast-20 Parallel Interface*, X3.277 –1996
 - ▶ *Standard IEEE 802.3, Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications*, 1985
 - ▶ *TapeAlert Specification*, NCITS T10/02-142R0, Version 3.0, March 2002
 - ▶ *EIA Rack Standards*, RS-310-B

The following standards are related to the Fibre Channel interface used by the library and tape drive(s):

- ▶ *ANSI Information Technology Fibre Channel Protocol for SCSI (FCP)*, X3.269-1996
- ▶ *Fibre Channel Protocol for SCSI, Second Revision 2 (FCP-2)*, T10/Project 1144-D/Rev 4, December 1999
- ▶ *ANSI Information Technology Fibre Channel Physical and Signaling Standard (FC-PH)*, X3.230-1994
- ▶ *ANSI Information Technology Fibre Channel 2nd Generation Physical and Signaling Standard (FC-PH-2)*, X3.303-1998
- ▶ *ANSI Information Technology Fibre Channel Arbitrated Loop (FC-AL)*, X3.272-1996
- ▶ *ANSI Information Technology Fibre Channel Arbitrated Loop (FC-AL-2)*, NCITS 332-1999
- ▶ *Information Technology Fibre Channel Fabric Loop Attachment (FC-FLA)*, T11/Project 1235-DT/Rev 2.7
- ▶ *Fibre Channel FC-Tape Standard*, T11/99 – 069v4, 1999
- ▶ *Fibre Channel Tape Connector Profile Using 80-pin SCA-2 Connector*, T11/99 – 234v2
- ▶ *Specification for 40-pin SCA-2 Connector w/Bidirectional ESI*, SFF-8067
- ▶ *Specification for 40-pin SCA-2 Connector w/Parallel Selection*, SFF-8045
- ▶ *SCA-2 Unshielded Connections*, EIA-700A0AE (SFF-8451)
- ▶ *Gigabit Interface Converter (GBIC)*, Small Form Factor, SFF-8053, Revision 5.x
- ▶ *Common FC-PH Feature Sets Profiles*, Fibre Channel Systems Initiative, FCSI-101-Rev. 3.1
- ▶ *SCSI Profile*, Fibre Channel System Initiative, FCSI-201-Rev. 2.2
- ▶ *FCSI IP Profile*, Fibre Channel System Initiative, FCSI-202-Rev. 2.1

CONVENTIONS USED IN THIS MANUAL

This manual uses the following conventions:

[Enter]: Boxed text indicates keys on the library's operator panel.

Note: Notes provide additional information or suggestions about the topic or procedure being discussed.

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



Caution

Read text marked by the "CAUTION" icon for information you must know to avoid damaging the library, the tape drive(s), or losing data.



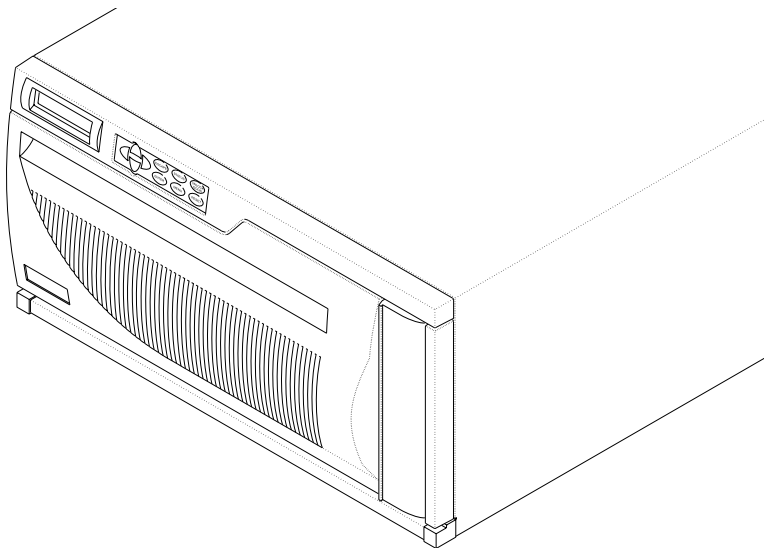
Warning

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

PRODUCT OVERVIEW

The Exabyte 221L and 221L-FC LTO Ultrium tape libraries provide unattended data storage, archiving, backup, and retrieval for midrange and high-end workstations, servers, and networks.

The 221L library has a SCSI interface; the 221L-FC library has a Fibre Channel interface. Both libraries are available with LTO Ultrium 1, Ultrium 2, or Ultrium 3 Fibre Channel tape drives and feature Exabyte's patented, award-winning ExaBiotics™.



LIBRARY FEATURES

The Exabyte 221L and 221L-FC libraries include the following features:

- ▶ **Storage for up to 21 data cartridges.** Cartridges are stored in two removable cartridge magazines containing seven slots each and seven additional fixed cartridge slots mounted next to the tape drive(s). The removable magazines are easily accessible from the front panel and can be used with an interlocking lid to store cartridges outside of the library.
- ▶ **One or two LTO Ultrium tape drives.** The tape drives are installed in drive carriers that allow easy installation and removal from the library.

- ▶ **Entry/exit port.** The entry/exit port allows you to insert and remove cartridges without opening the library's door and interrupting operation.
- ▶ **Robotic cartridge handler (robot).** The robot moves cartridges between the storage slots, tape drive(s), and the entry/exit port.
- ▶ **Bar code scanner.** The library uses a laser bar code scanner, attached to the robot, to read bar code labels on the data cartridges. The library stores the bar code information as part of its cartridge inventory.
- ▶ **Operator panel with LCD display.** The operator panel allows you to monitor library operations, select configuration options, and control the robot from the front panel.
- ▶ **Wide, low-voltage differential (LVD) SCSI interface (221L).** The 221L library and SCSI LTO Ultrium tape drive(s) each support independent sets of SCSI messages and commands and can be connected to separate LVD SCSI buses.
- ▶ **Native Fibre Channel interface (221L-FC).** The 221L-FC's native Fibre Channel interface allows seamless integration into data-intensive storage area network (SAN) environments.
- ▶ **Standalone or rack-mount capability.** The library is designed to operate as a standalone unit or in a standard 19-inch rack. Rack-mounting kits are available from Exabyte.
- ▶ **Ethernet port for connection to a 10/100BaseT Ethernet network.** You can connect the library to an Ethernet network for remote monitoring, management, upgrading firmware, and creating diagnostic listings.
- ▶ **Built-in remote management capability.** You can use the library's built-in Remote Management utility and a standard web browser to set configuration options, view library information, monitor, and manage operation over an Ethernet network.

Note: Your library may include Exabyte Library Monitor software on CD. Exabyte Library Monitor is an older program for remote monitoring that has been replaced by the library's built-in Remote Management utility. The Remote Management utility is available with the latest library firmware. You can download the latest firmware from Exabyte's web site (www.exabyte.com). Instructions for upgrading library firmware are provided on [page 143](#).

LIBRARY COMPONENTS

The following sections describe the library's front panel, internal, and back panel components.

FRONT PANEL COMPONENTS

Figure 1-1 shows the library's front panel components.

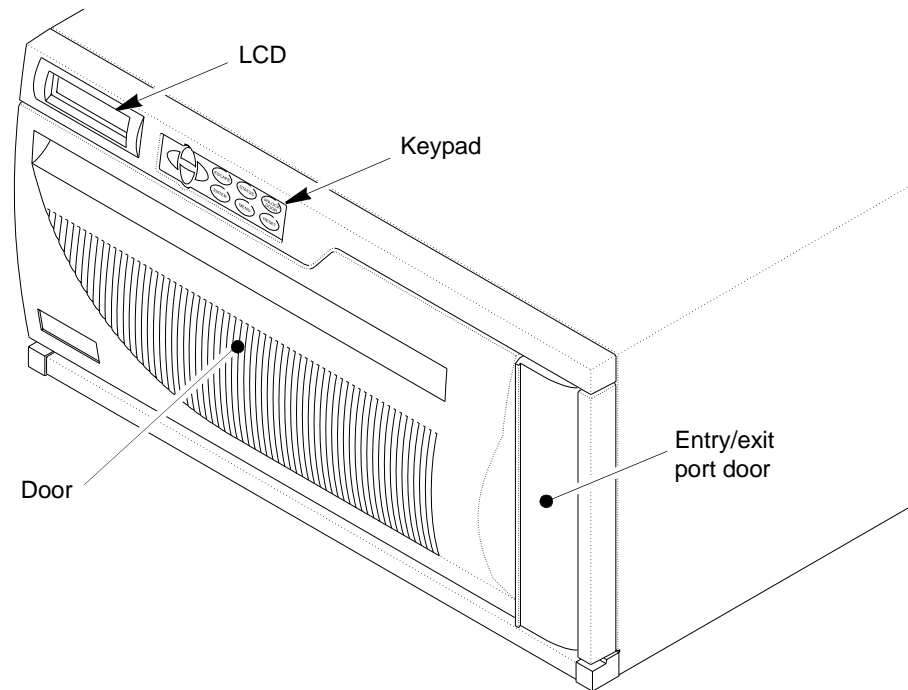


Figure 1-1 Front panel components

Operator Panel (LCD and Keypad) The operator panel includes a keypad and a two-line, 32-character liquid crystal display (LCD). You can use the operator panel to perform the following activities:

- ▶ View library and tape drive status and information
- ▶ Set or change library configuration options
- ▶ Unlock the door
- ▶ Lock and unlock the entry/exit port
- ▶ Run demonstration programs and test library operations
- ▶ Reset the library and tape drive(s)

Entry/Exit Port The entry/exit port door on the front of the library provides access to the entry/exit port caddy (see Figure 1-2). This caddy allows you to insert or remove a single cartridge without opening the library door.

To help maintain cartridge security and to provide safety from possible laser beam exposure, a solenoid-activated lock secures the caddy in the entry/exit port.

Door The door allows manual access to the library's internal components, including the tape drive(s), cartridge magazines, and fixed cartridge slots.

To help maintain cartridge security and to provide safety from possible laser beam exposure, the door is secured by a solenoid-activated electronic locking system. The library will not operate when the door is unlocked.

INTERNAL COMPONENTS

Figure 1-2 shows the internal components of the 221L. Except for the Fibre Channel interface on the tape drive, the components described in this section are identical for the 221L-FC.

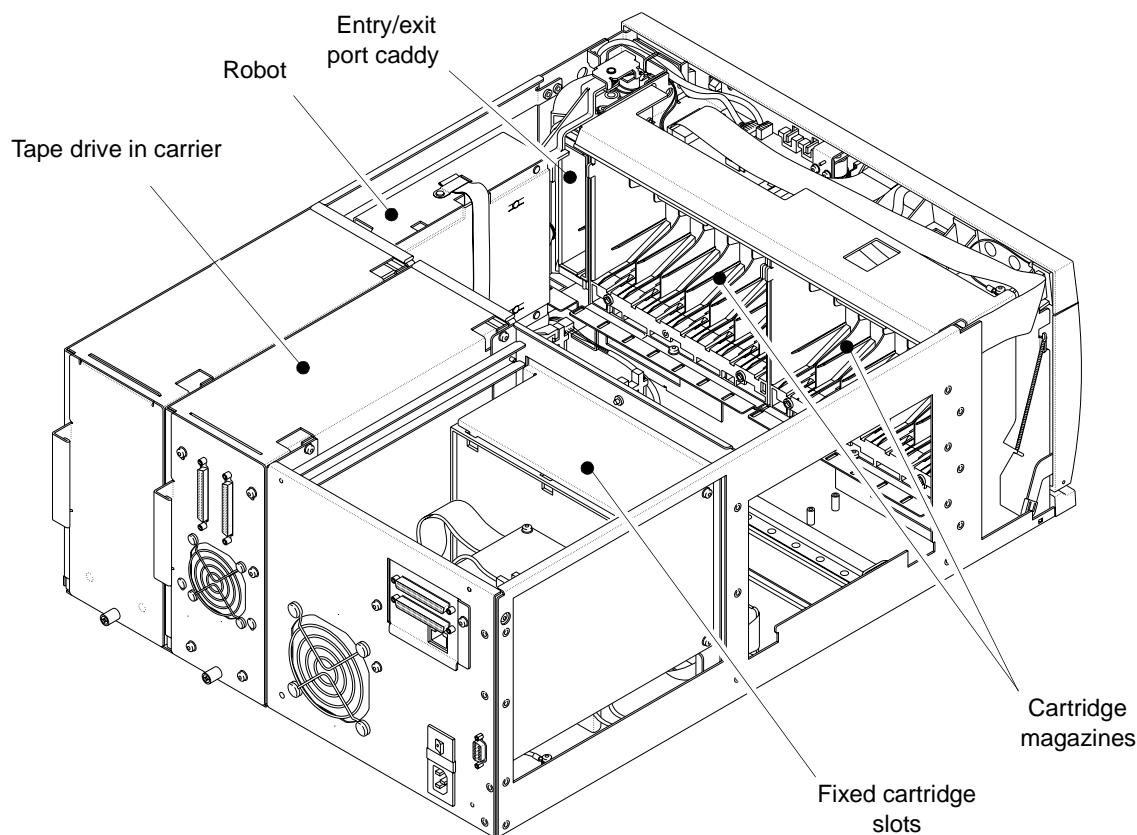


Figure 1-2 Internal components

LTO Ultrium Tape Drives The library contains one or two LTO Ultrium tape drives. As shown in [Figure 1-3](#), each tape drive is installed in a drive carrier to allow it to be easily inserted and removed from the library. When you remove the data cartridge magazines from the front of the library, you can access the tape drive(s) to manually load or remove a cartridge.

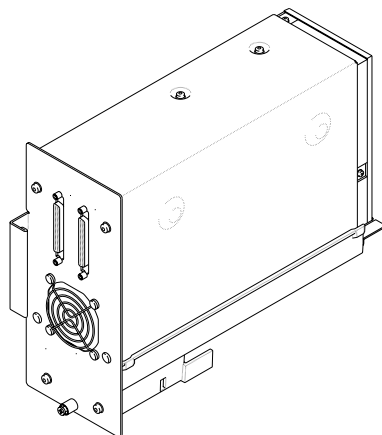


Figure 1-3 LTO Ultrium tape drive installed in a drive carrier (SCSI drive shown)

[Table 1-1](#) shows the data transfer rates and capacities for each generation of LTO Ultrium tape drive.

Table 1-1 LTO Ultrium tape drive transfer rates and capacities

Tape Drive	Maximum Data Transfer Rate (2:1 Compression)	Maximum Data Capacity (2:1 Compression)
LTO Ultrium 1	15 MB per second (108 GB per hour)	200 GB on one Ultrium 1 cartridge
LTO Ultrium 2	35 MB per second (252 GB per hour)	400 GB on one Ultrium 2 cartridge
LTO Ultrium 3	80 MB per second (576 GB per hour)	800 GB on one Ultrium 3 cartridge

Robot The robot picks and places cartridges, moving them between the cartridge storage locations, tape drive(s), and the entry/exit port. The bar code scanner is located on the robot. The scanner enables the library to read information from bar code labels on the cartridges into its cartridge inventory. A library application can use the inventory information to locate and move specific cartridges.

Cartridge magazines The library holds two removable cartridge magazines. Each magazine stores up to seven data cartridges. The magazine slots incorporate design features to ensure that the cartridges are always inserted correctly and to prevent the cartridges from falling out of the magazine.

The magazine, shown in [Figure 1-4](#), has alignment guides on the top and mounting slots on the bottom. These features align with guides on the magazine holder to ensure secure and accurate positioning of the magazine inside the library.

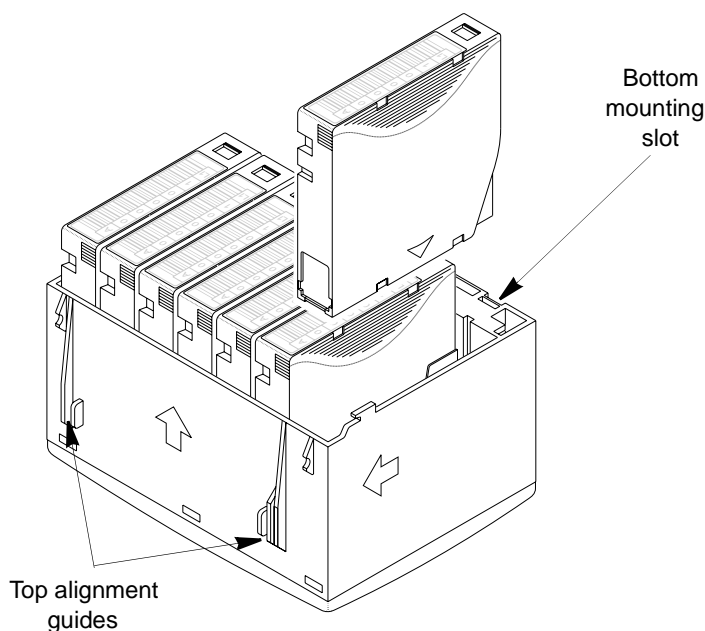


Figure 1-4 Data cartridge magazine

Fixed Cartridge Slots The library contains seven fixed cartridge slots located to the left of the tape drive(s). If desired, you can configure the fixed cartridge slot closest to the tape drive(s) to hold a cleaning cartridge.

BACK PANEL COMPONENTS

Figure 1-5 shows the back panel components of the 221L. Figure 1-6 shows the back panel components of the 221L-FC.

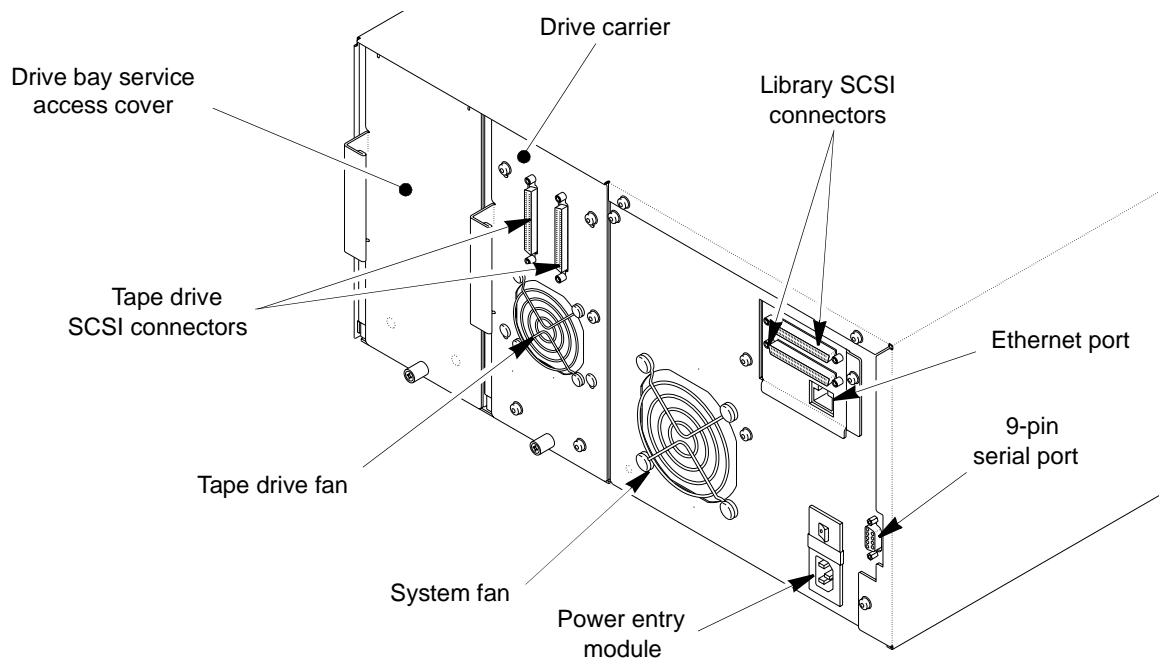


Figure 1-5 Back panel components (221L)

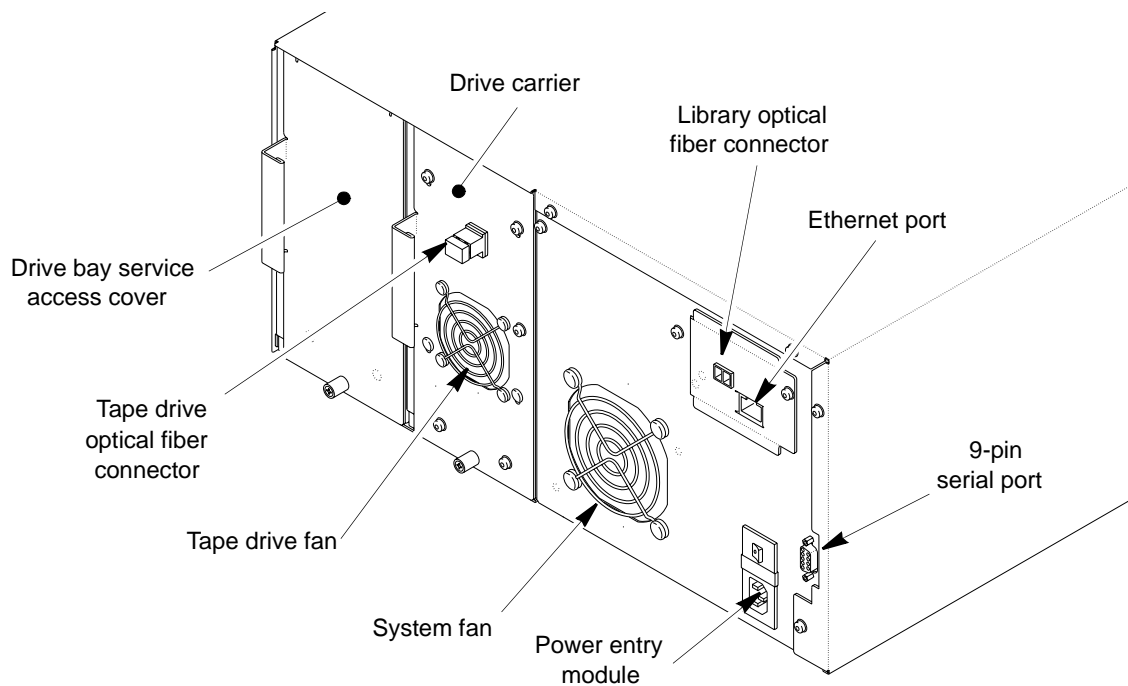


Figure 1-6 Back panel components (221L-FC)

Drive Carriers and Service Access Covers The library contains one or two LTO Ultrium tape drives installed in Exabyte drive carriers. In the 221L, each drive carrier includes two SCSI connectors for connecting the tape drive to a SCSI bus. In the 221L-FC, each drive carrier includes one integrated dual LC optical fiber connector for connecting the tape drive to a single loop on a Fibre Channel network.

The drive carrier allows the tape drive to be easily inserted and removed from the library. The drive carrier includes a fan to maintain the operating temperature of the tape drive. If your library contains only one tape drive, the unused drive slot is protected by a drive bay service access cover.

Library SCSI Connectors (221L) The 221L library has two 68-pin, wide LVD SCSI connectors for connection to a SCSI bus. The connectors accommodate either two SCSI cables or a cable and an external terminator. The library can be on the same bus as the tape drive(s) or on a separate bus.

Library Fibre Channel Connector (221L-FC) The 221L-FC library has one integrated dual LC optical fiber connector for connection to a Fibre Channel network. The library can be on the same loop as the tape drive(s) or on a separate loop.

Ethernet Port The Ethernet port allows you to connect the library to a 10/100BaseT Ethernet network. You can use the Ethernet connection to perform the following activities:

- ▶ Monitor and manage library operation remotely
- ▶ Download diagnostic information from the library
- ▶ Upgrade the library's firmware

9-Pin Serial Port A 9-pin serial port allows the library to be connected directly to a computer for diagnostics and firmware upgrades.

Power Entry Module The library chassis is grounded through the power entry module. The module includes the power cord connection and the power switch. The power cord connection provides AC power to the internal power supply for the library and the tape drive(s). The power switch allows you to turn power on and off for the library and the enclosed tape drive(s).

Fans The system fan provides cooling for the library. Each drive carrier also includes a fan to provide optimal cooling for the enclosed tape drive.

INSTALLING THE LIBRARY

This chapter describes how to install the library hardware. Depending on your requirements, installation will involve most of the following steps:

- ▶ Unpacking the library
- ▶ Obtaining accessories and equipment
- ▶ Preparing for installation
- ▶ Installing the library in a rack
- ▶ Installing a second tape drive
- ▶ Preparing and installing cartridges
- ▶ Connecting the library to SCSI (221L)
- ▶ Connecting the library to Fibre Channel (221L-FC)
- ▶ Connecting the library to Ethernet
- ▶ Powering on the library
- ▶ Verifying the hardware installation

UNPACKING THE LIBRARY

No special tools are required for unpacking the library. Save all the original packing materials, including the accessory box, in case you need to ship or move the library later.

1. Remove the library from the packing materials.
2. Grasp the library's door at the top and pull it open, as shown in [Figure 2-1](#).

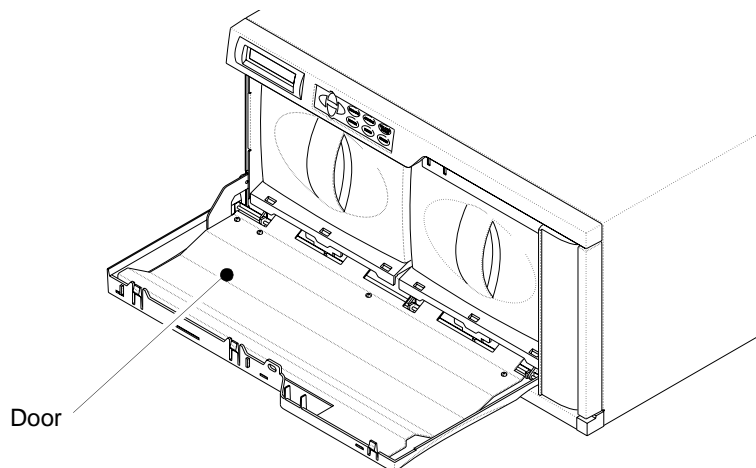


Figure 2-1 Opening the library's door

3. From inside the door, remove the magazine on the left side by grasping the handle, shown in [Figure 2-2](#), and pulling the magazine straight out.
4. Remove the robot shipping brace from the magazine, as shown in [Figure 2-2](#).

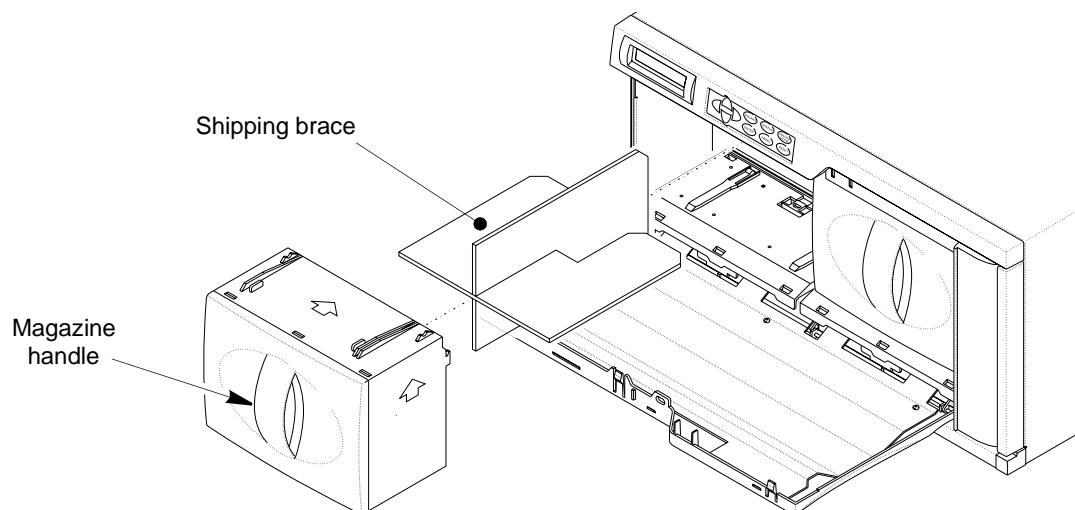


Figure 2-2 Removing the robot shipping brace

OBTAINING ACCESSORIES AND EQUIPMENT

Make sure that you have all the accessories and equipment for library installation and operation, as indicated in [Table 2-1](#). Many of these items are included in the library accessory box. If necessary, you can purchase items from Exabyte (see [page iv](#)).

Table 2-1 *Accessories and equipment for installation and operation*

Accessories and Equipment	
Power Cord	Two power cords are provided with the library: one for use in the US and Canada and one for use in Europe. If you plan to use the library outside of these locations, refer to page 173 for power cord requirements.
SCSI Cables (221L)	<p>Two SCSI cables are provided with the library: one for connecting a host computer to the library, and one for connecting the library to a tape drive.</p> <p>You will need one or more additional cables if you plan to install a second tape drive in the library or if you plan to attach multiple SCSI buses to the library. You can purchase SCSI cables from Exabyte or provide your own. If you want to use your own cables, follow these guidelines:</p> <ul style="list-style-type: none"> ▪ Use wide LVD SCSI cables that conform to SCSI-3 specifications. To comply with the regulations and standards listed in Appendix A, all SCSI cables used with the library must be properly shielded. ▪ The maximum allowable length of an LVD SCSI bus is 12 meters (39 feet) if you have more than two devices on the bus. To determine the bus length: <ul style="list-style-type: none"> a. Add together the lengths of all external SCSI cables on the bus. b. Add 23 centimeters (9 inches) for the internal cable length used by each tape drive on the bus and 5 centimeters (2 inches) for the internal cable length used by the robot. c. Add the internal cable lengths for any other SCSI devices on the bus.
SCSI Bus Terminator(s) (221L)	<p>One SCSI terminator is provided with the library.</p> <p>You may need additional terminators if you have more than one SCSI bus attached to the library.</p> <p>You can purchase terminators from Exabyte or provide your own. If you want to use your own terminators, use active terminators such as the AMP 796051-1 (SE/LVD Multi-mode) SCSI terminator. Termination must be external; do not use internal terminators.</p>
Fibre Channel Cables (221L-FC)	<p>No Fibre Channel cables are included with the library. The number of optical fiber cables required for attaching the library to a Fibre Channel network depends on how many tape drives are installed.</p> <p>You can purchase optical fiber cables from Exabyte or provide your own. Use either 50-micron or 62.5-micron multi-mode optical fiber cables with dual single-channel (LC) connectors. If you choose 50-micron multi-mode optical fiber cables, they must comply with the 100-M5-SN-I classification as specified in the Fibre Channel standard (FC-P1). If you choose 62.5-micron multi-mode optical fiber cables, they must meet the 100-M6-SN-I classification.</p> <p>Note: The length of 62.5 micron multi-mode cables should not exceed 275 meters. Operation over distances greater than 275 meters cannot be guaranteed.</p>

Table 2-1 Accessories and equipment for installation and operation (continued)

Accessories and Equipment	
Second Tape Drive (Optional)	The library is shipped with one tape drive installed. If desired, you can install a second tape drive. Contact Exabyte for tape drive upgrade kits
Ethernet Cable	<p>A shielded Ethernet cable is provided with the library. You can use this cable to connect the library to an Ethernet network for remote monitoring, management, firmware upgrades, and diagnostics.</p> <p>If you want to provide your own Ethernet cable, use a shielded Category 5 (10/100BaseT connection) data-grade cable or similar Category 5 cable that is compliant with EIA/TIA 568. The library's Ethernet port connector is a pin-through-hole RJ-45 shielded connector.</p> <p>To comply with the regulations and standards listed in Appendix A, all Ethernet cables used with the library must be properly shielded.</p>
Serial Cable (Optional)	If you want to connect to the library's Console interface for firmware upgrades and diagnostics, use a straight-through 9-pin serial cable (not a null modem cable).
Bar Code Labels	Sample bar code labels are included with the library. If you want to prepare your own labels, refer to the <i>Exabyte Bar Code Label Specification for LTO Ultrium Cartridges</i> on the documentation CD.
Cartridges	<p>One or more data cartridges and a cleaning cartridge may be included. Use only data and cleaning cartridges designed specifically for LTO Ultrium tape drives:</p> <ul style="list-style-type: none"> ▪ The LTO Ultrium 1 tape drive uses Ultrium 1 data cartridges, which are black (100 GB, native). ▪ The LTO-2 tape drive supports Ultrium 1 data cartridges and Ultrium 2 data cartridges, which are purple (200 GB, native). ▪ The LTO-3 tape drive supports Ultrium 3 data cartridges, which are slate blue (400 GB, native). It can also read and write Ultrium 2 cartridges and read Ultrium 1 cartridges. ▪ LTO Ultrium cleaning cartridges. <p>For maximum capacity, use Ultrium 2 data cartridges with the LTO-2 tape drive and Ultrium 3 data cartridges with the LTO-3 tape drive.</p> <p>You can purchase LTO Ultrium ExaPaks (7 data cartridges in a cartridge magazine) from Exabyte.</p>
Rack-Mount Hardware (Optional)	If you want to install the library in a rack, contact Exabyte for the rack-mount kit.

PREPARING FOR INSTALLATION

Before you begin installing the library, do the following:

- ▶ **Make sure that the SCSI host bus or Fibre Channel adapter card installed in the host computer, any necessary device drivers, and your backup software are compatible with the library.** Compatibility information is available at www.exabyte.com. If your software application has not yet been certified for the 221L library, you can use one of the library's emulation modes (see [page 43](#)). You can install the software on the host computer before or after library installation. However, if you install the software first, you may need to reconfigure it for use with the library after library installation is complete.
- ▶ **For SCSI configurations, plan the SCSI bus connections for the library and make sure you have the necessary SCSI cables and terminators.** The library can include up to three SCSI devices: the library itself and two tape drives. If desired, you can connect each device to a different SCSI bus. Before beginning installation, determine how many SCSI buses you will connect to the library and which bus you will connect to which device (see [page 18](#) for guidelines). Obtain the required SCSI cables and terminators for these connections.
- ▶ **For Fibre Channel configurations, plan the Fibre Channel connections and make sure you have the necessary hardware and optical fiber cables to connect the library and tape drive(s) to the network.** Before beginning installation, determine how many cables you will need and how they will be connected to Fibre Channel hubs, switches, or hosts (see [page 20](#) for guidelines).
- ▶ **Locate an appropriate area for the library.** The library must be operated on a level surface. There must be approximately 15 cm (6 inches) of open area behind the library for adequate air flow.
- ▶ **Ensure that the work area is free from conditions that could cause electrostatic discharge (ESD).** Discharge static electricity from your body by touching a known grounded surface, such as a computer's metal chassis.



Warning

Before performing any installation or maintenance procedures, be sure that the library's power switch is off and that the power cord is disconnected from the library and the outlet.

INSTALLING THE LIBRARY IN A RACK

The library is designed to operate as a standalone unit or in a standard 19-inch rack. If you plan to use the library in a rack and have obtained the rack-mount kit from Exabyte, install the library in the rack using the instructions provided in the kit.

INSTALLING A SECOND TAPE DRIVE

The library is shipped with one tape drive installed. If you plan to install a second tape drive and have obtained the tape drive kit from Exabyte, install the drive using the instructions provided in the kit or on [page 139](#).

PREPARING AND INSTALLING CARTRIDGES

Be sure to use the appropriate cartridges for the tape drive. [Table 2-2](#) shows the cartridge and write/read compatibility for the LTO Ultrium tape drives in the library.

Table 2-2 Tape drive cartridge read/write compatibility

LTO Ultrium Tape Drive	Ultrium 3 (slate blue)		Ultrium 2 (purple)		Ultrium 1 (black)		LTO Ultrium cleaning cartridge
	Read	Write	Read	Write	Read	Write	
LTO-3	✓	✓	✓	✓	✓	No	✓
LTO-2	No	No	✓	✓	✓	✓	✓
LTO-1	No	No	No	No	✓	✓	✓

For maximum capacity, use Ultrium 2 cartridges with the Ultrium 2 tape drive and Ultrium 3 data cartridges with the Ultrium 3 tape drive.

PREPARING CARTRIDGES

1. If desired, you can affix bar code labels to the cartridges. Position each label in the indented area on the cartridge, as shown in [Figure 2-3](#).

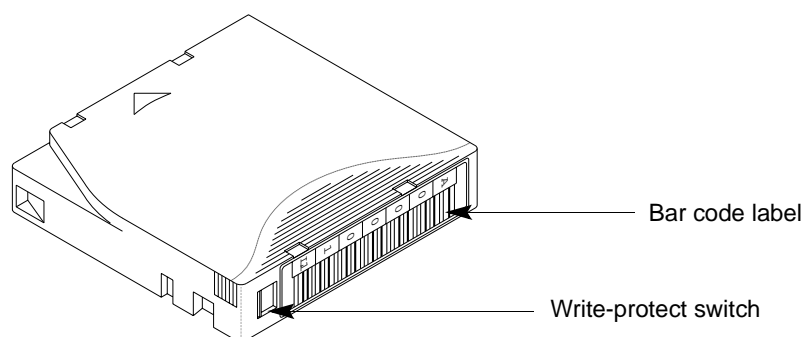


Figure 2-3 Bar code label placement and write-protect switch location

2. Make sure the write-protect switch on each cartridge is set for the desired operation. Refer to your cartridge packaging for instructions for setting the write-protect switch.

INSTALLING CARTRIDGES IN THE FIXED SLOTS

1. Open the library's door, as shown on [page 10](#).
2. Remove each magazine by grasping the handle and pulling straight out, as shown in [Figure 2-4](#).

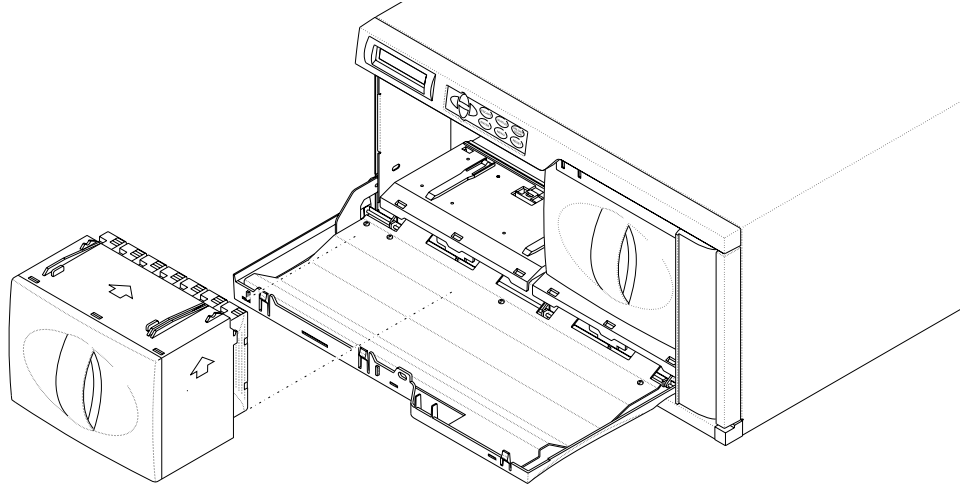


Figure 2-4 Removing a magazine

3. Install cartridges into the fixed slots, with the write-protect switches down and facing out, as shown in [Figure 2-5](#).

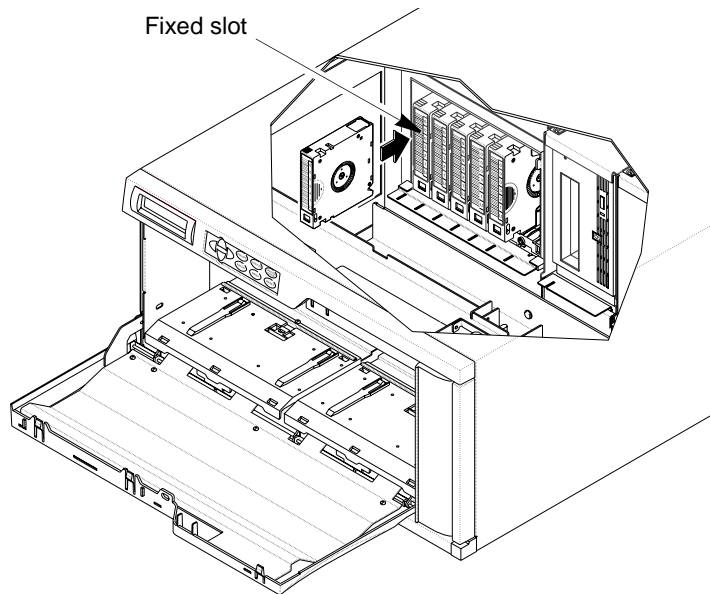


Figure 2-5 Installing cartridges in the fixed slots

Note: If your software license limits the number of cartridge slots you can use, you may need to configure the library to use less than 21 slots (see [page 48](#)).

4. If you plan to use a cleaning cartridge to clean the tape drive(s), place the cleaning cartridge in the fixed slot closest to the tape drive(s), as shown in [Figure 2-6](#). To use this slot for a cleaning cartridge, you must set the Clean Slot option during library configuration (described on [page 44](#)).

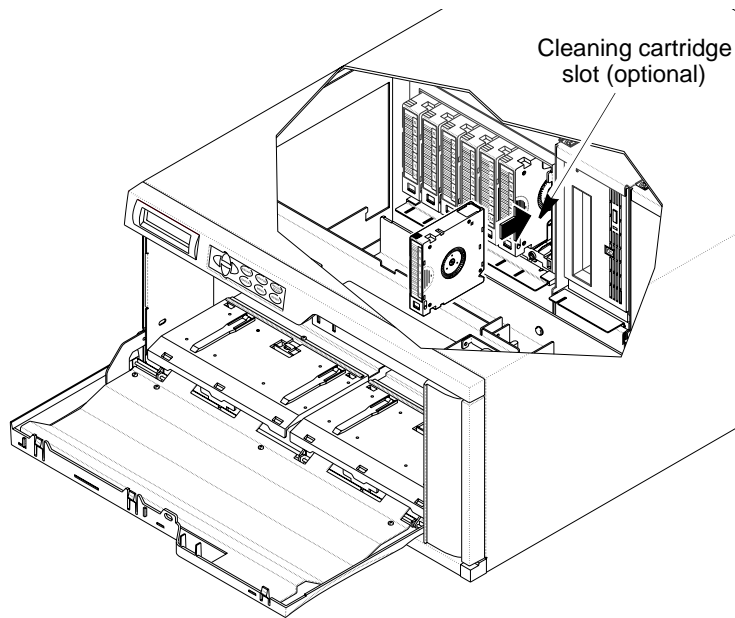


Figure 2-6 Installing a cleaning cartridge

Note: If you are using a cleaning cartridge and also set the Max Addressable Slot option (see [page 48](#)) to less than 21 slots, place the cleaning cartridge in the highest addressable slot. For example, if you configure the library to use 14 slots, place the cleaning cartridge in slot 14. See [page 69](#) for the cartridge numbering scheme.



Caution

Do not use cleaning cartridges other than those approved for LTO Ultrium tape drives. Using other types of cleaning cartridges will void your warranty.

Carefully follow all instructions and recommendations provided with the cleaning cartridge.

INSTALLING CARTRIDGES IN THE MAGAZINES

1. Install cartridges in each magazine so that the write-protect switches are positioned away from the alignment guides, as shown in [Figure 2-7](#).

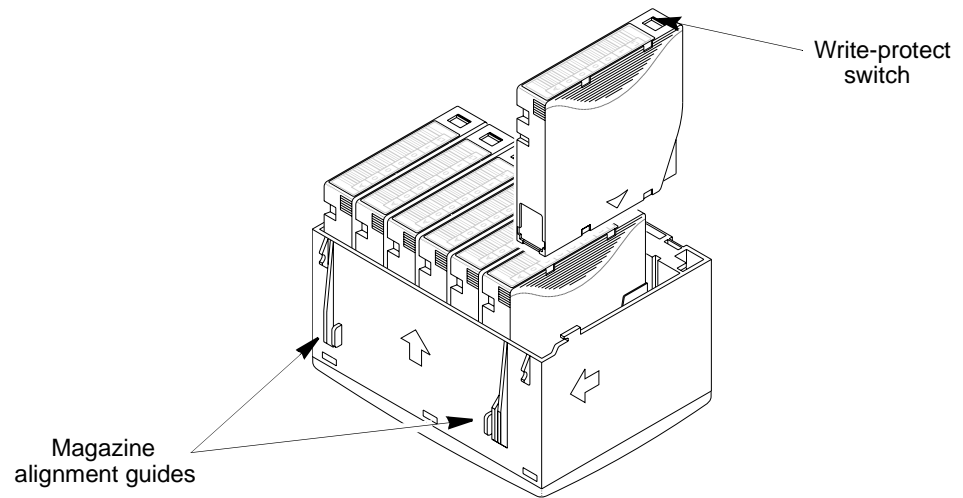


Figure 2-7 Installing cartridges in a magazine

2. Insert each cartridge magazine into the library so that the alignment guides are up (as shown in [Figure 2-8](#)) and the alignment grooves are down.

! Important The magazine fits only one way; do not try to force it into the library. If the magazine does not slide in easily, check its orientation and re-insert it.

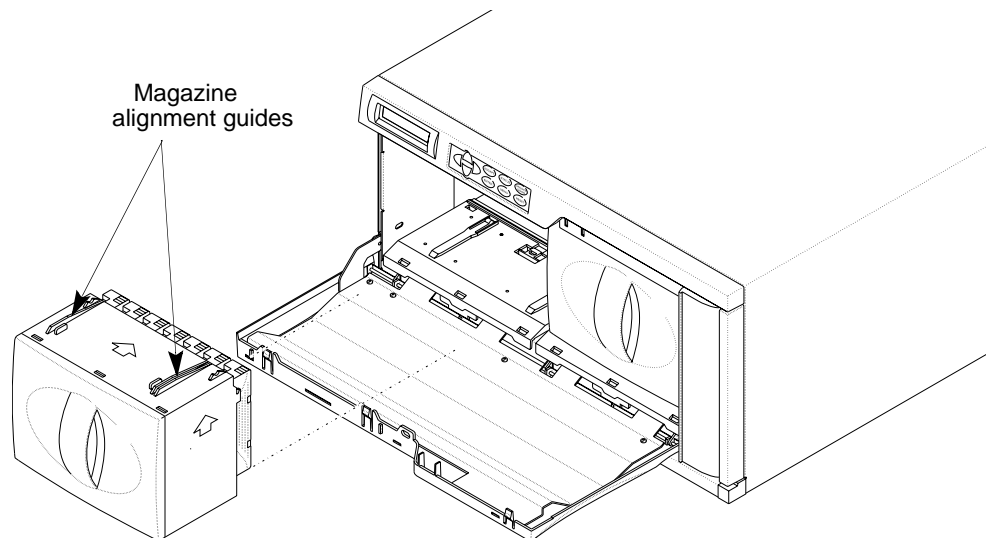


Figure 2-8 Installing a magazine in the library

3. Close the library's door.

CONNECTING THE LIBRARY TO SCSI (221L)

This section provides guidelines for connecting the library to host systems via SCSI. The 221L library and its tape drive(s) have independent wide LVD (low-voltage differential) SCSI interfaces and can be connected to a single or separate SCSI buses.

Note: To ensure optimum tape drive performance, connect the tape drive to an Ultra3 (Ultra160) SCSI host bus adapter.

GUIDELINES FOR CONNECTING TO SCSI

Before connecting the library and its tape drive(s) to SCSI, determine how many SCSI buses you will be using, which bus will connect to which device, and how many cables and terminators you will require. Keep in mind these guidelines as you plan your SCSI connections:

- ▶ **For best performance, avoid connecting more than two LTO tape drives to the same SCSI bus.** You can connect a library with two LTO tape drives to a single SCSI bus, but avoid placing additional LTO tape drives, whether standalone or in other libraries, on the same SCSI bus.
- ▶ **Do not connect single-ended SCSI devices.** Although single-ended SCSI is compatible with LVD Ultra2 and Ultra3 (Ultra160) SCSI, Exabyte does not support single-ended devices on the SCSI buses attached to the library or its tape drive(s).
- ▶ **Do not connect the library to a RAID controller.** The library will not operate if it is connected to a RAID controller.
- ▶ **Do not exceed SCSI bus length restrictions.** The maximum allowable length of an LVD SCSI bus is 12 meters (39 feet) if you have more than two devices on the bus. Make sure none of the buses attached to the library or its tape drive(s) exceed this length. To determine the length of each bus:
 - a. Add together the lengths of all external SCSI cables on the bus.
 - b. For each bus attached to a tape drive, add 23 centimeters (9 inches) for the internal cable length used by each tape drive on the bus.
 - c. For the bus attached to the library, add 5 centimeters (2 inches) for the internal cable length used by the library.
 - d. Add the internal cable lengths for any other SCSI devices on the bus.
- ▶ **Make sure each SCSI bus is properly terminated.** You must install a terminator on the device at the physical end of each bus. Typically, one of the library's tape drives will terminate the bus. See [page 11](#) for terminator requirements.

MAKING THE SCSI CONNECTIONS

To connect the library and its tape drive(s) to SCSI:

1. Make sure that the library is powered off.
2. Power off the host computer(s) and any peripheral devices on the SCSI bus(es).
3. Connect a SCSI cable to the host and to one of the library's SCSI connectors, shown in [Figure 2-9](#).

! Important Do not over-tighten the SCSI cable jack screws.

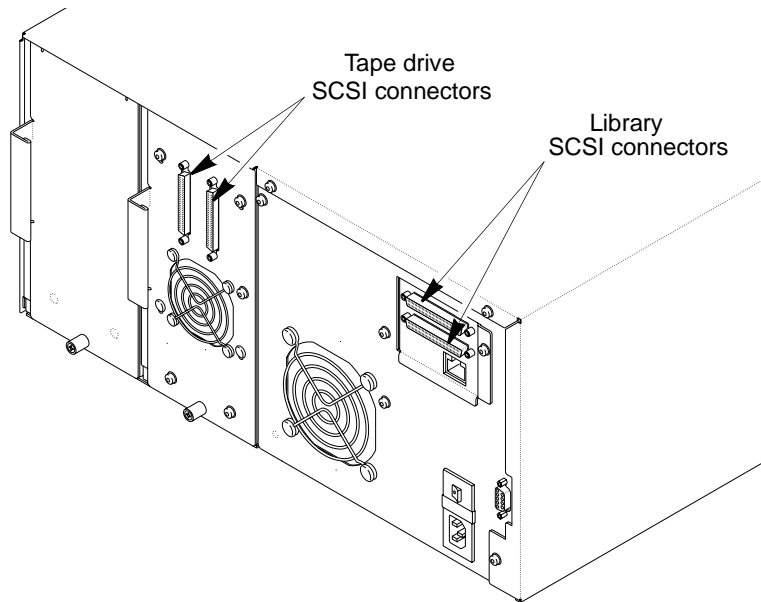


Figure 2-9 Location of library and tape drive SCSI connectors

4. Connect other SCSI cables, as necessary, depending on your bus configuration. If the library and tape drive(s) will share one bus, use jumper cables to daisy-chain the library and tape drive connectors, as shown in [Figure 2-10](#).

5. For the device at the physical end of each bus, install a terminator on one of the SCSI connectors for that device.

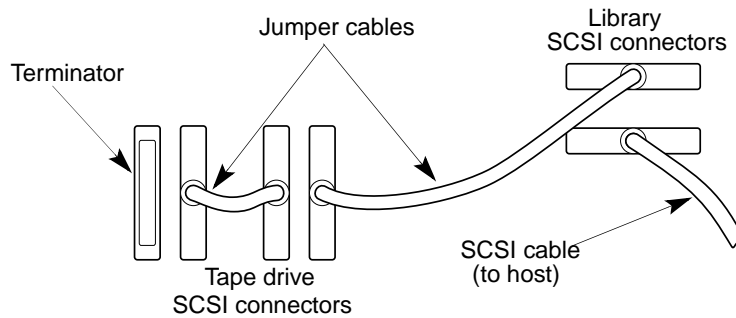


Figure 2-10 Cabling for a shared SCSI bus

6. Power on all of the peripheral devices on the SCSI bus(es).
7. Power on the library as described on [page 24](#).

CONNECTING THE LIBRARY TO FIBRE CHANNEL (221L-FC)

This section provides instructions for connecting the 221L-FC library and its tape drive(s) to a Fibre Channel network.

[Figure 2-11](#) shows the back panel of the 221L-FC. The library has one integrated dual single-channel LC optical fiber connector, Port A, which is used to connect the library to a single loop on a Fibre Channel network. Each tape drive also includes one integrated dual LC optical fiber connector, Port A, for connecting the tape drive to a Fibre Channel network. The library can be on the same loop as the tape drive(s) or on a separate loop.

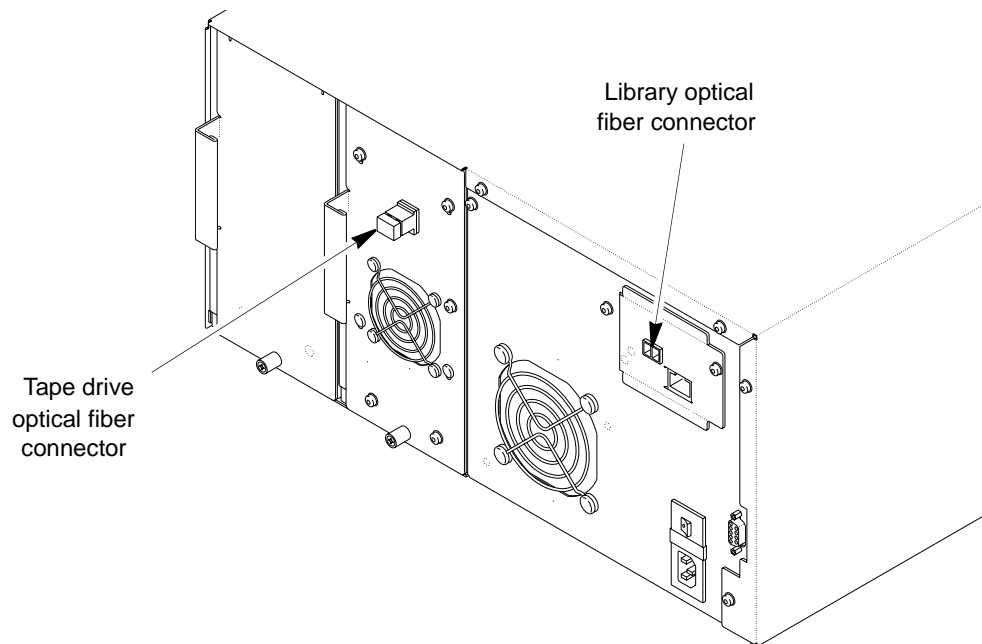


Figure 2-11 Fibre Channel connectors on the back of the 221L-FC

In a Fibre Channel environment, you can connect the library and tape drive(s) to a Fibre Channel hub or switch in an arbitrated loop or a switched fabric. For simplicity in these instructions, each of these situations is referred to as a “network.”

To connect the library and its tape drive(s) to a Fibre Channel network:

1. Remove the protective plugs (if present) from the library’s optical fiber connector and the optical connectors on each tape drive (see [Figure 2-12](#)).

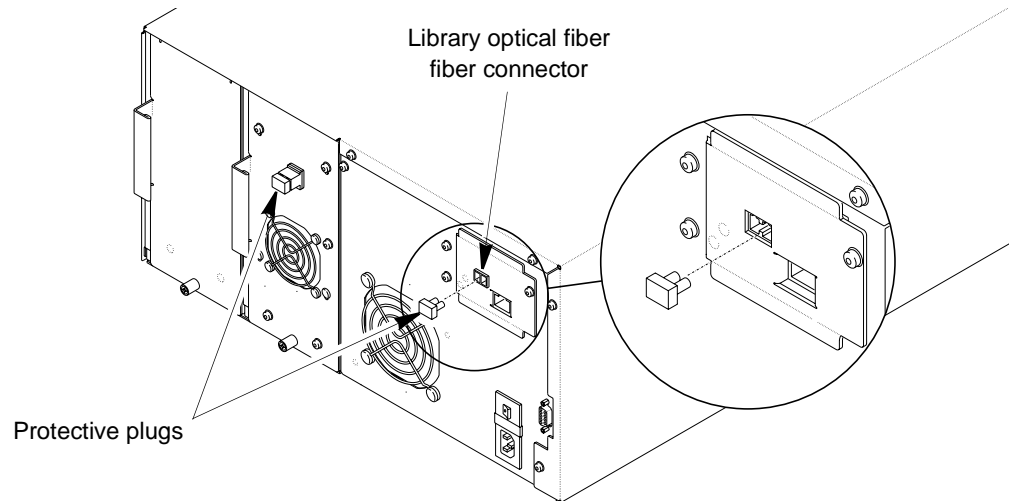


Figure 2-12 Removing the protective plugs from the optical fiber connectors

2. Attach an optical cable from the hub or switch to the library’s optical fiber connector (see [Figure 2-13](#)). The connectors are keyed to ensure that the cable is attached in the correct orientation.
3. Attach an optical cable from the hub or switch to the optical fiber connector on each tape drive (see [Figure 2-13](#)). The connector and the cable are keyed to ensure that the cable is attached in the correct orientation.

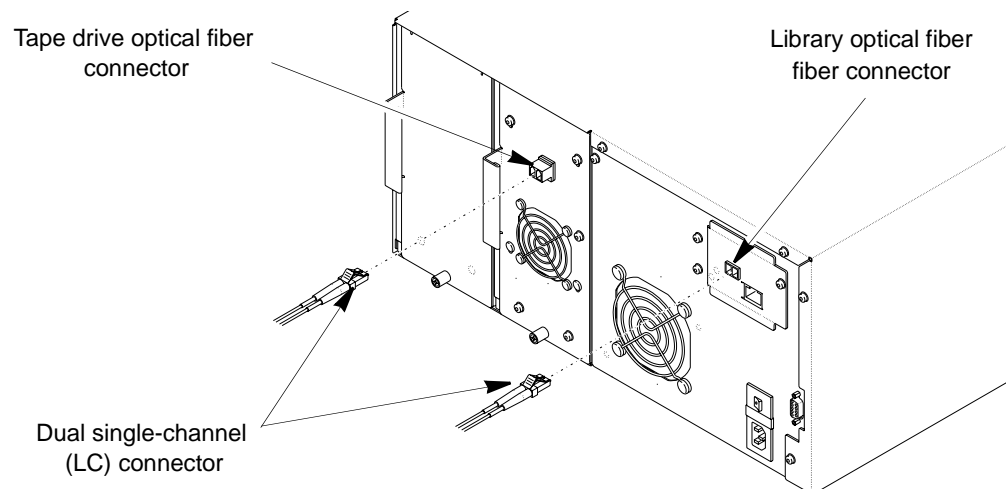


Figure 2-13 Connecting optical cables to the 221L-FC library and tape drive

Figure 2-14 shows a schematic representation of a possible configuration for integrating the library and tape drives into an arbitrated loop.

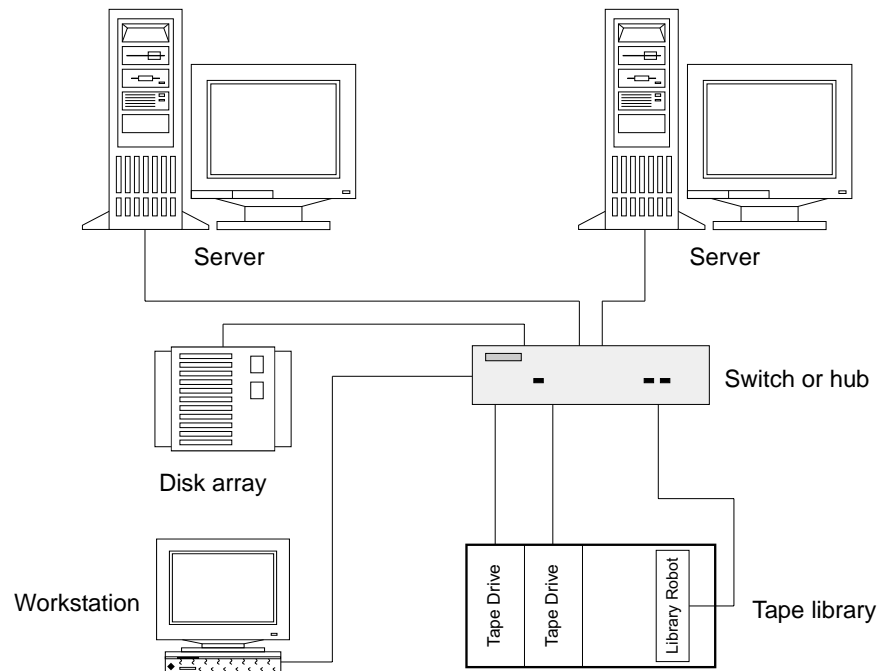


Figure 2-14 221L-FC library and tape drives connected to an arbitrated loop

Note: Once the library has been powered on and the Fibre Channel loop has been initialized, avoid disconnecting the library from the loop. If you need to disconnect the library from the loop, 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 loop. When you have reconnected the library, use the utility to return the port to a participating state.

CONNECTING THE LIBRARY TO ETHERNET (OPTIONAL)

If desired, you can connect the library to an Ethernet network to remotely monitor and manage library operation, create diagnostic listings, and upgrade library firmware. You can use the library's built-in Remote Management utility and a standard web browser to remotely configure, monitor, and manage the library (see [Chapter 6](#)). For information about upgrading firmware and creating diagnostic listings, see [page 143](#).

Note: Your library may include Exabyte Library Monitor software on CD. Exabyte Library Monitor is an older program for remote monitoring that has been replaced by the library's built-in Remote Management utility. The Remote Management utility is available with the latest library firmware. You can download the latest firmware from Exabyte's web site (www.exabyte.com). Instructions for upgrading library firmware are provided on [page 143](#).

To connect the library to Ethernet using the provided cable:

1. Insert one end of the cable into the library's Ethernet port until you hear it snap into place. The Ethernet port is located on the back of the library, as shown in [Figure 2-15](#).

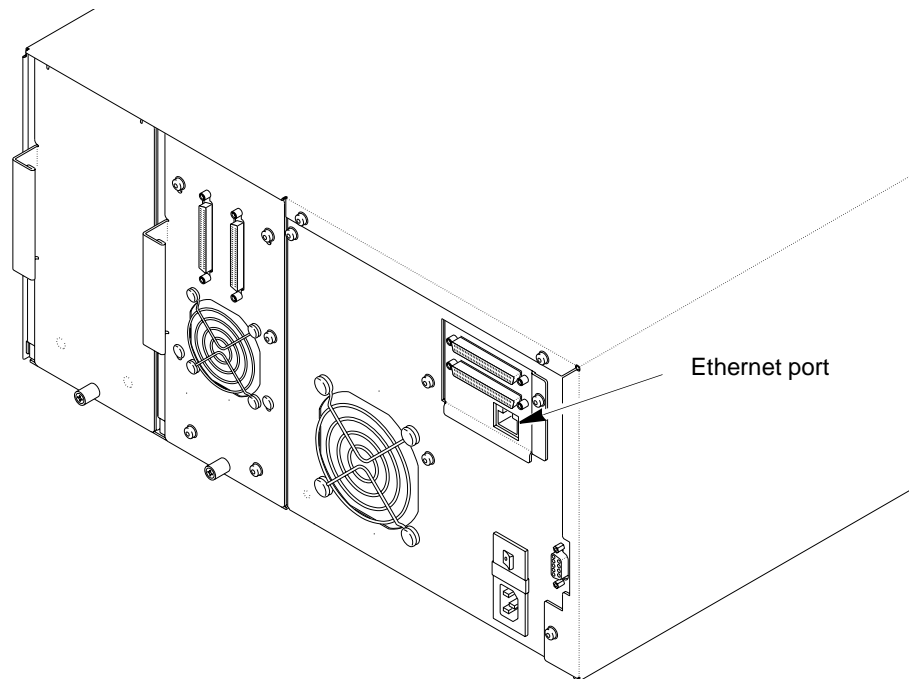


Figure 2-15 Location of Ethernet port (221L shown)

2. Connect the other end of the cable to the network or directly to the server you plan to use to monitor the library or upload firmware.

When you perform library configuration, you will configure the library's Ethernet interface (see [page 38](#)).

POWERING ON THE LIBRARY

To power on the library:

1. Make sure that the power switch on the back of the library, shown in [Figure 2-16](#), is off (the 0 is pressed).

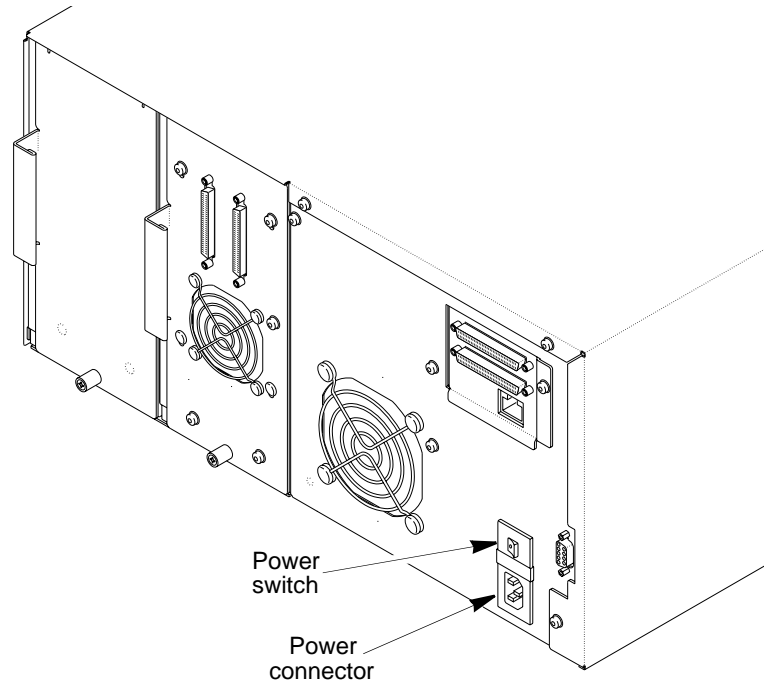


Figure 2-16 Location of library's power connector and power switch

2. Connect the female end of the power cord to the power connector on the back of the library.

! Important Two power cords are shipped with the library: One for use in the US and Canada, and one for use in Europe. Use the correct power cord for your location. See [page 173](#) for power cord requirements for other locations.

3. Plug the male end of the power cord into the power source.

Note: The library has autoranging voltage selection, so you do not need to change the voltage setting.

4. Make sure the library's door is closed.
5. Push the power switch on the back of the library to the on position (the I is pressed). The library performs its power-on sequence. During this time, the cooling fans begin to operate, the LCD illuminates, and the tape drive(s) and library perform power-on self-tests.

6. Power on the host computer system(s).

! Important Do not power on the host computer system(s) immediately after powering on the library. After you press the library's power switch, there is a short delay before the tape drives are on-line.

POWERING OFF THE 221L-FC

To avoid reinitializing the Fibre Channel loop when you power off the 221L-FC, use the utility provided with your switch or hub to bypass the ports used by the library and tape drive(s). When you are ready to power the library back on, use the utility to place the affected ports back into the loop, then power up the library.

VERIFYING THE HARDWARE INSTALLATION

After the library powers on, the LCD displays the Status screen. As shown in the example below, the first line of the Status screen displays the product name and the second line shows status for the tape drive(s) (ready, no tape loaded). If two drives are installed, the second line continuously cycles through status messages for Drive 1 and Drive 2.

Note: Drive 1 is the tape drive closest to the fixed cartridge slots; Drive 2 is located directly to the right of Drive 1.

<p>Exabyte 221L</p> <p>1 Ready - No Tape</p>
--

If the library powered on as described, continue with library configuration in [Chapter 3](#).

If the library did not power on as described, check the following:

- ▶ Is the power switch on?
- ▶ Is the power cord inserted correctly?
- ▶ Is the library's door closed?
- ▶ Is each SCSI bus terminated (221L)?
- ▶ Are the SCSI cables firmly connected to the library, tape drive(s), and host computer(s) (221L)?
- ▶ Are the devices on each SCSI bus attached to the library all LVD (221L)?
- ▶ Are the Fibre Channel cables firmly connected to the library, tape drive(s), and Fibre Channel hub or switch (221L-FC)?
- ▶ Is the host computer system turned on?
- ▶ Is there an error code displayed on the library LCD? (See [Chapter 8](#) for an explanation of the LCD error codes.)

If you cannot resolve the problem yourself, contact Exabyte Technical Support (see [page iv](#)).

NOTES

CONFIGURING THE LIBRARY

After installing the library hardware, you are ready to set configuration options. This chapter describes how to:

- ▶ Access configuration options
- ▶ Set configuration options
- ▶ Check the setup

ACCESSING CONFIGURATION OPTIONS

With the 221L or 221L-FC library, you can use the operator panel or the library's web-based Remote Management utility to access configuration options. If you plan to use the Remote Management utility, refer to [Chapter 6](#) for information about accessing the utility and instructions for setting configuration options through the utility.

USING THE OPERATOR PANEL

The library's operator panel includes a two-line LCD and keypad (see [Figure 3-1](#)) that allow you to interactively control library operations. Using the operator panel, you can set library options, check operating statistics, and diagnose errors.

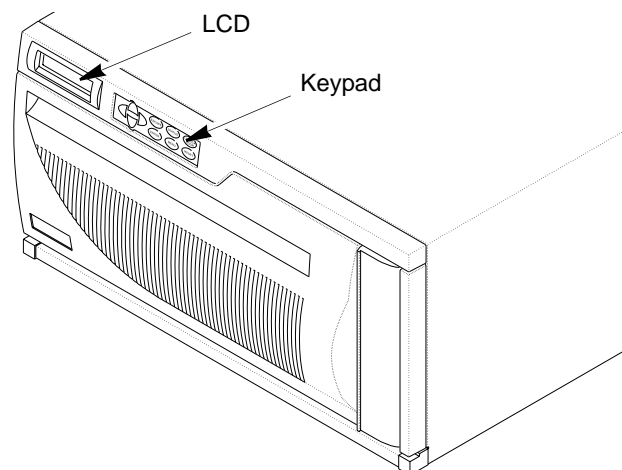


Figure 3-1 Library LCD and keypad

Viewing the Status Screen

During normal operation, the Status screen appears on the LCD (see the example below). You can use this screen to monitor library activities. By default, the Status screen displays the current operating status of the library and tape drive(s). If two drives are installed, the second line continuously cycles through status messages for Drive 1 and Drive 2.

Note: Drive 1 is the tape drive closest to the fixed cartridge slots; Drive 2 is located directly to the right of Drive 1.

```

      E x a b y t e   2 2 1 L
1 R e a d y - N o T a p e


```

If a hardware error occurs, an error code appears on the Status screen. Refer to [Chapter 8](#) for help in diagnosing and correcting errors. You must correct the error before operation can continue.

Using the Operator Panel Keys

Use the operator keys described in [Table 3-1](#) to perform the following actions:

Table 3-1 Operator key descriptions

Key	Action
 (Arrow keys)	Move up, down, left, or right through the menus and screens.
[ESCAPE]	Return to the previous menu or screen, or cancel an operation without saving changes.
[ENTER]	Select the item next to the screen arrow or accept a change.
[STATUS]	Display the Status screen, which shows library status, tape drive status, and operator messages.
[MENU]	Display a menu of options for configuring the library, viewing information screens, and issuing commands to the library.
[UNLOCKDOOR]	Stop robot operations and release the door's interlock mechanism. The door can then be opened manually.
[RESET]	Reset the library and tape drive(s).

OVERVIEW OF LIBRARY MENUS

To access the library's menus, press [MENU] on the keypad. The first menu to appear is "Cartridge Inventory." Press the up and down arrow keys to loop through the menu options.

If a menu contains a triangle symbol (▶), you can either press [ENTER] to access another screen or menu, or you can change values using the operator keys. A square symbol (■) indicates that the screen contains viewable information only.

Figure 3-2 shows the organization of the operator panel menus.

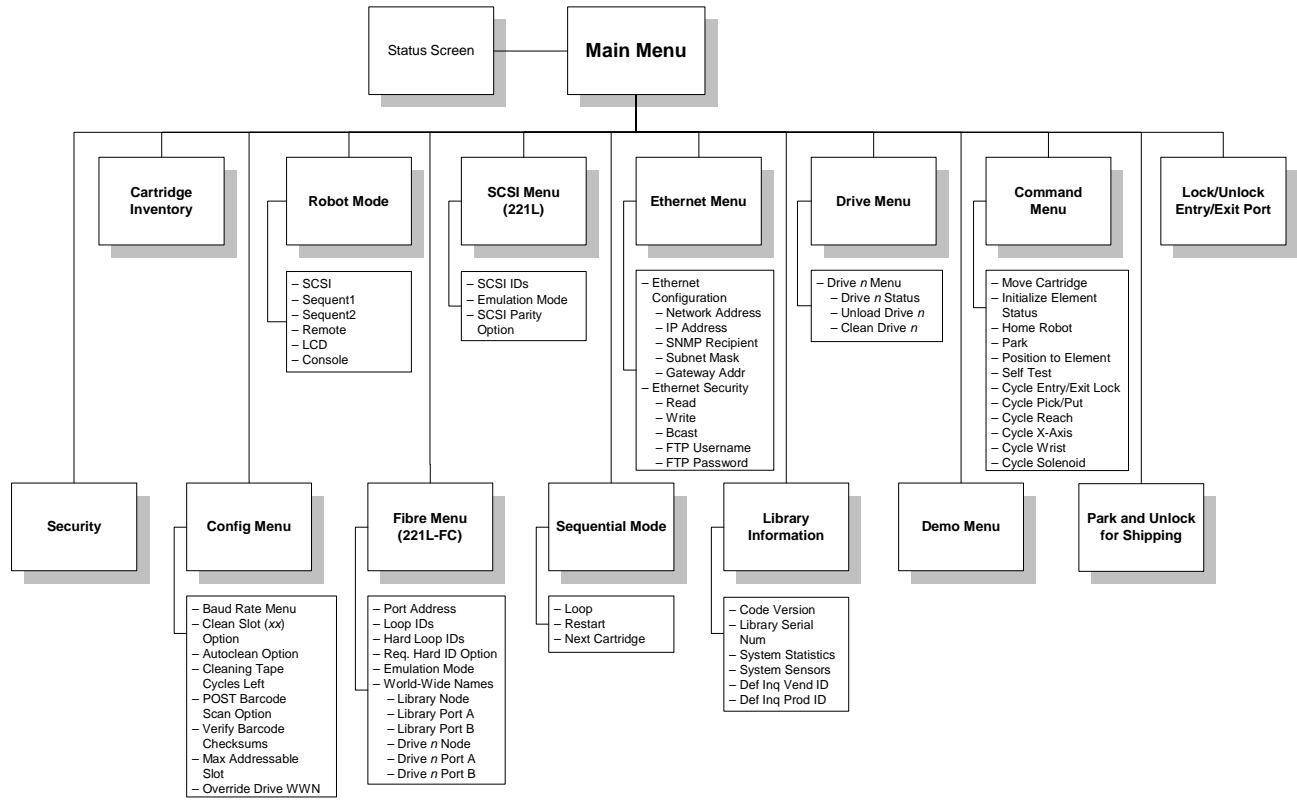


Figure 3-2 Library menu structure

Table 3-2 provides an overview of the menu options.

Table 3-2 Library menu options

Menu Option	Description
Security	Indicates whether options can be changed from the operator panel and allows you to enable or disable security with a password.
Cartridge Inventory	Displays the current inventory information for each library element.
Config Menu	Displays the current baud rate setting for the serial port and allows you to change the baud rate, reserve the last cartridge slot for use with a cleaning cartridge, enable Autoclean, choose whether the library scans the cartridge bar code labels during POST, choose whether bar code label checksums are verified, set the maximum number of cartridge slots the library uses, and override the world-wide names (WWNs) for the tape drives.
Robot Mode	Displays the current robot control mode (SCSI, Sequent1, Sequent2, Remote, LCD, or Console) and allows you to change the mode.

Table 3-2 Library menu options (continued)

Menu Option	Description
SCSI Menu (221L)	Displays the SCSI IDs for the library and tape drive(s). Allows you to set the SCSI IDs, emulation mode, and SCSI parity checking.
Fibre Menu (221L-FC)	Allows you to specify the Loop IDs for the library and tape drive(s), view the current Loop IDs, specify whether the library and tape drive(s) use hard or soft addressing when obtaining Loop IDs, set the emulation mode, and view the world-wide names for the library and tape drive(s).
Sequential Mode	Allows you to specify how the library functions when it operates in sequential mode.
Ethernet Menu	Displays the current network addressing method, IP address, SNMP recipient address, subnet mask, gateway address, and Ethernet security information. Allows you to change the library's FTP password and configure the library for operation on an Ethernet network.
Library Information	Displays information about the library's code versions, serial number, system statistics, system sensors, and INQUIRY data.
Drive Menu	Displays the status of the selected tape drive and allows you to issue commands to unload a cartridge from that drive or clean the drive.
Demo Menu	Allows you to run various demonstration programs to observe how the library operates.
Command Menu	Allows you to issue commands for basic robot motion operations and perform diagnostic tests.
Park and Unlock for Shipping	Moves the robot to the park position for shipping and unlocks the door.
Unlock/Lock Entry/Exit Port	Allows you to remove and replace an individual cartridge without opening the library door.

SETTING CONFIGURATION OPTIONS

This section provides step-by-step instructions for setting library configuration options. The instructions assume that you are using the operator panel to set options. If you are using the library's Remote Management utility (described in [Chapter 6](#)), the selections are generally the same, but you access menus and selections through web-style links and fields.

Table 3-3 provides an overview of each configuration option. Read through the table to determine which options you need to set, then follow the steps on the referenced pages.

Table 3-3 Library configuration options

Configuration Option	Description	See...
SCSI Configuration (221L)		
SCSI IDs	Setting SCSI IDs is required for 221L library operation. View the default settings and change them if necessary.	"Setting SCSI Configuration Options (221L)" on page 32
SCSI Parity	By default, parity checking is enabled. If desired, you can disable parity checking for the library if the SCSI adapter card connected to the library does not support parity checking.	
Fibre Channel Configuration (221L-FC)		
Hard Loop IDs	You can request specific Loop IDs to be used by the library and tape drive(s) during Fibre Channel initialization.	"Setting Fibre Channel Configuration Options (221L-FC)" on page 34
Require Hard ID	You can specify whether the library always attempts to obtain the specified Hard Loop ID (hard addressing) or accepts an ID assigned by the loop if the Hard Loop ID is unavailable (soft addressing).	
Override Drive WWN	You can specify whether the tape drives use the world-wide names (WWNs) set by their manufacturer or WWNs generated by the library. Overriding the tape drives' WWNs allows you to replace a tape drive without causing it to report a new WWN to an application.	
Ethernet Configuration		
Ethernet Addresses	If you are using the library's Ethernet interface, you can set the library's IP address, SNMP recipient address, subnet mask, and gateway address for communication across your Ethernet network. You can also choose whether the library uses a fixed IP address (static addressing) or an address assigned by a DHCP server.	"Setting Ethernet Configuration Options" on page 38
Ethernet Security	If you need to identify the library's SNMP settings to a network-based monitoring application, you can view the library's Read, Write, and Broadcast community access strings. If desired, you can change these settings from their default values. You can also view and set the library's FTP user name and password used for transferring firmware files and creating diagnostic listings.	
Emulation		
Emulation Mode	Setting an emulation mode is required if your application software does not support a 221L, but does support an Exabyte 210, 430, or 480 library.	"Changing the Emulation Mode" on page 43

Table 3-3 Library configuration options (continued)

Configuration Option	Description	See...
Automatic Tape Drive Cleaning		
Cleaning Slot Cleaning Cycles Autoclean	These options allow you to set up automatic tape drive cleaning. Note: To use automatic cleaning, a cleaning cartridge must be installed (see page 16).	“Setting up Automatic Tape Drive Cleaning” on page 44
Bar Code Scanning		
POST Bar Code Scan	You can set this option to cause the library to automatically scan all bar code labels whenever the door is opened and closed or the library is powered on. By default, this option is turned off.	“Setting Bar Code Scanning Options” on page 46
Verify Barcode Checksums	This option instructs the library to verify checksums on bar code labels. By default, this option is turned off.	
Number of Slots Used		
Max Addressable Slot	This option allows you to configure the library so that it uses and reports fewer slots than are physically present. You can set this option if your software application bases licensing on the number of slots being used and you are using fewer than the full number of slots in the library. If your software does not monitor the number of slots, you do not need to set this option. By default, the library reports 21 slots.	“Limiting the Number of Slots Used (Max Addressable Slot Option)” on page 48
Security		
LCD Security	By setting LCD security, you prevent unauthorized personnel from disrupting the operation of the library through the operator panel.	“Setting up Library Security” on page 49

SETTING SCSI CONFIGURATION OPTIONS (221L)

This section describes how to:

- ▶ Set SCSI IDs for the library and tape drive(s)
- ▶ Set SCSI parity checking

Setting the SCSI IDs

The library and its tape drive(s) are independent SCSI devices that can be attached to the same SCSI bus or to separate SCSI buses. Each device attached to a SCSI bus must have a unique SCSI ID within that bus. Because you may have multiple buses, the library does not check for duplicate SCSI IDs. Make sure you do not assign duplicate IDs within a bus.

To view and change the SCSI IDs:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press [MENU] to display the menus. The first menu item to appear is “Cartridge Inventory.”
3. Press the down arrow key until “SCSI Menu” appears. The SCSI Menu screen shows the current ID settings. In the example below, Drive 1 is set to 01, Drive 2 is set to 02, and the library is set to 00.

```

▶ S C S I   M e n u
D 0 1   0 2   L 0 0

```

Note: Drive 1 is the tape drive closest to the fixed cartridge slots.

4. If you want to change any of the settings, press [ENTER]. The SCSI IDs screen appears.

```

▶ S C S I   I D s
D 0 1   0 2   L 0 0

```

5. Press [ENTER] again to display the next screen for changing the IDs.

```

I D s ?   D 0 1   0 2   L 0 0
                ↑

```

6. To select a drive or the library, use the left and right arrow keys to move the screen arrow (↑) across columns. To change the ID, use the up and down arrow keys to scroll through values.
7. When you have set all the SCSI IDs, press [ENTER] to save your changes. The screen displays a status message for each ID you changed. When the library has finished changing the IDs, the SCSI IDs screen displays the new settings.

Setting the SCSI Parity Option

By default, the library checks all data coming across the SCSI bus for parity. If desired, you can disable parity checking for the library if the SCSI adapter card connected to the library does not support parity checking. The parity setting remains in effect across power cycles.

Note: Parity checking for the library can also be enabled through the application software. The method used last to set parity checking (operator panel or software) has precedence. Parity checking for the tape drive(s) is set separately.

To set parity checking:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press [MENU] to display the menus (or return to the top of the menu selections). Press the down arrow key until “SCSI Menu” appears on the screen, then press [ENTER].
3. Press the down arrow key until “SCSI Parity” appears, as shown below. This screen shows whether parity is enabled (1) or disabled (0).

```

▶ S C S I   P a r i t y
   O p t i o n :   1
  
```

4. Press [ENTER]. The following screen appears.

```

S C S I
P a r i t y ?   1 ↓
  
```

5. Use the up or down arrow key to select “1” to turn parity checking on or “0” to turn parity checking off, then press [ENTER]. The screen shows the new setting.

SETTING FIBRE CHANNEL CONFIGURATION OPTIONS (221L-FC)

For the 221L-FC library, you can set options that specify how the library and tape drive(s) obtain Loop IDs on a Fibre Channel loop. You can also specify whether the tape drives use the world-wide names (WWNs) set by their manufacturer or WWNs generated by the library (see [page 37](#)).

During Fibre Channel loop initialization, each device on the loop is assigned a unique Loop ID between 0 and 125 (00h and 7Dh). You can request specific Loop IDs by specifying values through the operator panel. You can also specify whether the library uses hard addressing or soft addressing to obtain Loop IDs, as described below.

Hard Addressing If desired, you can use the Require Hard ID option to force the library and tape drive(s) to use the Loop IDs that you specify. During loop initialization, the library and drive(s) attempt to obtain the IDs you specify through the operator panel. If a requested Loop ID is already in use by another device on the loop, the library or tape drive requesting that ID will not be able to participate on the Fibre Channel loop.

Soft Addressing By default, the library and tape drive(s) use soft addressing to obtain their Loop IDs. When using soft addressing, the library and tape drive(s) first attempt to obtain the Loop IDs you specify through the operator panel. If an ID is already in use by another device on the loop, the library or drive requesting that ID is assigned an another available ID.

Setting the Loop IDs

To set the Loop IDs for the library and tape drive(s):

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press [MENU] to display the menus. Press the down arrow key until “Fibre Menu” appears. The Fibre Menu screen shows the current Loop ID for each tape drive and the library. Each ID is a two-digit hexadecimal number.

In the following example, Drive 1 is 01, Drive 2 is 02, and the library is set to 00.

```

▶ F i b r e   M e n u
D 0 1   0 2           L 0 0
  
```

Note: Drive 1 is the tape drive closest to the fixed cartridge slots; Drive 2 is located directly to the right of Drive 1.

The second line of the Fibre Menu may include one of the codes listed in [Table 3-4](#) instead of a Loop ID.

Table 3-4 Loop ID codes

Loop ID Code	Description
?	The Loop ID is unknown because the Loop Initialization process (LIP) is not complete.
HW	The library's Fibre Channel interface card is not installed.
B	A drive blank is installed at this tape drive location.
SA	Soft addressing is in use.
NP	The library or tape drive is in a non-participating mode because it could not obtain a Loop ID.

3. Press [ENTER]. Press the down arrow key until the Hard Loop IDs screen appears.

```

▶ H a r d   L o o p   I D s
D 0 1   0 2   L 0 0
  
```

4. Press [ENTER] again to display the next screen for changing the Loop IDs.

```

I D s ?   D 0 1   0 2   L 0 0
           ↑
  
```

5. Use the left and right arrow keys to move the screen arrow (↑) across columns until it is under either digit of the Loop ID that you want to change. The Loop ID is a two-digit hexadecimal number from 00h through 7Dh.
6. To change the ID, use the up and down arrow keys to scroll through values for each digit of the address. If you do not care what Loop IDs the library and tape drive(s) use, you can set the Loop IDs to SA (soft addressing).
7. Press [ENTER] to save your changes. The library resets and the changes take effect.

Note: Unless you turn on the Require Hard ID option (see the following section), changing the Loop ID of the library or a tape drive does not guarantee that the selected Loop ID will be used during login on the Fibre Channel network.

Setting the Require Hard ID Option

To set the Require Hard ID option:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press [MENU] to display the menus. Press the down arrow key until “Fibre Menu” appears.
3. Press [ENTER]. Press the down arrow key until the Require Hard ID Option screen appears. This screen shows the current setting. The default setting for the Require Hard ID option is disabled (0).

```

▶ R e q u i r e   H a r d   I D
O p t i o n :                               0

```

4. Press [ENTER]. The following screen appears.

```

R e q u i r e   H a r d
I D ?                               0   ↑

```

5. Use the up or down arrow key to select “1” to require hard addressing or “0” to allow soft addressing, then press [ENTER]. The screen shows the new setting.

! Important If you turn on the Require Hard ID option, and the Loop ID you selected for the library or a tape drive is already in use by another device on the network, the library or tape drive will not be able to log onto the network and will be unable to participate on the Fibre Channel loop.

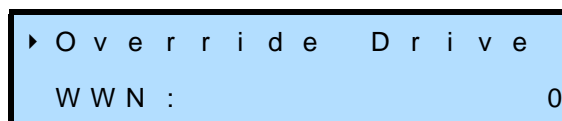
To ensure that the library and tape drive(s) use soft addressing when the Loop ID you set is unavailable, disable (0) the Require Hard ID option.

Overriding the Tape Drive World-Wide Names

By default, the tape drives use the world-wide names (WWNs) set by their manufacturer. These are the WWNs reported to an application. If you want to be able to replace tape drives without causing new WWNs to be reported to the application, you can set an option that overrides the tape drives' WWNs. When you use the Override Drive WWN option, the library generates unique WWNs for each tape drive based on its own WWN. These WWNs remain in effect for any tape drives installed in the two tape drive bays.

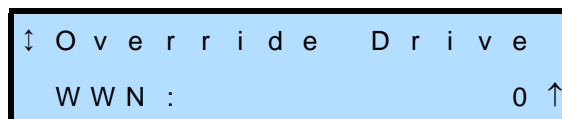
To set the Override Drive WWN option:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press [MENU] to display the menus. Press the down arrow key until “Config Menu” appears, then press [ENTER].
3. Press the down arrow key until “Override Drive WWN” appears. This screen shows whether the option is on (1) or off (0).



► O v e r r i d e D r i v e
W W N : 0

4. Press [ENTER]. The following screen appears.



↑ O v e r r i d e D r i v e
W W N : 0 ↑

5. Use the up arrow key to turn the option on, then press [ENTER]. The screen displays the new setting.

6. Reset the tape drive (see [page 66](#)) to cause the new WWNs to take effect.

! Important If you remove a tape drive after the Override Drive WWN option has been in effect, the library-generated WWN stays with the tape drive. If you want the tape drive to revert to its original WWN, you must turn off the Override Drive WWN option and reset the tape drive before removing it from the library.

SETTING ETHERNET CONFIGURATION OPTIONS

If desired, you can connect to the library's Ethernet interface to remotely monitor and manage operation, upgrade firmware, and create diagnostic listings. Instructions for connecting the library to Ethernet are provided on [page 22](#). For information about using the library's Remote Management utility, see [Chapter 6](#).

Configuring the library's Ethernet interface typically involves specifying the library's IP address, subnet mask, and gateway address. The IP address is used to route information from the library to the server. You can choose between dynamic (server-assigned) or static (user-assigned) addressing for the IP address. The subnet mask is used to route information to designated devices within the network. The gateway address allows information to be routed outside the subnet. You can also view and set the library's SNMP (Simple Network Management Protocol) recipient IP address.

If you are using a network-based library monitor/management application other than the library's Remote Management utility, you may need to identify the library's SNMP settings to the application. These settings include the read, write, and broadcast community strings. You can view these settings on the Ethernet Security screens, but you cannot change their values from the operator panel. If you need to change the values for these strings, you can use the library's Console interface. See [page 144](#) for information about connecting to the Console interface.

The library also includes an FTP interface that you can use to transfer firmware files or create diagnostic listings. You can set up an FTP user name and password for this interface or use the library's defaults. See [page 149](#) for instructions for accessing the library's FTP interface and using an FTP utility to upgrade firmware or obtain diagnostic listings.

Setting the Ethernet Addresses

To set the Ethernet addresses:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press [MENU] to display the menus. Press the down arrow key until “Ethernet Menu” appears.

```

▶ E t h e r n e t   M e n u
S   0 .   0 .   0 .   1
  
```

3. Press [ENTER]. The Ethernet Configuration menu appears.

```

▶ E t h e r n e t
  C o n f i g u r a t i o n
  
```

4. Press [ENTER]. The Network Address screen appears.

```

▶ N e t w o r k
  A d d r e s s : S t a t i c
  
```

There are five screens for setting Ethernet addresses: Network Address, IP Address, SNMP Recipient, Subnet Mask, and Gateway Address. Press the down arrow key to view each screen. The options are described in [Table 3-5](#).

Table 3-5 Ethernet address configuration options

Ethernet Address Option	Description
Network address	<p>Selects the method used to set the Internet Protocol (IP) address for the library, as follows:</p> <ul style="list-style-type: none"> ▪ Static – The library uses a fixed IP Address, which is assigned in the IP Address option, described below. ▪ DHCP – The library uses an IP address assigned by the network DHCP (Dynamic Host Configuration Protocol) server. <p>Static addressing is recommended. Dynamic assignment of the library’s IP address may require periodic reinstallation or reconfiguration of some monitoring software applications.</p>
IP Address	Sets the IP address for the library or displays the IP address obtained by the DHCP server.
SNMP Recipient	Sets the IP address for the SNMP trap recipient.

Table 3-5 Ethernet address configuration options (continued)

Ethernet Address Option	Description
Subnet Mask	Sets the subnet mask for the library. Note: This option displays “N/A” if the network address is set to DHCP.
Gateway Address	Sets the default TCP/IP (Transmission Control Protocol/Internet Protocol) gateway address for the library. Note: This option displays “N/A” if the network address is set to DHCP.

- At each screen, press [ENTER] to display another screen for setting values. To change addresses, use the left and right arrow keys to move the screen arrow (↑) across columns until it is under a digit you want to change. Use the up and down arrow keys to scroll through values. When you have finished changing all of the desired values, press [ENTER] to save your changes.

Viewing the SNMP Settings, FTP User Name, and FTP Password

The Ethernet Security screens allow you to view the read-only values for the library’s Read, Write, and Broadcast community access strings. You can also view and change the library’s FTP user name and password.

To view the Ethernet security screens:

- If the security option has been enabled, disable it (see [page 50](#)).
- Press [MENU] to display the menus. Press the down arrow key until “Ethernet Menu” appears.

```

▶ E t h e r n e t   M e n u
S   0 .   0 .   0 .   1

```

- Press [ENTER]. The Ethernet Configuration menu appears.

```

▶ E t h e r n e t
C o n f i g u r a t i o n

```

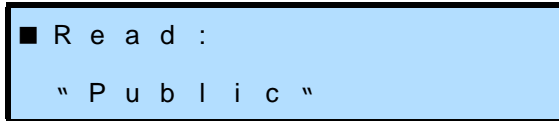
- Press the down arrow key until “Ethernet Security” appears.

```

▶ E t h e r n e t
S e c u r i t y

```


5. Press [ENTER]. The first screen to appear is shown below.



■ R e a d :
" P u b l i c "

There are five Ethernet security screens: Read, Write, Bcast (Broadcast), FTP User, and FTP User PW. Press the down arrow key to view each screen. The screens are described in [Table 3-6](#).

Note: If security is enabled (either from the LCD or SCSI), these options display asterisks (****).

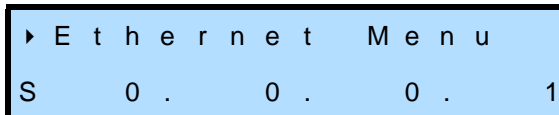
Table 3-6 Ethernet security screens

Ethernet Security	Description
Read	Displays the library's alphanumeric Read community string. The default is <i>public</i> .
Write	Displays the library's alphanumeric Write community string. The default is <i>public</i> .
Bcast (Broadcast)	Displays the library's alphanumeric Broadcast community string. The default is <i>public</i> .
FTP User	Displays the library's FTP user name, up to 16 characters. The default is <i>anonymous</i> .
FTP PW (Password)	Displays the library's FTP password, up to 16 characters. The default is <i>Exabyte</i> .

Changing the FTP User Name and Password


To change the library's FTP user name and password:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press [MENU] to display the menus. Press the down arrow key until "Ethernet Menu" appears.



► E t h e r n e t M e n u
S 0 . 0 . 0 . 1

3. Press [ENTER]. Press the down arrow key until "Ethernet Security" appears.



► E t h e r n e t
S e c u r i t y

4. Press [ENTER]. Press the down arrow key until the FTP User screen appears. “Anonymous” is the default FTP user name for the library.

```

▶ F T P   U s e r :
“ a n o n y m o u s ”

```

5. Press [ENTER] to display the screen for changing the user name.

```

a n o n y m o u s
↓                                     →

```

6. Use the left and right arrow keys to move the screen arrow (↑) across columns until it is under a character you want to change. Use the up and down arrow keys to scroll through letters. You can enter a user name of up to 16 characters. When you have finished changing all of the desired characters, press [ENTER] to save your changes. The FTP User screen displays the new user name.
7. To change the FTP password, press the down arrow key until the FTP PW screen appears. “Exabyte” is the default FTP password for the library.

```

▶ F T P   P W :
“ E x a b y t e ”

```

8. Press [ENTER] to display the screen for changing the password.

```

E x a b y t e
↓                                     →

```

9. Use the left and right arrow keys to move the screen arrow (↑) across columns until it is under a character you want to change. Use the up and down arrow keys to scroll through letters. You can enter a password of up to 16 characters. When you have finished changing all of the desired characters, press [ENTER] to save your changes. The FTP PW screen displays the new password.

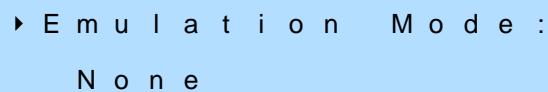
CHANGING THE EMULATION MODE

If your library software has not yet been certified for the Exabyte 221L or 221L-FC library, you can select an option that allows the library to emulate an Exabyte 210, 430, or 480 library. By default, the library returns “Exabyte 221L” in response to a SCSI INQUIRY command from an application. Changing the emulation mode causes the library to return “EXB-210,” “EXB-480,” or “Exabyte 430” instead. Because most library applications are certified for these libraries, changing the emulation mode may allow these applications to support the 221L and 221L-FC.

! Important If you change the emulation mode, you will need to reboot your host computer so that it recognizes the new emulation mode.

To change the emulation mode:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press [MENU] to display the menus (or return to the top of the menu selections). Press the down arrow key until “SCSI Menu” (221L) or “Fibre Menu” (221L-FC) appears, then press [ENTER].
3. Press the down arrow key until “Emulation Mode” appears, as shown below. This screen shows the current mode.



```

▶ E m u l a t i o n   M o d e :
    N o n e
  
```

4. Press [ENTER]. The following screen appears.



```

E m u l a t i o n   M o d e ?
    N o n e           ↑
  
```

5. Use the up or down arrow key to select an emulation mode, then press [ENTER]. Select “EXB-210” if your software supports the Exabyte 210 library; select “EXB-480” if your software supports the Exabyte 480 library; select “Exabyte 430” if your software supports the Exabyte 430.

SETTING UP AUTOMATIC TAPE DRIVE CLEANING

The Autoclean option enables the library to automatically perform tape drive cleaning without operator intervention. When Autoclean is enabled, the library monitors the cleaning requirements of the tape drive(s). When a drive indicates a “Needs Cleaning” status, the robot removes the cleaning cartridge from its slot and inserts it into the tape drive. After the cleaning cycle is complete, the robot returns the cleaning cartridge to its slot and resumes operation.

! Important If you plan to use automatic cleaning, make sure that you have installed a cleaning cartridge in the cleaning cartridge slot location (see [page 16](#)).

If your library software has a cleaning option, be sure to turn that option OFF.

Note: You do not have to use the library’s Autoclean option to clean the tape drive(s). You can choose from several other cleaning methods, including using your software’s cleaning function and using commands available through the operator panel. See [page 63](#) for information about these cleaning alternatives.

Setting up automatic tape drive cleaning involves three procedures:

- ▶ Activating the cleaning slot
- ▶ Setting the number of cleaning cycles
- ▶ Enabling the Autoclean option

Activating the Cleaning Slot

Activating the Clean Slot option designates the right-most fixed cartridge slot (closest to the tape drives) as a permanent storage location for a cleaning cartridge.

Note: If you change the Max Addressable Slot option (see [page 48](#)), the location of the cleaning slot changes. The cleaning cartridge slot, if used, is always the highest storage element address enabled. For example, if you change the Max Addressable Slot option to 14, then the cleaning slot will be 14. For more information on storage element addresses, see [page 69](#).

To activate the Clean Slot option:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Change the control mode to LCD (see [page 54](#)).
3. Press [MENU] to display the menus. Press the down arrow key until “Config Menu” appears, then press [ENTER].

4. Press the down arrow key to display “Clean Slot Option,” then press [ENTER]. The Clean Slot Option screen shows which slot is designated as the cleaning slot (21 in the example below) and whether the option is on (1) or off (0).

```

▶ C l e a n   S l o t   ( 2 1 )
O p t i o n :                               0

```

5. Press [ENTER]. The following screen appears.

```

C l e a n i n g   S l o t   a t
S l o t   2 1 ?                               0 ↑

```

6. Press the up or down arrow key to select “1” to turn the fixed cleaning slot option on or “0” to turn it off, then press [ENTER]. The screen shows the current selection.

Setting the Number of Cleaning Cycles

The Cleaning Tape Cycles Left option is a counter that tracks the number of times a cleaning cartridge has been used. When you install a new cleaning cartridge, you must use this option to set the number of cleaning cycles that remain. After completing a cleaning cycle, the library automatically decreases the Cleaning Tape Cycles Left counter by one.

Note: Refer to the information provided with your LTO Ultrium cleaning cartridge to determine how many cleaning cycles it contains.

To set the Cleaning Tape Cycles Left option:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. If necessary, press [MENU] to display the menus. Press the down arrow key until “Config Menu” appears, then press [ENTER].
3. Press the down arrow key to display “Cleaning Tape Cycles Left.”

```

▶ C l e a n i n g   T a p e
C y c l e s   L e f t :                       1

```

4. Press [ENTER]. The following screen appears.

```

C l e a n i n g   C y c l e s
L e f t ?                                     1 ↑

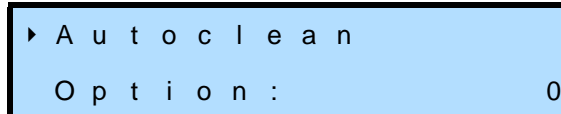
```

5. Use the arrow keys to set the number of cleaning cycles that remain on the installed cleaning cartridge, then press [ENTER].

Enabling the Autoclean Option

After setting up the cleaning slot and the number of cleaning cycles remaining, you can turn on autocleaning by enabling the Autoclean option:

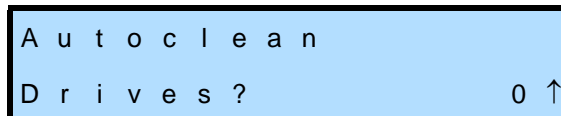
1. If the security option has been enabled, disable it (see [page 50](#)).
2. If necessary, press [MENU] to display the menus. Press the down arrow key until “Config Menu” appears, then press [ENTER].
3. Press the down arrow key until “Autoclean Option” appears. This screen shows whether Autoclean is enabled (1) or not (0).



```

▶ A u t o c l e a n
O p t i o n :           0
  
```

4. Press [ENTER]. The following screen appears.



```

A u t o c l e a n
D r i v e s ?         0 ↑
  
```

5. Press the up or down arrow key to select “1,” which turns on the Autoclean option, or “0” to turn the option off, then press [ENTER].

Note: When the Cleaning Tape Cycles Left counter reaches zero, the library disables Autoclean and displays a message on the Status screen that reminds you to replace the cleaning tape.

SETTING BAR CODE SCANNING OPTIONS

If you are using bar code labels with your cartridges, you can set options that determine when the library scans all of the cartridge labels and whether the library verifies checksum characters on the labels.

Setting the POST Bar Code Scan Option

When the POST Bar Code Scan option is enabled, the library automatically scans the bar code labels whenever the library’s door is opened and closed or whenever the library is powered up. By default, this option is turned off. Enabling this option increases the amount of time the library requires to complete POST (power-on self-test).

To turn on the POST Bar Code Scan option:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press [MENU] to display the menus (or return to the top of the menu selections). Press the down arrow key until “Config Menu” appears, then press [ENTER].

3. Press the down arrow key until “POST Bar Code Scan Option” appears. This screen shows whether bar code scanning is enabled (1) or disabled (0).

```

▶ P O S T   B a r c o d e
   S c a n   O p t i o n :   0

```

4. Press [ENTER]. The following screen appears.

```

S c a n   b a r c o d e s
d u r i n g   P O S T ?   0

```

5. Use the up or down arrow key to select “1” to turn the option on or “0” to turn the option off. Press [ENTER]. The screen shows the new setting.

Setting the Verify Barcode Checksums Option

If you use bar code labels that contain checksum characters, you should enable the Verify Barcode Checksums option. If you do not use bar code labels that include checksum characters or if you mix labels containing checksum characters with labels that do not, you should turn off the Verify Barcode Checksums option. By default, this option is turned off.

You can determine whether your bar code labels contain checksum characters by contacting your vendor or by following these steps:

- a. Count the number of black bars on the label. (The number will be a multiple of 5.)
- b. Divide this number by 5 to get the number of characters.
- c. Subtract the number of human-readable characters on the label from the result of step b. If the result is 2, the label does not include a checksum character; if the result is 3, the label includes a checksum character.

To set the Verify Barcode Checksums option:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press [MENU] to display the menus (or return to the top of the menu selections). Press the down arrow key until “Config Menu” appears on the screen, then press [ENTER].
3. Press the down arrow key until “Verify Barcode Checksums” appears. This screen shows whether the option is enabled (1) or disabled (0).

```

▶ V e r i f y   B a r c o d e
   C h e c k s u m s :   0

```

4. Press [ENTER]. The following screen appears.

```

V e r i f y   B a r c o d e
C h e c k s u m s ?           0

```

5. Use the up or down arrow key to select “1” to turn the option on or “0” to turn the option off. Press [ENTER]. The new setting appears on the screen.

LIMITING THE NUMBER OF SLOTS USED (MAX ADDRESSABLE SLOT OPTION)

Some library applications base licensing fees on the number of cartridge slots in the library. If you don't plan to use all of the slots in the library initially, use the Max Addressable Slot option to limit the number of slots used and reported to the application. When the Max Addressable Slot is set to a value less than 21 (the default), the library will not allow any commands with source or destination element addresses greater than that number.

To set the Max Addressable Slot option:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Change the control mode to LCD (see [page 54](#)).
3. Press [MENU] to display the menus (or return to the top of the menu selections). Press the down arrow key until “Config Menu” appears on the screen, then press [ENTER].
4. Press the down arrow key until “Max Addressable Slot” appears. This screen shows the current value (21).

```

▶ M a x   A d d r e s s a b l e
  S l o t                               2 1

```

5. Press [ENTER]. The following screen appears.

```

M a x   A d d r e s s a b l e
S l o t ?                               2 1 ↓

```

6. Use the up or down arrow key to select the desired slot number, then press [ENTER]. The screen displays the new setting.

SETTING UP LIBRARY SECURITY

To prevent unauthorized users from disrupting library operation, you can set up a password for accessing operator panel menus, using the entry/exit port, and opening the door. You can enable or disable security in either of the following ways:

- ▶ **From the operator panel (LCD security).** You can set the security option from the LCD, as described in this section.
- ▶ **Through your library application (SCSI security).** If your application supports this feature, you can issue commands from the application to turn security on and off. Refer to your software documentation for information.

Note: Whichever method you use to enable security (operator panel or application), you must also use to disable security. That is, if you enable security from the LCD, you must disable it from the LCD. If you enable security through your application (SCSI), you must disable it through the application.

When you enable security, the following activities are prevented:

- ▶ Changing the robot control mode
- ▶ Changing configuration settings (except baud rate)
- ▶ Changing the SCSI Menu options
- ▶ Changing the Fibre Menu options
- ▶ Changing the Ethernet Menu options
- ▶ Cleaning the tape drive(s)
- ▶ Using the Demo Menu
- ▶ Using the Command Menu
- ▶ Unlocking the entry/exit port (LCD security only)
- ▶ Unlocking and opening the door (LCD security only)

If you attempt to perform any of these operations when security is enabled, the library displays a message that states security is active.

! Important LCD security includes prevention of access through the entry/exit port and door. If you enable security through your application, access through the entry/exit port and door is not prevented. Separate commands for preventing entry/exit port and door access may be available through your application. Refer to your software documentation for information.

Note: If you are using the library's Remote Management utility (see [Chapter 6](#)), you can set up a password in the utility to prevent unauthorized users from accessing menu items through the utility that would disrupt operation. This password is separate from the password set for LCD security.

Enabling Security from the Operator Panel (LCD Security)

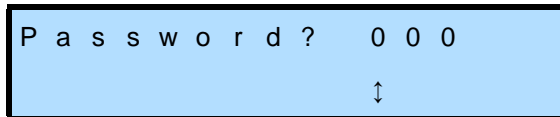
To enable LCD security:

1. Press [MENU] to display the menus (or return to the top of the menu selections). Press the down arrow key until “Security” appears. This screen shows whether security is currently enabled or disabled.



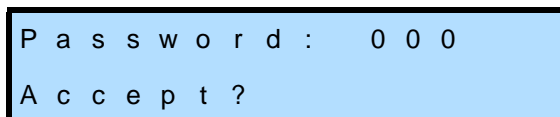
► S e c u r i t y
D i s a b l e d

2. Press [ENTER]. An informational message appears, then the following screen appears.



P a s s w o r d ? 0 0 0
 ↑

3. Use the left and right arrow keys to move across the columns. Use the up and down arrow keys to select a number. When you have selected a password, press [ENTER]. A prompt similar to the one below appears.



P a s s w o r d : 0 0 0
A c c e p t ?

4. Press [ENTER] to accept the new password. The Security screen then displays “LCD Password.”

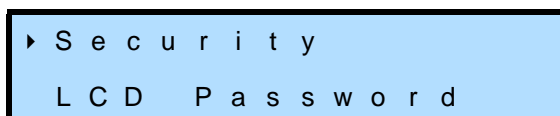
Note: Once enabled, security remains in effect through resets and power cycles.

Disabling Security from the Operator Panel

To disable LCD security:

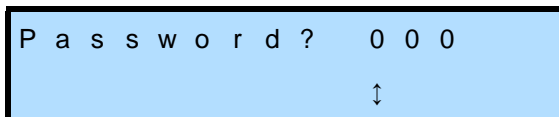
1. Press [MENU] to display the menus (or return to the top of the menu selections). Press the down arrow key until “Security” appears. If security is enabled, “LCD Password” appears on this screen.

Note: Security may have been enabled by your application using a SCSI command (the LCD will display “SCSI”). If this is the case, security must be disabled by your application.



► S e c u r i t y
L C D P a s s w o r d

2. Press [ENTER]. The following screen appears.



3. Enter the LCD security password set previously. Use the left and right arrow keys to move across the columns. Use the up and down arrow keys to select a number. Press [ENTER]. Security is disabled.

CHECKING THE SETUP

After configuring the library, check the setup by performing the exercises suggested below. While these exercises are not required, it is a good idea to verify that your software and hardware are properly communicating before you begin operation.

- ▶ Use the options on the Demo Menu or Command Menu to exercise the hardware. These exercises help determine whether the library hardware components are operating properly. See [page 69](#) for instructions.

Note: These hardware exercises require changing the control mode to LCD, as described on [page 54](#). When you complete the exercises, be sure to change the library's control mode back to SCSI, which is the standard operating mode for the library.

- ▶ If you have not already done so, install the software application on the host computer. Instruct the software to perform a cartridge load and unload operation for each tape drive. This test helps determine whether the software and library are communicating properly.
- ▶ Back up several megabytes of data to each tape drive and perform a comparison check on the backed-up data. This determines whether the software and tape drive(s) are communicating properly.

If the library and tape drive(s) are not operating as expected, see [Chapter 8](#) for troubleshooting and error code information. If you cannot resolve the problem yourself, contact Exabyte Technical Support (see [page iv](#)).

NOTES

OPERATING THE LIBRARY

After you have configured the library, you can put it into operation. If you operate your library in SCSI mode, your library application controls which cartridges are moved to and from the tape drive(s). If you operate the library in one of the sequential modes (see [page 60](#)), the library automatically processes the cartridges in sequential order. In both cases, your backup application controls backup and restore jobs in the tape drive(s).

Before beginning operation, always make sure that:

- ▶ The robot does not contain a cartridge.
- ▶ The cartridge magazines are installed.
- ▶ The library's door is closed.
- ▶ The library is in the proper control mode. SCSI is the standard operating mode (see [page 54](#)).

You can monitor library operation by viewing the operator panel or by using the library's Remote Management utility (see [Chapter 6](#)). The Status screen (see [page 28](#)) provides continuous updates on the activities of the library and tape drive(s).

During normal operation, you do not need to intervene in library activities. However, you may occasionally need to perform the following tasks, described in this chapter.

- ▶ Change the robot control mode
- ▶ Open the door to access cartridge magazines or tape drive(s)
- ▶ Remove and add cartridges through the entry/exit port
- ▶ Operate the library in sequential mode
- ▶ Clean the tape drive(s)
- ▶ Reset the library and tape drive(s)
- ▶ Eject a cartridge
- ▶ Perform hardware exercises
- ▶ Store cartridges that you have removed from the library

CHANGING THE ROBOT CONTROL MODE

The robot control mode determines the source of commands issued to the robot to move cartridges. You can set the library to one of the following control modes: SCSI, Sequent1, Sequent2, Remote, LCD, or Console. These control modes allow you to operate the library with application software (SCSI), operate the library as a stacker device (Sequent1 and Sequent2), control robot motion from the Remote Management utility (Remote), control robot motion from the operator panel (LCD), or perform diagnostic functions (Console).

Note: Control mode settings remain through power cycles.

The robot control modes are described in [Table 4-1](#).

Table 4-1 Robot control modes

Control Mode	Description
SCSI	<p>This is the standard operating mode and the default setting for the library. When the library is operating in SCSI mode, the motion of the robot is controlled by application software running on the host computer.</p> <p>Note: An application can issue commands to the library regardless of the control mode. However, the library must be in SCSI mode for the application to control robot motion.</p>
Sequent1 and Sequent2	<p>In the sequential modes, no library application is required to control robot motion. The library's internal firmware instructs the robot to pick all cartridges sequentially, from the first cartridge in the magazines through the last cartridge in the fixed slots (or the last data cartridge slot specified by the Max Addressable Slot option, as described on page 48). In Sequent1 mode, the cartridges are processed in Drive 1 only. In Sequent2 mode, the cartridges are processed in Drive 2 only.</p>
Remote	<p>When the library is operating in Remote mode, you control the motion of the robot by issuing commands from the library's Remote Management utility (see Chapter 6).</p> <p>Note: You can monitor library operation through the Remote Management utility without setting the library to Remote mode. You only need to use Remote mode when you want to control robot motion from the Remote Management utility.</p>
LCD	<p>When the library is operating in LCD mode, you control the motion of the robot by issuing commands through the library's operator panel. You can use this mode to move cartridges and perform hardware exercises and demos.</p> <p>Note: You can use most operator panel functions without setting the library to LCD mode. You only need to use LCD mode when you want to control robot motion from the operator panel.</p>
Console	<p>When the library is operating in Console mode, robot motion is controlled from a terminal connected to the library's serial port.</p> <p>Note: You do not need to switch to Console mode if you want to create diagnostic listings for technical support or upgrade firmware. For information about these tasks, see page 143.</p>

To change the robot control mode:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press [MENU] to display the menus, then press the down arrow until “Robot Mode” appears. The Robot Mode screen shows the current mode.

```

▶ R o b o t   M o d e
   S C S I
  
```

3. Press [ENTER]. An informational message appears, then the following screen appears.

```

R o b o t   M o d e ?
S C S I           ↑
  
```

4. Use the arrow keys to select the desired mode and press [ENTER]. The screen shows the new selection.

OPENING AND CLOSING THE LIBRARY'S DOOR

You can access the cartridges and tape drive(s) by opening the library's door.

! Important Avoid opening the library's door to replace individual cartridges during library operation. Opening and closing the door interrupts operation and causes the library to perform a cartridge inventory. Instead, use the library's entry/exit port as described on [page 57](#).

Opening the Door

To open the library's door:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press the [UNLOCK[DOOR]] button. At the Unlock Door prompt, press [ENTER].
3. Wait while the robot moves to the park position (at the far right).



Caution

Do not force the door open. The door's interlock mechanism may be prevented from releasing by LCD security or by the application software.

4. Pull open the door, as shown in [Figure 4-1](#).

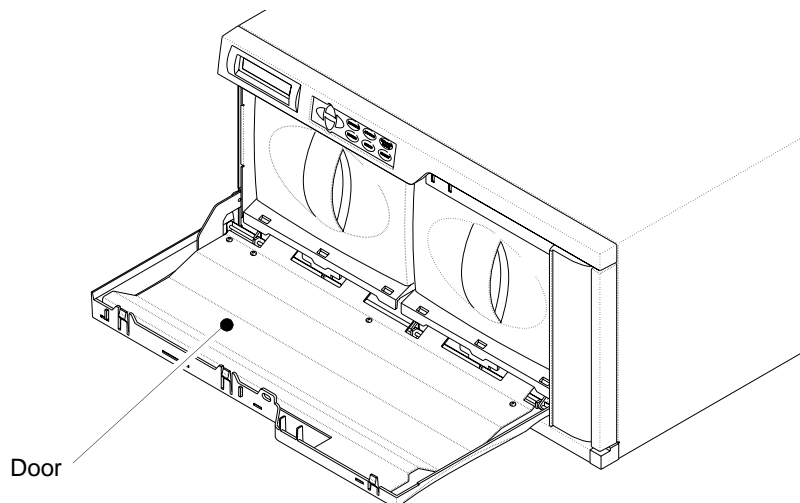


Figure 4-1 Opening the library's door

Removing and Replacing Magazines

To remove and replace cartridge magazines:

1. Remove each magazine by grasping the handle and pulling straight out, as shown in [Figure 4-2](#).

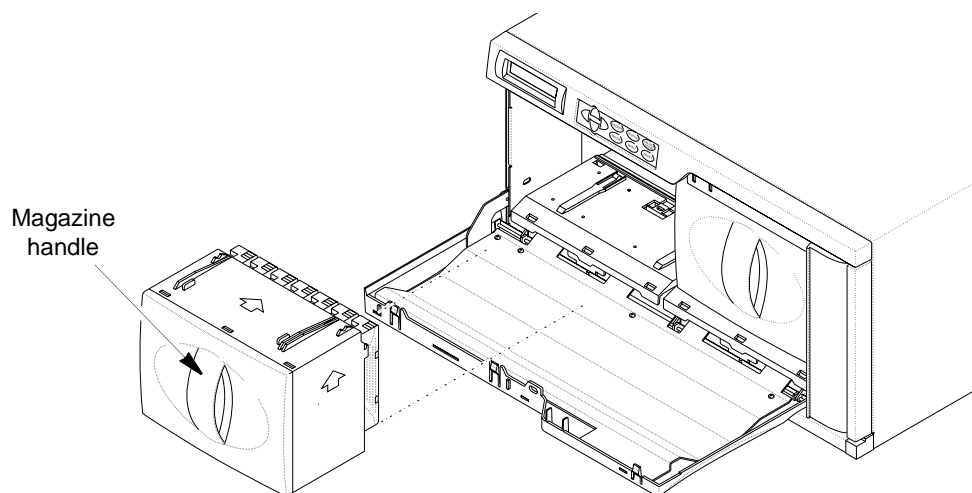


Figure 4-2 Removing a magazine

2. If desired, replace cartridges in the magazines (see [page 17](#)).

3. Insert each cartridge magazine into the library so that the alignment guides are up (as shown in [Figure 4-3](#)) and the alignment grooves are down.

! Important The magazine fits only one way; do not try to force it into the library. If the magazine does not slide in easily, check its orientation and re-insert it.

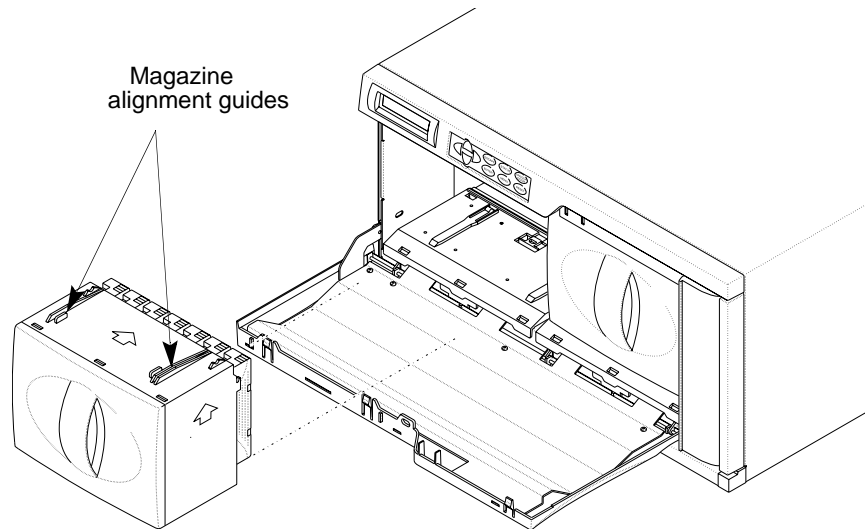


Figure 4-3 Installing a magazine in the library

Closing the Door

To close the library's door:

1. Lift up on the door to close it. Make sure it is closed completely so that the door locks can engage. The door locks automatically.
2. If necessary, re-enable security.

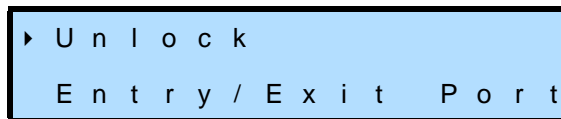
REMOVING AND ADDING CARTRIDGES THROUGH THE ENTRY/EXIT PORT

Use the library's entry/exit port to remove or add individual cartridges without opening the library's door. You can control entry/exit port operation from the library's operator panel, the Remote Management utility, or through your library application. This section explains how to use the operator panel to operate the entry/exit port. Refer to [Chapter 6](#) for information about using the Remote Management utility. Refer to your software documentation for information about using the application to operate the entry/exit port.

Note: For data security, you can prevent entry/exit port access by enabling LCD security (see [page 49](#)) or by issuing commands from the library application. If LCD security has been enabled through the operator panel, you must enter a password to disable LCD security. If access has been prevented through the library application, you must issue commands from the application to allow access.

To remove and add cartridges through the entry/exit port:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Change the control mode to LCD (see [page 54](#)).
3. Use the Move Cartridge command to move a cartridge from one of the storage slots to the entry/exit port. For instructions on using the Move Cartridge command, see [page 71](#). For the element numbering scheme, see [page 69](#). The entry/exit port is element number 81.
4. Press [MENU] to display the menus, then press the up arrow until “Unlock Entry/Exit Port” appears. Press [ENTER] to unlock the entry/exit port.



► U n l o c k
E n t r y / E x i t P o r t

5. Rotate the entry/exit port door, from left to right, as shown in [Figure 4-4](#).

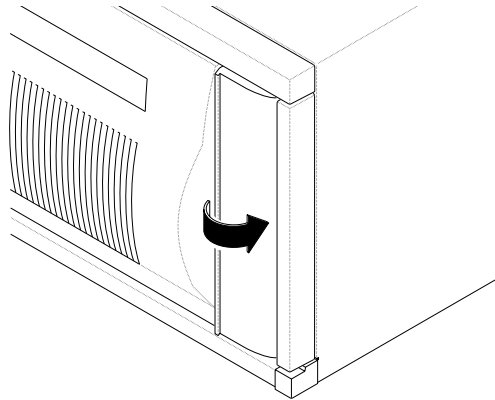


Figure 4-4 Opening the entry/exit port door

6. Press the top and bottom buttons to release the entry/exit port caddy, then pull it out, as shown in [Figure 4-5](#).

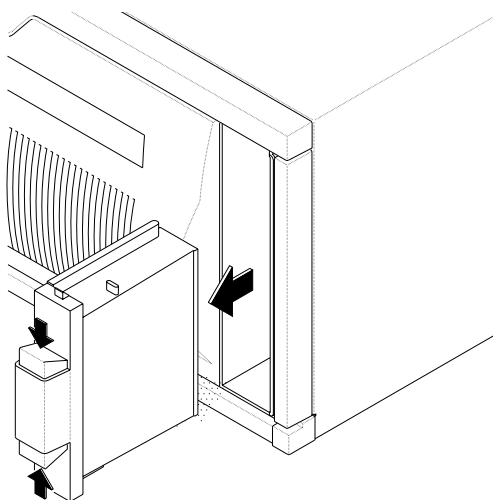


Figure 4-5 Removing the entry/exit port caddy

7. Remove the cartridge and insert a new cartridge in the caddy, with the write-protect switch facing out, as shown in [Figure 4-6](#).

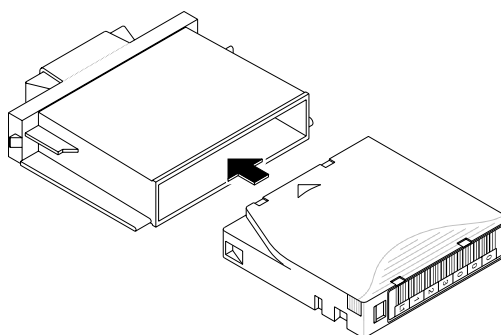


Figure 4-6 Inserting a cartridge in the entry/exit port caddy

8. Press the top and bottom buttons on the entry/exit port caddy, then insert the caddy back into the entry/exit port, as shown in [Figure 4-7](#). Make sure the cartridge's write-protect switch is at the bottom.

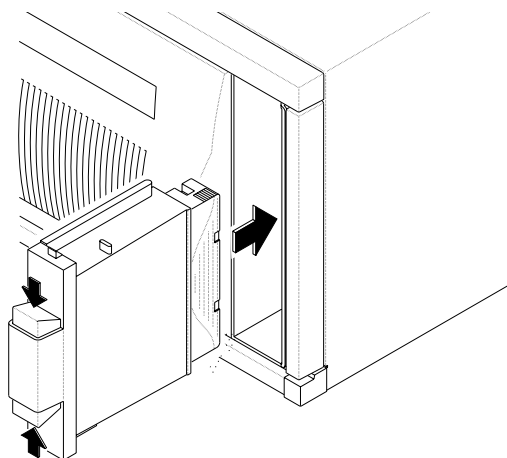


Figure 4-7 Reinserting the entry/exit port caddy

9. Close the entry/exit port door.
10. The operator panel displays “Lock Entry/Exit Port.” Press [ENTER].
11. Use the Move Cartridge command to move the cartridge from the entry/exit port to a storage slot or tape drive. See [page 69](#) for the element numbering scheme.
12. If necessary, re-enable security and change the control mode back to its original operating mode.

OPERATING THE LIBRARY IN SEQUENTIAL MODE

When the library is operating in sequential mode, its internal firmware instructs the robot to move cartridges sequentially between the cartridge slots and a tape drive. Sequential mode is useful with software applications that support functions performed by the tape drive but not functions performed by the library robotics.

When you select a sequential mode from the Robot Mode screen (see [page 54](#)), you choose whether the library uses tape drive 1 (Sequent1 mode) or tape drive 2 (Sequent2 mode); the library does not use both tape drives when operating in sequential mode.

In sequential mode, the library performs the following steps:

1. Picks the cartridge from slot 1 and places it in the tape drive specified by the control mode (Sequent1 or Sequent2). If the slot is empty, the robot picks the next cartridge in the magazine.
2. Waits until the tape drive ejects the cartridge, then returns the cartridge to its original slot.
3. Repeats these steps for the next cartridge until it has processed all of the cartridges.
4. Returns to the first cartridge and begins the process again or stops, depending on how the Loop option, described in the following section, is set.

SEQUENTIAL MODE OPTIONS

To customize how sequential mode works, you can set the Loop, Restart, and Next Cartridge options. These options, described below, are not affected by a reset or power cycle.

Loop Option

The Loop option determines what the library does after it has finished processing the last cartridge in a sequence. As shown in [Table 4-2](#), the library can either loop back to the first cartridge in the sequence and start processing the cartridges again or stop and wait for operator intervention. (Operator intervention typically means opening the library's door, removing cartridges for storage, installing new cartridges, and closing the door.)

Table 4-2 *Using the Loop option to control cartridge processing during sequential operation*

If Loop is...	The Library...
On	Returns to cartridge 1 and starts processing the cartridges again.
Off	Stops processing cartridges, displays a message indicating that sequential mode is done, and waits for operator intervention.

Restart Option

The Restart option determines what the library does after it is reset or power cycled, or after the door is opened and closed. The library can either restart at the beginning of the cartridge sequence or resume where it left off when the interruption occurred. As shown in [Table 4-3](#), the Restart option determines what the library does next.

Table 4-3 *Using the Restart option to control processing after an interruption*

If Restart is...	The Library...
On	Restarts at slot 1.
Off	Resumes where it left off.

Before the Library Restarts... Before restarting, the library performs the following actions:

1. If the robot was moving a cartridge, it finishes the move. (This includes inserting the cartridge into the tape drive if the robot was moving a cartridge to the tape drive.)

Note: If you attempt to open the door, the library will not release the door interlock until it has completed the move.
2. The library performs a power-on self-test (POST). If you opened the door, the library performs its POST after you close the door.
3. If a cartridge is in the tape drive, the robot waits for the cartridge to be ejected, then returns it to its original slot.

Next Cartridge Option

The Next Cartridge option allows you to interrupt sequential processing and specify that the next cartridge the library selects is the cartridge in slot 1. If you want to stop sequential processing and resume from the first cartridge, select Next Cartridge from the Sequential Mode menu.

SETTING SEQUENTIAL MODE OPTIONS

To set sequential mode options:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Press [MENU] to display the menus, then press the down arrow until “Sequential Mode” appears. The Sequential Mode screen shows the current settings for the Loop option (L), the Restart option (R), and the Next Cartridge option (N).

```

▶ S e q u e n t i a l   M o d e
  L 0   R 1   N 0
  
```

3. Press [ENTER]. The Loop Option screen appears. This screen shows whether the Loop option is on (1) or off (0).

```

▶ L o o p   O p t i o n :
  0
  
```

4. Press [ENTER] again to display the screen for changing the Loop option.

```

L o o p
O p t i o n ?   0 ↑
  
```

5. Use the up or down arrow key to change the setting, then press [ENTER]. The Loop Option screen shows the new setting.
6. Press the down arrow key to display the Restart Option screen. This screen shows whether the Restart option is on (1) or off (0).

```

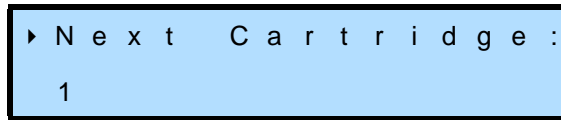
▶ R e s t a r t   O p t i o n :
  1
  
```

7. Press [ENTER] again to display the screen for changing the Restart option.

```

R e s t a r t
O p t i o n ?   1 ↓
  
```

8. Use the up or down arrow key to change the setting, then press [ENTER]. The Restart Option screen shows the new setting.
9. Press the down arrow key to display the Next Cartridge screen.



10. Press [ENTER] to set the next cartridge to 1 or [ESCAPE] to cancel.
11. Press [ESCAPE] to return to the Sequential Mode screen.

AVOIDING INTERRUPTIONS DURING SEQUENTIAL OPERATION

Although the library has effective methods for resuming operation, it is best to avoid interruptions when the library is operating sequentially. In particular:

- ▶ **Do not reset or power cycle the library unless absolutely necessary.** Reset the library only to clear certain error conditions, and power off the library only to perform maintenance or to store it. Avoid resetting or power cycling the library when a cartridge is in the tape drive or the robot.
- ▶ **Do not open the door unless absolutely necessary.** During operation, open the door only to replace a magazine after the library has processed all the cartridges. Never force the door. The library will not release the door until it has completed a cartridge move or load already in progress. Certain applications may also prevent the door from being opened.
- ▶ **Do not remove a cartridge from the tape drive or insert a cartridge into the tape drive.** If you want to remove a cartridge, wait until the robot has placed it in the magazine before removing it. If you want to add a cartridge, add it directly to one of the magazines.

CLEANING THE TAPE DRIVE(S)

Under normal operating conditions, the LTO Ultrium tape drive(s) in the library do not require regular cleaning. Each tape drive contains an automatic cleaning mechanism that allows it to clean itself as necessary. Occasionally, a tape drive may require cleaning with a cleaning cartridge. The tape drive monitors its cleaning needs internally and notifies the library when it requires cleaning. When cleaning is required, the library displays a cleaning message on the Status screen.

You can clean the tape drive(s) in several ways:

- ▶ **Use the library's Autoclean feature.** Set up automatic tape drive cleaning during library configuration (see [page 44](#)) and store a cleaning cartridge in the library. The Autoclean option instructs the library to clean the tape drive(s) automatically when necessary and without disrupting normal operation.

- ▶ **Use the Clean Drive option from the library's operator panel.** Use the Clean Drive option (described in this section) and a cleaning cartridge stored in the library to clean the drive(s) when the library or software notifies you to do so.
- ▶ **Use the library's entry/exit port to insert a cleaning cartridge.** Use the entry/exit port and the Move Cartridge command to insert a cleaning cartridge in a tape drive when necessary (see [page 57](#)). The tape drive automatically performs the cleaning process and unloads the cartridge when the process is complete. Use the Move Cartridge command and the entry/ exit port to remove the cleaning cartridge from the library.
- ▶ **Use your software's cleaning option.** Set the cleaning option in your software application (if available) so that the software monitors drive cleaning requirements and automatically performs cleanings using a cleaning cartridge stored in the library. Refer to your software documentation for information about setting up this option.

USING THE CLEAN DRIVE OPTION

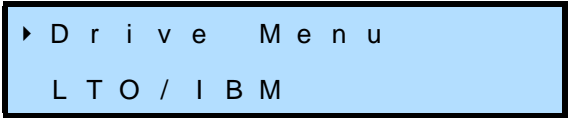
Before using the Clean Drive option, make sure that:

- ▶ A cleaning cartridge is installed in the appropriate slot (see [page 16](#)).
- ▶ You have set the Clean Slot option, which designates a permanent storage location for a cleaning cartridge. See [page 44](#).
- ▶ You have set the Cleaning Tape Cycles Left option, which is a counter that tracks the number of times a cleaning cartridge has been used. When you install a new cleaning cartridge, you must use this option to set the number of cleaning cycles that remain. See [page 45](#).
- ▶ You have turned the Autoclean Option off. See [page 46](#).

Note: The “Clean Drive” option is only available if the Clean Slot option is configured and the Cleaning Tape Cycles Left counter is greater than 0.

When a tape drive requires cleaning:

1. If security has been enabled, disable it (see [page 50](#)).
2. Change the control mode to LCD (see [page 54](#)).
3. Press [MENU] to display the menus. Press the down arrow key until “Drive Menu” appears.



```

▶ D r i v e   M e n u
  L T O / I B M
  
```


4. Press [ENTER]. The Drive 1 Menu appears.

```

▶ D r i v e   1   M e n u
L T O / I B M

```

5. Use the up or down arrow key to select the menu for the drive you want to clean, then press [ENTER]. (For example, to clean Drive 1, select “Drive 1 Menu.”) A screen similar to the example below appears.

```

▶ D r i v e   1   S t a t u s
R E A D Y - N O T A P E

```

Note: Drive 1 is the tape drive closest to the fixed slots; Drive 2 is located directly to the right of Drive 1.

6. Use the down arrow key to select “Clean Drive *n*,” where *n* is the number of the tape drive you want to clean. Then press [ENTER].

The following activities occur:

- ▶ The robot picks the cleaning cartridge from its slot and inserts it in the tape drive you specified.
 - ▶ The tape drive automatically performs the cleaning process and ejects the cartridge when the process is complete (in several minutes).
 - ▶ The robot picks the cleaning cartridge from the tape drive and replaces it in its slot.
7. Confirm that the cleaning completed successfully by looking at the operator panel. The cleaning message should be gone. If the cleaning was not successful, the cleaning material in the cartridge may be expended. Replace the cleaning cartridge and clean the tape drive again.

! Important If the tape drive ejects the cleaning cartridge immediately after loading it, you need to replace the cleaning cartridge. To order cleaning cartridges, contact Exabyte (see [page iv](#)).

8. When the cleaning is complete, return the library to its original control mode and re-enable security (if desired).

! Important After cleaning, the library automatically decreases the Cleaning Tape Cycles Left counter. When you install a new cleaning cartridge, you must manually reset the Cleaning Tape Cycles Left counter (see [page 45](#)).

RESETTING THE LIBRARY AND TAPE DRIVE(S)

If the library or a tape drive has encountered an error and is not operating as expected after you have tried the recommended corrective actions, you may need to reset the library or the individual tape drive. From the operator panel, you can reset the library and the tape drive(s) simultaneously, or you can reset the library or a tape drive individually. You can also reset the library and tape drive(s) by powering the library off and back on.

Note: You may also be able to perform resets from the library software. Refer to your software documentation for instructions.

Resetting the library causes it to perform its power-on self-test and a full cartridge inventory. If the library is performing a cartridge move operation when it is reset, it completes the move operation before it performs the power-on self-test.

Resetting a tape drive causes the drive to perform its power-on self-test and rewind any loaded tape to the beginning.

! Important After a tape drive is reset, the drive rewinds the tape but does not eject the cartridge. Make sure that it is safe to overwrite the tape before performing a backup so that you don't lose previously recorded data. If necessary, eject the cartridge as described on [page 67](#).

To reset the library or tape drive(s) from the operator panel:



Caution

Before resetting, make sure the library and tape drive(s) are not communicating across the SCSI bus. The reset may disrupt communications on the SCSI bus.

1. Press the [RESET] key. The following screen appears.

```

▶ R e s e t   L i b r a r y
  &   D r i v e s
  
```

If you want to reset the library only, use the down arrow key to display “Reset Library,” shown below.

```

▶ R e s e t   L i b r a r y
  
```

If you want to reset an individual tape drive, use the down arrow key to display “Reset Drive *n*,” where *n* is the number of the drive you want to reset. For example, the screen shown below is for resetting Drive 2.

```

▶ R e s e t   D r i v e   2
  R e a d y   T a p e   O u t

```

Note: Drive 1 is the tape drive closest to the fixed slots.

2. Press [ENTER]. At the confirmation prompt, press [ENTER] again. The library performs the reset operation.

EJECTING A CARTRIDGE

If a tape drive problem occurs that requires intervention, you may need to eject a cartridge from the tape drive. You can either eject the cartridge by using the operator panel or by opening the library's door and pressing the tape drive's unload button.

EJECTING A CARTRIDGE USING THE OPERATOR PANEL

To eject a cartridge using the operator panel:

1. If the security option has been enabled, disable it (see [page 50](#)).
2. Change the control mode to LCD (see [page 54](#)).
3. Press [MENU] to display the menus. Press the down arrow key until “Drive Menu” appears.

```

▶ D r i v e   M e n u
  L T O / I B M

```

4. Press [ENTER]. The Drive 1 Menu screen appears. Press the down arrow key if you want the menu for drive 2.

```

▶ D r i v e   1   M e n u
  L T O / I B M

```

5. Press [ENTER]. The Drive Status menu appears.
6. Use the down arrow key to select “Unload Drive.”

```

▶ U n l o a d   D r i v e

```

7. Press [ENTER]. The following screen appears.

```

  ▶ C o n f i r m   U n l o a d ?
    R e a d y - T a p e
  
```

8. Press [ENTER] to eject the cartridge from the drive.

EJECTING A CARTRIDGE BY PRESSING THE UNLOAD BUTTON

To eject a cartridge by pressing the tape drive's unload button:

1. Open the library's door (see [page 55](#)).
2. Remove the magazine on the right side.



Caution

Discharge static electricity from your body before touching the tape drive. Touch a known grounded surface, such as the library's metal chassis.

Before pressing the unload button, make sure the tape drive is not communicating across the SCSI bus. Pressing the unload button may disrupt communications on the SCSI bus.

3. Press the unload button on the drive's faceplate, as shown by the arrow in [Figure 4-8](#).

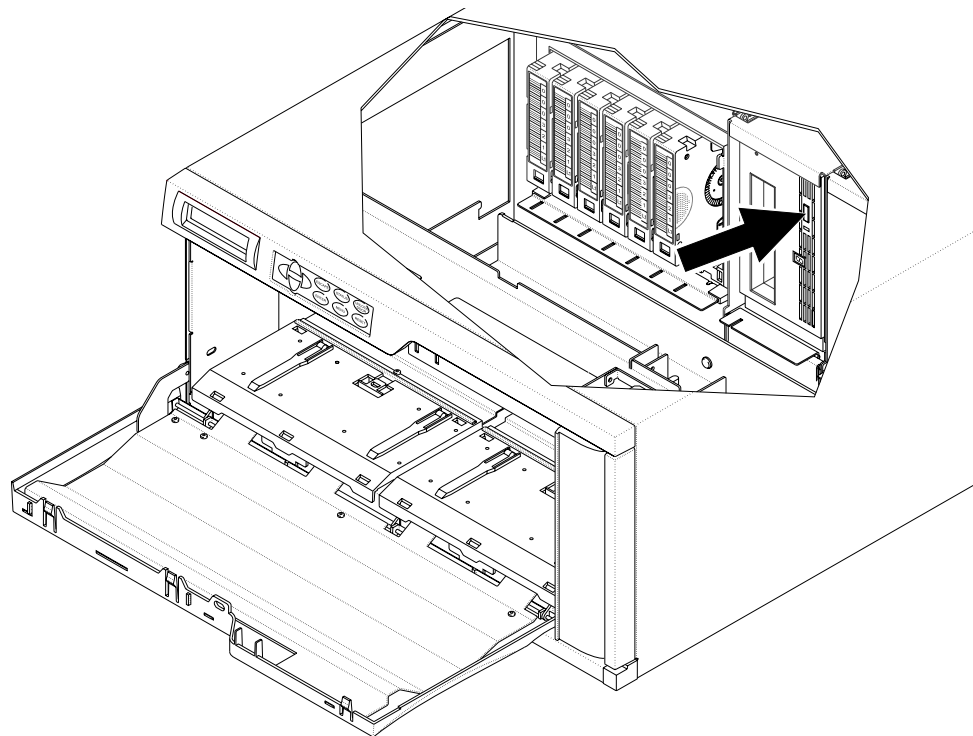


Figure 4-8 Using the tape drive's unload button to manually eject a cartridge

4. Remove the cartridge.
5. Replace the cartridge magazine.
6. Close the library's door and re-enable security, if desired.

PERFORMING HARDWARE EXERCISES

This section describes hardware exercises you can perform from the operator panel to test library functions. Hardware exercises are available from the Demo Menu and the Command Menu. The Demo Menu provides options for running the library in a continuous demo mode, where the robot randomly moves cartridges between slots. The Command Menu provides options for performing specific robot movements.

Note: You can also perform hardware exercises through the library's Remote Management utility and through the Console interface program. For information about the Remote Management utility, see [Chapter 6](#). For information about Console, see [page 143](#).

USING ELEMENT INDEXES

Elements are the physical locations in the library that can accept a cartridge (the robot, the magazine slots, the fixed slots, the entry/exit port, and the tape drives).

Each element has an *element index* that enables the library to identify it. Many operator panel functions require you to specify element indexes. For example, to move a cartridge, you must specify the source and destination element indexes. The source is the location from which the robot will pick the cartridge. The destination is where the robot will place the cartridge.

[Figure 4-9](#) shows the element indexes for the library.

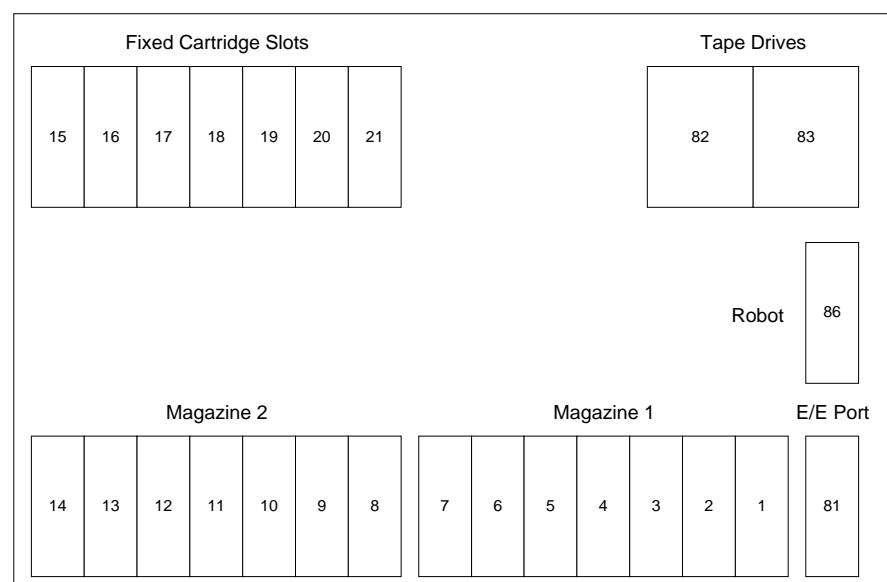


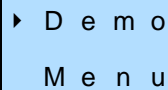
Figure 4-9 Library element index assignments

Note: Your application software may use *element addresses* to identify elements in the library. The difference between an element index and an element address is that an index is a fixed number set in the library's firmware, whereas an address can be changed by your application software. The library's default element addresses correspond to the element indexes.

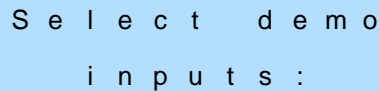
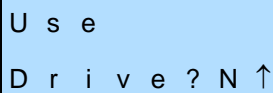
RUNNING DEMOS

To run a demo:

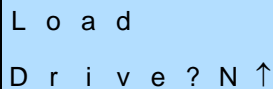
1. If necessary, disable security (see [page 50](#)).
2. Change the robot mode to LCD (see [page 54](#)).
3. Make sure there is at least one cartridge present and one empty slot before you begin the test.
4. Press [MENU] to display the menus. Press the down arrow key until "Demo Menu" appears.

A screenshot of a light blue rectangular screen with a black border. It contains the text "► D e m o" on the first line and "M e n u" on the second line, with wide spacing between characters.

5. Press [ENTER]. The following screens appear.

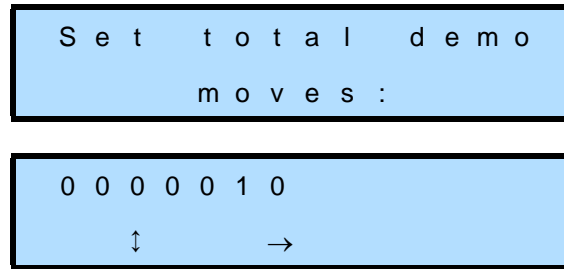
A screenshot of a light blue rectangular screen with a black border. It contains the text "S e l e c t d e m o" on the first line and "i n p u t s :" on the second line, with wide spacing between characters.A screenshot of a light blue rectangular screen with a black border. It contains the text "U s e" on the first line and "D r i v e ? N ↑" on the second line, with wide spacing between characters.

6. Use the up or down arrow keys to indicate whether you want a tape drive used in the demo. If you selected No, skip to step 7. If you selected Yes, press [ENTER]. The following screen appears.

A screenshot of a light blue rectangular screen with a black border. It contains the text "L o a d" on the first line and "D r i v e ? N ↑" on the second line, with wide spacing between characters.

Use the up or down arrow keys to indicate whether you want cartridges loaded in the tape drive or just inserted into the drive opening during the demo.

7. Press [ENTER]. The following screens appear.



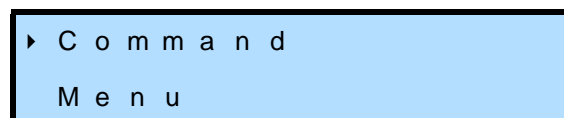
8. Use the arrow keys to set the number of moves (the left and right arrow keys move across the columns; the up and down arrow keys change the numbers). Then press [ENTER].
9. The library begins the demo and displays status messages. If you want to stop a demo in progress, press [ESCAPE].

ISSUING LIBRARY COMMANDS

You can use the commands available through the Command Menu to perform isolated library functions such as positioning the robot or moving a cartridge. Exercises available through the Command Menu can also be used to troubleshoot library hardware problems. Refer to the diagram on [page 69](#) for the element indexes. These numbers correspond to library components and are necessary for some commands.

To use library commands:

1. If necessary, disable security (see [page 50](#)).
2. Change the control mode to LCD (see [page 54](#)).
3. Press [MENU] to display the menus. Press the down arrow key until “Command Menu” appears.



4. Press [ENTER]. The LCD displays the first command.



5. Use the up or down arrow keys to select one of the commands (described in the following table), then press [ENTER].
6. When the command is finished, the screen displays a status message. Press [ESCAPE] to return to the Command Menu or to stop a command in progress.

Table 4-4 describes the commands that are available from the Command menu.

Table 4-4 Library commands

Command	Description
Move Cartridge	The robot moves a cartridge from one location to another. Specify the source and destination for the cartridge. If the destination is a tape drive, indicate whether you want the cartridge loaded into the drive. Important: If you insert a data cartridge into a tape drive, be aware that the drive will not automatically eject the data cartridge. However, if you insert a cleaning cartridge into a tape drive, the cartridge will be ejected when the cleaning is finished.
Initialize Element Status	The robot checks for cartridge presence and scans all of the cartridge labels.
Home Robot	The robot moves to the home position.
Park	The robot moves to the park position at the right side of the library rotated toward the back (facing the tape drives).
Position to Element	The robot moves to a position in front of a tape drive, fixed cartridge slot, magazine slot, or entry/exit port. Specify the destination element for the robot.
Self Test	The robot does the following: <ul style="list-style-type: none"> ▪ Moves from its current position to a position in front of Drive 1. ▪ Rotates 180 degrees on the wrist axis and moves to a position in front of slot 1. ▪ Rotates 180 degrees on the wrist axis and returns to a position in front of Drive 1.
Cycle Entry/Exit Lock	The entry/exit port locks and unlocks. Specify the number of cycles for the exercise.
Cycle Pick/Put	The robot takes a cartridge from a specified element and replaces it in the same location. Specify the source element and the number of cycles for the exercise.
Cycle Reach	The robot moves in and out on the reach axis. Specify the number of cycles for the exercise.
Cycle X-Axis	The robot moves left and right on the horizontal (X) axis. Specify the number of cycles for the exercise.
Cycle Wrist	The robot's wrist rotates from the rear-facing position to the front-facing position. Specify the number of cycles for the exercise.
Cycle Solenoid	The solenoid that controls the locking mechanism on the door opens and closes. Specify the number of cycles for the exercise.

STORING CARTRIDGES

After you have filled cartridges with data, you may want to store them outside of the library to make room for additional cartridges in the library. To maximize the shelf life of your cartridges and ensure data integrity, follow these storage guidelines:

- ▶ **Store cartridges in a suitable environment.** Follow the specifications for storage temperature and other environmental requirements, as described on the cartridge packaging. Do not allow the temperature and humidity in the storage environment to fluctuate.
- ▶ **Store cartridges with the write-protect switch in the protected position.** See [page 14](#) for information about setting the write-protect switch.
- ▶ **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 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 fluctuation, particulate contamination, and excessive handling.
- ▶ **If possible, store cartridges in a cartridge magazine.** In the cartridge magazine, cartridges are protected from airborne contaminants by a clear plastic cover. With the cover in place, the magazines can be stacked on top of each other to make the most efficient use of storage space.

NOTES

VIEWING LIBRARY INFORMATION

The library maintains an internal database containing extensive information about its configuration and operations. This information is available through the operator panel. During day-to-day operation, you typically do not need to access this information. However, if you need to contact Exabyte Technical Support about your library, you may be asked to check and report back on various settings and event results.

This chapter explains how to view the following:

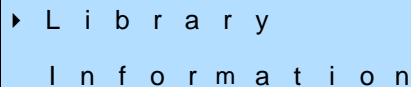
- ▶ Library code version and serial number
- ▶ Fibre Channel information (221L-FC)
- ▶ Statistics
- ▶ Sensor readings
- ▶ Library INQUIRY data
- ▶ Cartridge inventory
- ▶ Tape drive information

Note: You can also view library information through the Remote Management utility. See [Chapter 6](#) for more information.

VIEWING THE LIBRARY'S CODE VERSION AND SERIAL NUMBER

To check the library's code (firmware) version and serial number:

1. Press [MENU] to display the menus. Press the down arrow key until "Library Information" appears.



▶ L i b r a r y
I n f o r m a t i o n

2. Press [ENTER]. The screen displays the library code version, similar to the example below.

```

■ C o d e   V e r s i o n
  V n . n . n

```

3. Press the down arrow key to display the serial number.

```

■ L i b r a r y   S e r i a l
  N u m :   0 0 0 0 0 0 0 0 1

```

VIEWING FIBRE CHANNEL INFORMATION (221L-FC)

The Fibre Menu provides information about the 221L-FC library and tape drives in the Fibre Channel environment. From the Fibre Menu, you can view the library's Port Address, Loop IDs, and World Wide Names.

To view Fibre Channel information:

1. Press [MENU] to display the menus. Press the down arrow key until "Fibre Menu" appears. The Fibre Menu screen shows the current Loop ID for each tape drive and the library. Each ID is a two-digit hexadecimal number.

In the following example, Drive 1 is 01, Drive 2 is 02, and the library is set to 00.

```

► F i b r e   M e n u
D 0 1   0 2                               L 0 0

```

Note: Drive 1 is the tape drive closest to the fixed cartridge slots; Drive 2 is located directly to the right of Drive 1.

The second line of the Fibre Menu may include one of the codes listed in [Table 5-1](#) instead of a Loop ID.

Table 5-1 Loop ID codes

Loop ID Code	Description
?	The Loop ID is unknown because the Loop Initialization process (LIP) is not complete.
HW	The library's Fibre Channel interface card is not installed.
B	A drive blank is installed at this tape drive location.
SA	Soft addressing is in use.
NP	The library or tape drive is in non-participating mode because it could not obtain a Loop ID.

2. Press [ENTER]. The Port Address screen appears. The Port Address screen allows you to view, but not change, the 24-bit hexadecimal Port Address Identifier for the library:

```

■ P o r t   A d d r e s s :
                                0 x n n n n n p p
  
```

where:

0 × indicates that the address is a hexadecimal number.

nnnn is the 16-bit N_Port Identifier (fabric address).

pp is the AL_PA for the library port.

3. Press the down arrow key until the Loop IDs screen appears. The Loop ID screen allows you to view, but not change, the current Loop IDs for the library and tape drives.

```

■ L o o p   I D s
D 0 1   0 2                               L 0 0
  
```

The second line of the Loop IDs screen may include one of the codes listed in [Table 5-1](#) instead of a Loop ID.

4. Press the down arrow key until the World-Wide Names screen appears. The World Wide Names screen allows you to view, but not change, the world wide names (WWN) for the library and each tape drive.

```

► W o r l d   W i d e
N a m e s
  
```

5. Press [ENTER] to display the first world-wide name. The library and each tape drive have three world-world wide names. The first world-wide name is for the Node; the second world-wide name is for Port A; the third world-wide name is for Port B.

Note: Although a world-wide name is listed for Port B, this port is not used and is not accessible.

```

■ L i b r a r y   N o d e :
1 0 0 0 0 0 D 0 8 0 n n n n n n
  
```

The first line of the screen identifies the world-wide name being displayed (Node or Port A); the second line shows the hexadecimal value for the WWN.

6. Use the up and down arrow keys to scroll through the remaining world-wide names for the library and tape drives.

VIEWING LIBRARY STATISTICS

The System Statistics screens allow you to view historical data about robot moves to library elements, pick and put retries, positioning retries, and powerup totals. The system statistics are cumulative totals from the time the library was first installed; they do not restart from zero each time the library is powered on.

To view library statistics:

1. Press [MENU] to display the menus. Press the down arrow key until “Library Information” appears.

```

▶ L i b r a r y
  I n f o r m a t i o n
  
```

2. Press [ENTER]. Press the down arrow key until “System Statistics” appears.

```

▶ S y s t e m
  S t a t i s t i c s
  
```

3. Press [ENTER]. The first statistic to appear is Total Moves, as shown in the example below.

```

■ T o t a l   M o v e s :
                                     1 4 2 4 0 6
  
```

4. To display additional Statistics screens, press the down arrow.

Table 5-2 describes the information in the System Statistics screens.

Table 5-2 Information available on the System Statistics screens

System Statistic	Description ^a
Total Moves	The number of times the robot has picked a cartridge and placed it in a slot or tape drive.
Pick Retries	The number of times the robot retried picking a cartridge.
Put Retries	The number of times the robot retried placing a cartridge.
Rotate Retries	The number of times the robot retried rotating on the wrist axis.
PTE Retries	The number of times the robot performed a position to element (PTE) retry.
Powerup Count	The number of times the library has been power cycled.

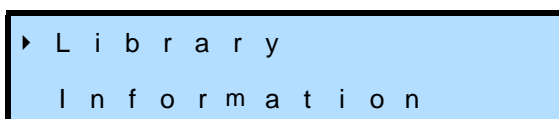
^a Cumulative over the life of the library.

VIEWING SYSTEM SENSORS

The System Sensors screens can assist in troubleshooting hardware problems by displaying the current status of the library's internal mechanical sensors.

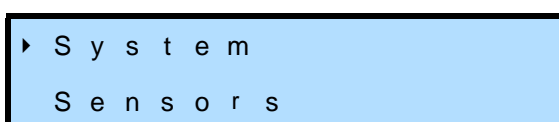
To view system sensor information:

1. Press [MENU] to display the menus. Press the down arrow key until "Library Information" appears.



► L i b r a r y
I n f o r m a t i o n

2. Press [ENTER]. Press the down arrow key until "System Sensors" appears.



► S y s t e m
S e n s o r s

3. Press [ENTER]. The first screen to appear is Door Locked, as shown in the example below.



■ D o o r L o c k e d
1

4. To display additional screens, press the down arrow.

Table 5-3 describes the information in the System Sensors screens.

Table 5-3 Information available on the System Sensors screens

System Sensor	Description
Door Locked	The door is locked (1) or unlocked (0).
Door Closed 1	The first door sensor is on (1) or off (0).
Door Closed 2	The second door sensor is on (1) or off (0).
Cartridge Seated	A cartridge is seated in the robot (1) or the robot is empty (0).
Reach Position	The robot fingers are closed (1) or open (2).
Magazine 1 Present	The right-side magazine is installed (1) or removed (0).
Magazine 2 Present	The left-side magazine is installed (1) or removed (0).
EEP Present	The entry/exit port (EEP) caddy is installed (1) or removed (0).
EEP Locked	The entry/exit port (EEP) is locked (1) or unlocked (0).
X Axis Home	The robot is in the home position on the X axis (1) or not (0).
X Axis EOT	The robot is at the EOT (end of travel) position on the X axis (1) or not (0).

Table 5-3 Information available on the System Sensors screens (continued)

System Sensor	Description
Wrist Back	The robot wrist position is toward the back of the library (1) or not (0).
Wrist Front	The robot wrist position is toward the front of the library (1) or not (0).
Bay 1 Occupied Bay 2 Occupied	There is a drive or drive blank installed in the drive bay (1) or the drive bay is empty (0). Note: Bay 1 is located next to the fixed slots.
Library Fan Fail	The library's fan is operational (0) or has failed (1).
Drive 1 Fan Fail Drive 2 Fan Fail	The fan for the drive is operational (0) or has failed (1). Note: Drive 1 is located next to the fixed slots.

VIEWING LIBRARY INQUIRY DATA

From the Library Information screens, you can view the following INQUIRY data for the library:

- ▶ **Def Inq Vend ID** - The default Vendor Identification value (EXABYTE), as reported in response to an INQUIRY command from an application.
- ▶ **Def Inq Prod ID** - The default Product Identification value (Exabyte 221L), as reported in response to an INQUIRY command from an application.

To view the library's INQUIRY data:

1. Press [MENU] to display the menus. Press the down arrow key until "Library Information" appears.

```

▶ L i b r a r y
  I n f o r m a t i o n

```

2. Press [ENTER]. Press the down arrow key until "Def Inq Vend ID" appears.

```

■ D e f   I n q   V e n d   I D
  E X A B Y T E

```

3. Press the down arrow key to display "Def Inq Prod ID."

```

■ D e f   I n q   P r o d   I D
  E x a b y t e   2 2 1 L

```


VIEWING THE CARTRIDGE INVENTORY

The Cartridge Inventory screens allow you to view information the library maintains for each element. Elements are physical locations in the library that can accept a cartridge (the magazine slots, the fixed slots, the tape drives, the entry/exit port, and the robot). Information maintained in the inventory includes whether an element contains a cartridge, bar code label information for the cartridge, the exact location of an element, and how many positioning retries have occurred at an element. The library uses this information to process commands from the library software. Viewing cartridge inventory information can aid in troubleshooting library problems.

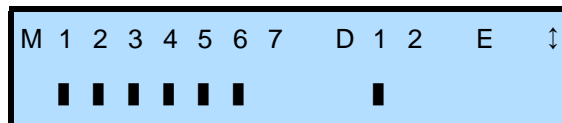
To view the cartridge inventory:

1. Press [MENU] to display the menus. The Cartridge Inventory screen appears.

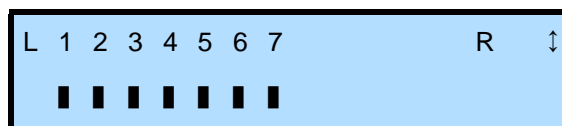


2. Press [ENTER] to display the first inventory information screen. Press the down arrow key to display additional screens.

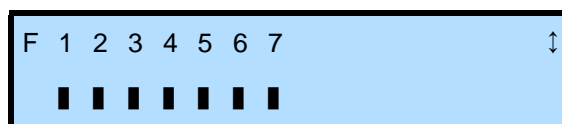
There are three screens that provide inventory information. The first screen depicts information about the slots in the right-side magazine (M 1 through 7), for Drives 1 and 2 (D 1 and 2), and for the entry/exit port (E).



The second screen is for the left-side magazine (L1 through 7) and the robot (R).



The third screen is for the fixed cartridge slots (F1 through 7), as shown below.



The second line of the cartridge inventory screens can contain the following information:

- ▶ A bar (■) under the element number indicates that a cartridge is stored in that element.

- ▶ A blank space indicates that no cartridge is stored in that element.
 - ▶ A dash (–) indicates that the slot is not usable because it is beyond the value set for the Maximum Addressable Element (see [page 48](#)).
 - ▶ A question mark (?) indicates that the Occupied flag for that element is not valid.
3. To view information about a specific element, use the left and right arrow keys to move across the columns. An underline indicates the currently selected element (for example, 1).
 4. After you select an element, press [ENTER] to display the Index and Type information for the element. Use the up and down arrow keys to scroll through the fields.

[Table 5-4](#) provides a description of each field in the cartridge inventory.

Table 5-4 Cartridge inventory field descriptions

Cartridge Inventory Field	Description
Index	Lists the index of the element for which the information is being displayed. (See page 69 for the element index number assignments.)
Type	Indicates the type of element: <ul style="list-style-type: none"> ▪ Cartridge slot ▪ Tape drive ▪ Robot ▪ Entry/exit port (EEP)
Warning	Displays 0 if there are no failures or errors associated with this element or displays an error code. See Chapter 8 for a list of error codes and corrective actions.
Occupied	Indicates whether the element contains a cartridge (1) or not (0).
Valid	Indicates whether the Occupied field is accurate (1) or is questionable (0).
Accessible	Indicates whether the tape drive is accessible (1) or not (0). The tape drive is accessible if it is installed in the drive bay and there is no cartridge loaded inside the drive. Note: This field applies only to tape drives. For all other elements, the value is 0.
Present	Indicates whether the tape drive or magazine is installed (1) or not (0) or if the entry/exit port is locked (1) or unlocked (0). Note: If the element references a slot, this flag indicates whether the corresponding magazine is installed.
Label/Valid	If the element contains a cartridge whose bar code label has been scanned, the Label field contains the bar code label contents. The Valid field indicates whether the Label field is valid (1) or not (0).

Table 5-4 Cartridge inventory field descriptions (continued)

Cartridge Inventory Field	Description
Label Error	Indicates if the bar code scan was successful (0) or displays an error condition: 60 – The bar code scanner could not read the bar code label because there was no label on the cartridge. 62 – The bar code scanner could not read the label because the magazine is not present. 64 – The bar code scanner could not read the label because the label checksum is bad.
Sndvol Match (Send Volume Match)	Indicates whether the cartridge label matched the template sent with the last SCSI SEND VOLUME TAG command (1) or not (0).
Source	Displays the index of the last storage element from which the cartridge was moved. If the Source displays "255," the cartridge in that element has not been moved since the last reset.
Address	Displays the SCSI element address.
Reserved	Indicates whether the element is reserved by a host (1) or not (0).
Rsv Host ID	Displays the SCSI ID of the host that has reserved the element (if it is reserved).
Reserve ID	Displays the ID that the element is reserved under. This is a number assigned by a host when the reservation was made. If there is no reservation, the Reservation ID and Host ID columns display "0."
X Axis	Displays the distance the robot must move along the X axis to the specified element location.
W Axis	Indicates the direction the robot must face to access the element. A value of 0 indicates the robot must face the front of the library; a value of 500 indicates the robot must face the back of the library.
Total Puts/ Drive Loads	Shows the number of times the library placed a cartridge in the element. (If the element is a slot, this field shows "Total Puts" since the last reset. If the element is a tape drive, it shows "Drive Loads" since the first power-on.)
Total Put Retries/ Drive Reloads	Shows the number of times the library retried placing a cartridge in the element. (If the element is a slot, this field shows "Total Put Retries" since the last reset. If the element is a drive, it shows "Drive Reloads" since the first power-on.)
Total Pick Retries/ Drive Pick Retries	Shows the number of times the library retried picking from the element. (If the element is a slot, this field shows "Total Pick Retries" since the last reset. If the element is a drive, it shows "Drive Pick Reloads" since the first power-on.)

VIEWING TAPE DRIVE INFORMATION

From the Drive Status screens, you can view status information about the tape drive(s), including the type of tape drive(s) installed and their operational status. Tape drive information is updated whenever there is a change in drive status.

To view tape drive information:

1. Press [MENU] to display the menus. Press the down arrow key until “Drive Menu” appears.

```

▶ D r i v e   M e n u
  L T O / I B M
  
```

2. Press [ENTER]. The Drive 1 Menu appears, which shows the type of drive currently installed in drive bay 1.

```

▶ D r i v e   1   M e n u
  L T O / I B M
  
```

3. Use the up or down arrow key to select the menu of the drive for which you want to display information, then press [ENTER]. (For example, to show information for Drive 1, select “Drive 1 Menu.”) A screen similar to the example below appears.

```

▶ D r i v e   1   S t a t u s
  R e a d y   T a p e   O u t
  
```

4. Press [ENTER].
5. Use the arrow keys to scroll through the status screens.

Table 5-5 describes the information in the Drive Status fields.

Table 5-5 Status information available from the library Drive Status screens

Drive Status Field	Description														
Type	Identifies the tape drive model.														
Serial Number	Displays the tape drive's serial number.														
Inq Version	Displays the four-character Inquiry version returned by the drive in response to a SCSI INQUIRY command.														
Needs Cleaning	Indicates if the drive needs cleaning (1) or not (0).														
Cart Status	Displays the status of the cartridge, if any, in the tape drive: <table> <tr> <td>▪ Empty</td><td>▪ Unloading</td></tr> <tr> <td>▪ Ready No Tape</td><td>▪ Ready Tape Out</td></tr> <tr> <td>▪ Loading</td><td>▪ Error</td></tr> <tr> <td>▪ Ready Tape</td><td>▪ Clean Drive</td></tr> <tr> <td>▪ Reading</td><td>▪ No Comm</td></tr> <tr> <td>▪ Writing</td><td>▪ Cleaning</td></tr> <tr> <td>▪ Tape in Motion</td><td>▪ Unknown</td></tr> </table>	▪ Empty	▪ Unloading	▪ Ready No Tape	▪ Ready Tape Out	▪ Loading	▪ Error	▪ Ready Tape	▪ Clean Drive	▪ Reading	▪ No Comm	▪ Writing	▪ Cleaning	▪ Tape in Motion	▪ Unknown
▪ Empty	▪ Unloading														
▪ Ready No Tape	▪ Ready Tape Out														
▪ Loading	▪ Error														
▪ Ready Tape	▪ Clean Drive														
▪ Reading	▪ No Comm														
▪ Writing	▪ Cleaning														
▪ Tape in Motion	▪ Unknown														

Table 5-5 Status information available from the library Drive Status screens (continued)

Drive Status Field	Description
Format	Displays the data format of the cartridge currently in the tape drive.
Warning	Indicates if the drive is free of errors (0) or displays an error code. For information about LTO Ultrium error codes, refer to the LTO Ultrium tape drive documentation available from IBM Corporation or visit www.storage.ibm.com .
Present	Indicates whether a drive is not installed (0) or is installed (1).
Access	Indicates if the drive is not present or there is a tape inside the drive (0), or the drive is present and there is no tape inside the drive (1).
Occupied	Indicates whether there is no cartridge loaded in the tape drive (0) or a cartridge is loaded in the tape drive (1).
Occup Valid (Occupied Valid)	Indicates whether the door has been opened or some other interruption has occurred so that the occupied information may not be reliable (0) or the occupied information is reliable (1).

NOTES

USING THE REMOTE MANAGEMENT UTILITY

If desired, you can use the library's Remote Management utility to set configuration options, view library information, monitor, and manage operation across an Ethernet network. You can access the Remote Management utility using a standard web browser.

This chapter explains how to access the Remote Management utility and how to set configuration options, view information, and issue commands through the utility. If you plan to use the utility, refer to this chapter in conjunction with [Chapter 3 - Configuring the Library](#), [Chapter 4 - Operating the Library](#), and [Chapter 5 - Viewing Library Information](#).

WHERE TO FIND INSTRUCTIONS

The following is a list of tasks you can perform through the Remote Management utility. Instructions are provided on the referenced pages.

To Perform this Task...	See...
Access the Remote Management utility	page 89
Set the robot control mode	page 92
Configure the library's interfaces –	
SCSI (221L)	page 92
Fibre Channel (221L-FC)	page 93
Ethernet	page 94
Serial	page 98
Set configuration options –	
Emulation mode	page 99
Bar code scanning	page 99
Maximum number of addressable slots	page 101
Sequential mode operation	page 102
Override tape drive WWNs	page 103
Door/LCD security	page 104
Remote manager security	page 105
Automatic tape drive cleaning	page 107
Unlock and lock the entry/exit port door	page 108
Unlock the front door	page 109
View information –	
SCSI	page 110
Fibre Channel	page 112
Network	page 113
Statistics	page 113
Sensor readings	page 117
Cartridge inventory	page 119
History	page 121
Tape drive	page 123
Run library demos	page 124
Issue library commands –	

To Perform this Task...	See...
Run the self test	page 126
Position the robot to an element	page 126
Park the robot	page 127
Home the robot	page 127
Scan bar code labels	page 127
Move a cartridge	page 128
Run diagnostic tests –	
Scan bar code labels	page 129
Pick and place a cartridge	page 130
Cycle an axis	page 131
Cycle a solenoid	page 131
Issue tape drive commands –	
Clean a tape drive	page 132
Unload a tape drive	page 133
Calibrate the library and tape drive(s)	page 134
Reset the library and tape drive(s)	page 136

ACCESSING THE REMOTE MANAGEMENT UTILITY

To access the library's Remote Management utility:

1. Connect the library to your Ethernet network as described on [page 22](#).
2. If not already powered on, power on the library as described on [page 24](#).
3. Use the library's operator panel to set up the Ethernet interface as described on [page 38](#). Make a note of the library's IP address.
4. Launch your web browser and enter the library's IP address in the following format: `http://IP address`

5. Press Enter. The utility's Home page appears. Figure 6-1 shows an example of the Home page.



Figure 6-1 Remote management utility – Home page

The Home page provides information in three sections:

- ▶ **Library Status** – Indicates the current robot control mode and any messages displayed on the first and second lines of the library's LCD.
- ▶ **Operator Messages** – Provides information when the library is operating in sequential mode.
- ▶ **Tape Drive Status** – Indicates the current status of each tape drive.

At the bottom of the Home page is a Refresh button that you can click to update the information on the page. An option for automatically refreshing the page is also available. To use this option, check the Automatically refresh library status box and click on the Refresh button. The information on the page is refreshed approximately every 3 seconds.

ACCESSING ADDITIONAL PAGES

At the top of each page, you can click on links to access the following pages:

- ▶ **Configure** – Provides selections for changing the library's robot control mode; configuring the SCSI, Fibre Channel, network (Ethernet), and serial interfaces; and configuring system-wide, security, and tape drive cleaning settings.
- ▶ **Access** – Provides selections for unlocking the library's entry/exit port and door.

- ▶ **Info** – Provides selections for viewing SCSI, Fibre Channel, and network interface information; viewing library statistics, sensor values, cartridge inventory, and history; and viewing tape drive information.
- ▶ **Maintenance** – Provides selections for running the library in demo mode, issuing individual library and tape drive commands, performing library diagnostic tests, calibrating library elements, and resetting the library and tape drive(s).

Clicking on the product name at the top left from any page returns you to the Home page. Clicking on the Exabyte “e” logo takes you to Exabyte’s web site at www.exabyte.com.

SETTING CONFIGURATION OPTIONS

Click on Configure at the top of the page to view the Configure page. Figure 6-2 shows an example of the Configure page.



Figure 6-2 Remote management utility – Configure page

The Configure page indicates the library’s current robot control mode. From this page, you can make the following selections:

- ▶ **Set the robot control mode** – Choose the source of commands issued to the robot to move cartridges.
- ▶ **Configure the interfaces** – Specify settings for the library’s SCSI or Fibre Channel interface, network (Ethernet) interface, and serial interface.
- ▶ **Configure the library** – Specify an emulation mode, bar code scanning options, maximum addressable slot, sequential mode options, tape drive WWN override, security, and tape drive cleaning settings.

SETTING THE ROBOT CONTROL MODE

The robot control mode determines which interface controls the robot. Refer to [page 54](#) for descriptions of the available robot control modes.

To set the robot control mode:

1. Click on Configure at the top of the page.
2. Click on Set the robot control mode. A page similar to [Figure 6-3](#) appears.



Figure 6-3 Remote management utility – Robot Control Mode Configuration page

3. If necessary, enter the remote manager password (see [page 105](#)).
4. Click on the radio button for the new control mode.
5. Click on the Change button. The new control mode takes effect.

CONFIGURING THE INTERFACES

From the Remote Management utility, you can configure the library's SCSI, Fibre Channel, network, and serial interfaces.

Configuring the SCSI Interface (221L)

For the 221L, you can set the SCSI IDs for the library and tape drive(s) and enable or disable SCSI parity checking. See [page 32](#) for information about SCSI IDs. See [page 33](#) for information about SCSI parity checking.

To configure the library's SCSI interface:

1. Click on Configure at the top of the page.
2. Click on Configure the interfaces.
3. Click on Configure the SCSI interface. A page similar to [Figure 6-4](#) appears.

Device	Current SCSI ID	New SCSI ID
Library	0	0
Drive 1	6	6
Drive 2	7	7

☒ Enable parity

Figure 6-4 Remote management utility – SCSI Interface Configuration page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. Enter new SCSI IDs for the library, drive 1, and drive 2, as desired.
6. Check or uncheck the Enable parity box.
7. Click on the Change button. The changes take effect.

Configuring the Fibre Channel Interface (221L-FC)

For the 221L-FC, you can set the Fibre Channel Loop IDs for the library and tape drive(s) and enable or disable hard addressing. See [page 34](#) for information about Loop IDs and hard addressing.

To configure the library's Fibre Channel interface:

1. Click on Configure at the top of the page.
2. Click on Configure the interfaces.

3. Click on Configure the Fibre Channel interface. A page similar to [Figure 6-5](#) appears.

Device	Current Loop ID	New Loop ID
Library	0	0
Drive 1	1	1
Drive 2	2	2

Figure 6-5 Remote management utility – Fibre Channel Interface Configuration page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. Enter new Loop IDs for the library, drive 1, and drive 2, as desired.
6. Check or uncheck the Require hard loop IDs box.
7. Click on the Change button. The changes take effect.

Configuring the Network (Ethernet) Interface

For the library's network interface, you can set up the network addresses, specify the SNMP trap recipient address, and change the FTP user name and password. See [page 38](#) for information about network addresses, SNMP, and FTP settings.

Setting Up the Network Addresses To set up the library's network addresses:

1. Click on Configure at the top of the page.
2. Click on Configure the interfaces.
3. Click on Configure the network interface.
4. Click on Set up the network interface. A page similar to [Figure 6-6](#) appears.

221

Configure - Access - Info - Maintenance

Configure: Interfaces: Network: Setup

☒ Gateway address: 10.1.50.254
☒ IP address assignment: Static
☒ IP address: 10.1.50.130
☒ Subnet mask: 255.255.255.0

Remote Manager Password:

Change the gateway address and/or the type of IP address assignment. If a static IP address is selected, set the library's IP address and subnet mask.

Gateway address:

☐ Dynamic
☒ Static

IP address: (static IP assignment only)

Subnet mask: (static IP assignment only)

Figure 6-6 Remote management utility – Network Interface Configuration page

5. If necessary, enter the remote manager password (see [page 105](#)).
6. Enter a new value for the Gateway address, as desired.
7. Click on the radio button for Dynamic or Static addressing.
8. If you selected Static addressing, enter values for the IP address and Subnet mask, as desired.
9. Click on the Change button. The changes take effect.

Setting the SNMP Trap Recipient Address To set the SNMP trap recipient address:

1. Click on Configure at the top of the page.
2. Click on Configure the interfaces.
3. Click on Configure the network interface.

- Click on Configure SNMP. A page similar to [Figure 6-7](#) appears.



Figure 6-7 Remote management utility – SNMP Configuration page

- If necessary, enter the remote manager password (see [page 105](#)).
- Enter a new value for the trap recipient IP address, as desired.
- Click on the Change button. The change takes effect.

Changing the FTP User Name and Password To change the FTP user name:

- Click on Configure at the top of the page.
- Click on Configure the interfaces.
- Click on Configure the network interface.
- Click on Configure FTP.
- Click on Change the FTP user name. A page similar to [Figure 6-8](#) appears.



Figure 6-8 Remote management utility – Change FTP User Name page

- If necessary, enter the remote manager password (see [page 105](#)).

7. Enter the current user name and password.

Note: The factory default user name is *anonymous* and the password is *Exabyte*. The user name and password are case-sensitive.

8. Enter a new user name, up to 16 characters.
9. Click on the Change button. The change takes effect.

To change the FTP password:

1. Click on Configure at the top of the page.
2. Click on Configure the interfaces.
3. Click on Configure the network interface.
4. Click on Configure FTP.
5. Click on Change the FTP password. A page similar to [Figure 6-9](#) appears.

Figure 6-9 Remote management utility – Change FTP Password page

6. If necessary, enter the remote manager password (see [page 105](#)).
7. Enter the current password.

Note: The factory default password is *Exabyte*. The password is case-sensitive.
8. Enter a new password, up to 16 characters. Re-type the password to confirm it.
9. Click on the Change button. The change takes effect.

Configuring the Serial Interface

For the library's serial interface, you can specify the baud rate. You can use the serial interface for upgrading firmware and creating diagnostic listings. See [page 143](#) for information about using the library's serial interface.

To set the baud rate for the library's serial interface:

1. Click on Configure at the top of the page.
2. Click on Configure the interfaces.
3. Click on Configure the serial interface. A page similar to [Figure 6-10](#) appears.



Figure 6-10 Remote management utility – Serial Interface Configuration page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. Click the radio button for the new baud rate.
6. Click on the Change button. The change takes effect.

CONFIGURING THE LIBRARY

From the Remote Management utility, you can specify settings for the following system options:

- ▶ Emulation mode
- ▶ Bar code scanning
- ▶ Maximum number of addressable slots
- ▶ Sequential mode
- ▶ WWN override for tape drives
- ▶ Library security
- ▶ Remote manager security
- ▶ Automatic tape drive cleaning

Changing the Emulation Mode

If your application software is not yet certified for the 221L, you can change the library's emulation mode. See [page 43](#) for information about emulation modes.

To change the emulation mode:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure library system. A page similar to [Figure 6-11](#) appears.

Figure 6-11 Remote management utility – Library System Configuration page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. Select the new emulation mode from the pulldown menu.
6. Click on the Change button. The change takes effect.

! Important After changing the library's emulation mode, you will need to reboot your host computer so that it recognizes the new emulation mode.

Setting Bar Code Scanning Options

You can set options that determine when the library scans all of the cartridge labels and whether the library verifies checksum characters on the labels.

If you want the library to scan all bar code labels whenever it is powered up or the door is opened and closed, you can enable the POST bar code scan option. By default this option is disabled. See [page 46](#) for more information about this option.

If your bar code labels contain checksum characters, you should enable the Verify Barcode Checksums option. By default, this option is disabled. See [page 47](#) for more information about this option.

To enable or disable the bar code scanning options:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure library system. A page similar to [Figure 6-12](#) appears.

221

Configure - Access - Info - Maintenance

Configure: Library: System

Remote Manager Password:

Emulation mode:

☐ Scan Barcode on POST

☐ Verify barcode checksums

Max Addressable Element:

☐ Sequential Restart

☐ Sequential Loop

Sequential next slot:

☐ Override Drive WWN

Figure 6-12 Remote management utility – Library System Configuration page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. Check or uncheck the Scan Barcode on POST box.
6. Check or uncheck the Verify barcode checksums box.
7. Click on the Change button. The changes take effect.

Setting the Maximum Number of Addressable Slots

Setting the maximum number of addressable slots causes the library to use and report fewer slots than are physically present. Use this option if your application bases licensing on the number of slots being used and you are using fewer than the full number of slots in the library. See [page 48](#) for more information about this option.

To set the maximum number of available slots:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure library system. A page similar to [Figure 6-13](#) appears.

The screenshot displays the 'Configure: Library: System' page in the Remote Manager utility. The page has a breadcrumb trail at the top: 'Configure > Access > Info > Maintenance'. On the left, there is a logo with the number '221' and a stylized 'E' symbol. The main configuration area is enclosed in a dashed border and contains the following elements:

- Remote Manager Password:** A text input field.
- Emulation mode:** A dropdown menu currently showing '-native-'.
- ☐ Scan Barcode on POST
- ☐ Verify barcode checksums
- Max Addressable Element:** A text input field containing the value '21'.
- ☐ Sequential Restart
- ☐ Sequential Loop
- Sequential next slot:** A text input field containing the value '1'.
- ☐ Override Drive WWN
- Change:** A button at the bottom of the configuration area.

Figure 6-13 Remote management utility – Library System Configuration page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. In the Max Addressable Element field, enter the element index of the highest numbered slot you want the library to use. See [page 69](#) for element index number assignments.
6. Click on the Change button. The change takes effect.

Setting Sequential Mode Options

When the library is operating in one of its sequential modes, it automatically moves cartridges sequentially between the cartridge slots and a tape drive, without instructions from an application. To customize how sequential mode works, you can set the Loop, Restart, and Next Cartridge options. See [page 60](#) for more information about sequential operation and the sequential mode options.

To set sequential mode options:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure library system. A page similar to [Figure 6-14](#) appears.

The screenshot displays the 'Configure: Library: System' page in the Remote Management Utility. The page has a header with '221' and a navigation bar with 'Configure', 'Access', 'Info', and 'Maintenance'. The main content area is titled 'Configure: Library: System' and contains a form with the following fields and options:

- Remote Manager Password: [Text input field]
- Emulation mode: [-native-] [Dropdown menu]
- ☐ Scan Barcode on POST
- ☐ Verify barcode checksums
- Max Addressable Element: [21] [Text input field]
- ☐ Sequential Restart
- ☐ Sequential Loop
- Sequential next slot: [1] [Text input field]
- ☐ Override Drive WWN
- [Change] [Button]

Figure 6-14 Remote management utility – Library System Configuration page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. Check or uncheck the Sequential Restart and Sequential Loop boxes, as desired.
6. Specify a slot number in the Sequential next slot field, as desired.
7. Click on the Change button. The changes take effect.

Overriding the Tape Drive World-Wide Names (221L-FC)

If you want to be able to replace tape drives in the 221L-FC library without causing new world-wide names (WWNs) to be reported to your application, you can set an option that overrides the tape drives' WWNs. See [page 37](#) for more information about this option.

To override the tape drives' WWNs:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure library system. A page similar to [Figure 6-15](#) appears.

221

Configure - Access - Info - Maintenance

Configure: Library: System

Remote Manager Password:

Emulation mode:

☐ Scan Barcode on POST

☐ Verify barcode checksums

Max Addressable Element:

☐ Sequential Restart

☐ Sequential Loop

Sequential next slot:

☐ Override Drive WWN

Figure 6-15 Remote management utility – Library System Configuration page

4. Check the Override Drive WWN box.
5. Click on the Change button.
6. Reset the tape drive (see [page 137](#)) to cause the new WWNs to take effect.

! Important If you remove a tape drive after the Override Drive WWN option has been in effect, the library-generated WWN stays with the tape drive. If you want the tape drive to revert to its original WWN, you must turn off the Override Drive WWN option and reset the tape drive before removing it from the library.

Setting Up Library (Door/LCD) Security

If you want to restrict access to the library, you can set a password that users must enter at the operator panel before the door can be opened or configuration options can be changed from the operator panel. See [page 49](#) for more information about LCD security.

Enabling the Door/LCD Password To enable a door/LCD password:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure library Door/LCD security. A page similar to [Figure 6-16](#) appears.

221

Configure > Access > Info > Maintenance

Configure: Library: Door Password

Remote Manager Password:

Restrict access to the library by requiring a password to unlock the front door and access the menus:

Door/LCD Password:

Door/LCD Password (again):

Figure 6-16 Remote management utility – Door/LCD Password Configuration (Enable) page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. Enter a numeric password for unlocking the door and using the LCD, up to 3 digits. Re-type the password to confirm it.
6. Click on the Change button. The password takes effect.

Disabling the Door/LCD Password To disable the door/LCD password:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure library Door/LCD security. A page similar to [Figure 6-17](#) appears.

221

Configure > Access > Info > Maintenance

Configure: Library: Door Password

Remote Manager Password:

Disable the front door/menu password and allow open access to the library: ☐

Door/LCD Password:

Figure 6-17 Remote management utility – Door/LCD Password Configuration (Disable) page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. Enter the door/LCD password.
6. Click on the Change button. The password is disabled.

Setting Up Remote Manager Security

If you want to restrict access to the remote manager utility, you can set up a password that users must enter in the utility before changing configuration options.

Note: If you set a remote manager password, the password applies only to activities that could disrupt library operation. Informational pages are still available without the password.

Enabling the Remote Manager Password To enable a remote manager password:

1. Click on Configure at the top of the page.
2. Click on Configure the library.

3. Click on Configure library Remote Manager security. A page similar to Figure 6-18 appears.



Figure 6-18 Remote management utility – Remote Manager Password Configuration (Enable) page

4. Enter a password for using the Remote Management utility, up to 18 characters. Re-type the password to confirm it.

Note: The password is case-sensitive.

5. Click on the Change button. The password takes effect.

Disabling the Remote Manager Password To disable the remote manager password:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure library Remote Manager security. A page similar to Figure 6-19 appears.



Figure 6-19 Remote management utility – Remote Manager Password Configuration (Disable) page

4. Enter the remote manager password.

Note: The password is case-sensitive.

5. Click on the Change button. The password is disabled.

Setting Up Automatic Tape Drive Cleaning

If you want the library to automatically perform tape drive cleanings, you can enable the Autoclean option, activate the cleaning cartridge slot, and specify the number of cleaning cycles available on the cleaning cartridge. See [page 44](#) for more information about these settings.

-
- ! Important** If you plan to use automatic cleaning, make sure that you have installed a cleaning cartridge in the cleaning cartridge slot location (see [page 16](#)).
- If your library software has a cleaning option, be sure to turn that option OFF.
-

To set up automatic tape drive cleaning:

1. Click on Configure at the top of the page.
2. Click on Configure the library.
3. Click on Configure drive cleaning settings. A page similar to [Figure 6-20](#) appears. This page indicates the current slot designated for a cleaning cartridge, the number of cleaning cycles remaining for the cleaning cartridge (if present), and whether the Autoclean option is enabled or disabled.

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Configure - Access - Info - Maintenance

Configure: Library: Drive Cleaning

■ Cleaning cartridge: 21
 ■ Cleaning cycles: 0
 ■ Autoclean: Disabled

Remote Manager Password:

Set up the library to automatically clean the tape drives:

Assign a cleaning cartridge:
☒ Yes
☐ No

Number of cleaning cycles:

☐ Enable autoclean

Figure 6-20 Remote management utility – Drive Cleaning Configuration page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. If you want to enable the Autoclean option, click the Yes radio button to activate the cleaning cartridge slot.
6. Specify the number of cleaning cycles available on the cleaning cartridge.

7. Check the Enable autoclean box.
8. Click on the Change button. The changes take effect.

UNLOCKING THE ENTRY/EXIT PORT DOOR AND FRONT DOOR

To add or remove individual cartridges from the library without interrupting operation, use the library's entry/exit port. To use the entry/exit port, you must unlock the entry/exit port door. To move cartridges to or from the entry/exit port, you must issue a Move Cartridge command to the library (see [page 128](#)).

If necessary, you can access the cartridges and tape drive(s) by opening the front door. Note that opening and closing the door causes the library to perform a cartridge inventory. To open the front door, you must unlock it.

The following sections explain how to unlock/lock the entry/exit port door and unlock the front door from the Remote Management utility. See [page 57](#) for information about how to use the entry/exit port to add and remove cartridges. See [page 55](#) for information about how to remove and replace cartridge magazines.

! Important The front door and the entry/exit port door may be prevented from unlocking by the library application. If access has been prevented through the application, you must issue commands from the application to allow access.

UNLOCKING AND LOCKING THE ENTRY/EXIT PORT DOOR

To unlock the entry/exit port door:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Access at the top of the page.
3. Click on Unlock the entry/exit port door. A page similar to [Figure 6-21](#) appears.



Figure 6-21 Remote management utility – Unlock EEPort page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. Click on the Unlock button. The entry/exit port unlocks.

After you have added or removed cartridges (see [page 57](#)), lock the entry/exit port door as follows:

1. Click on Access at the top of the page.
2. Click on Lock the entry/exit port door.
3. Click on the Lock button. The entry/exit port locks.

UNLOCKING THE DOOR

To unlock the door:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Access at the top of the page.
3. Click on Unlock the library's front door. A page similar to [Figure 6-22](#) appears.



Figure 6-22 Remote management utility – Unlock Front Door page

4. If necessary, enter the door password (see [page 104](#)).
5. If necessary, enter the remote manager password (see [page 105](#)).
6. Click on the Unlock button. The front door unlocks.

After you have finished removing and replacing cartridges, close the front door. The door locks automatically.

VIEWING INTERFACE, LIBRARY, AND TAPE DRIVE INFORMATION

The library maintains an internal database containing information about its configuration and operations. You can view this information through the Remote Management utility.

Click on Info at the top of the page to view the Info page. [Figure 6-23](#) shows an example of the Info page.

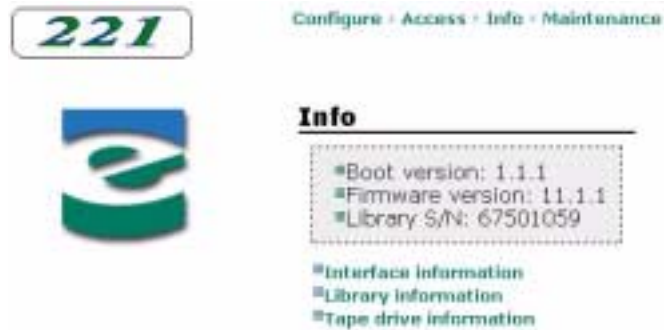


Figure 6-23 Remote management utility – Info page

The Info page indicates the library's boot code version, firmware version, and serial number. From this page, you can make the following selections:

- ▶ **Interface information** – View SCSI, Fibre Channel, and network interface information.
- ▶ **Library information** – View statistics, sensor values, cartridge inventory data, and history.
- ▶ **Tape drive information** – View tape drive identification and status information.

VIEWING INTERFACE INFORMATION

You can view information for the following interfaces:

- ▶ SCSI
- ▶ Fibre Channel
- ▶ Network

Viewing SCSI Information

To view SCSI information:

1. Click on Info at the top of the page.
2. Click on Interface information.

3. Click on SCSI information. A page similar to [Figure 6-24](#) appears.



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Info: Interfaces: SCSI

Unit reserved: No
Reserved by: N/A

Element address assignment mode parameters:

Element Type	Saved	Current	Default	Count
Storage	1	1	1	21
E/E port	01	01	01	1
Drive	02	02	02	2
Robot	06	06	06	1

Parity and security mode parameters:

Mode Parameter	Saved	Current	Default
Parity	1	1	1
Parity Retries	1	1	1
Security	0	0	0

Resource recovery information:

Parameter	Saved	Current	Default
Control Byte	0x38	0x30	0x30
TO Units	0x00	0x00	0x00
TO Value	0x00	0x00	0x00

Figure 6-24 Remote management utility – SCSI Interface Information page

This page indicates whether the library is reserved by a host, and, if the library is reserved, indicates the host's SCSI ID. This page also displays element address, parity, and resource recovery information for the library. These parameters are equivalent to those reported by the library in response to a MODE SENSE command issued by the application software. For information about the MODE SENSE command, refer to the *Exabyte 110L, 215, 221L, and 430 SCSI Reference*.

For each parameter, the following values are provided:

- ▶ **Saved**—The value specified as the power-on default by a MODE SELECT command. After a saved value has been specified with a MODE SELECT command, this value takes effect immediately and each time you power on the library.
- ▶ **Current**—The value currently active. It is either the power-on default or a temporary value set by the latest MODE SELECT command.
- ▶ **Default**—The original value set at the factory.

[Table 6-2](#) describes the information on this page.

Table 6-1 SCSI interface mode parameters

Field	Description
Storage	The element address of the first cartridge storage location. (See page 69 for information about element addresses.) The Count value indicates the number of storage elements in the library.
E/E Port	The element address of the first entry/exit port slot. The Count value indicates the number of slots in the entry/exit port.
Drive	The element address of the first tape drive. The Count value indicates the number of tape drives in the library.
Robot	The element address of the robot. The Count value indicates the number of robots.
Parity	The setting for SCSI parity checking (1=on, 0=off). When the parity option is on, the library checks all data coming across the SCSI bus for parity.
Parity Retries	The number of times the library will retry a SCSI phase after detecting a parity error.
Security	Whether the library's menus are password protected (1=protected, 0=not protected).
Control Byte	A Fibre Channel protocol parameter (applicable to Fibre Channel libraries only).
TO Units	A Fibre Channel protocol parameter (applicable to Fibre Channel libraries only).
TO Value	A Fibre Channel protocol parameter (applicable to Fibre Channel libraries only).

Viewing Fibre Channel Information

To view Fibre Channel information:

1. Click on Info at the top of the page.
2. Click on Interface information.
3. Click on Fibre Channel information. A page similar to [Figure 6-25](#) appears.



Figure 6-25 Remote management utility – Fibre Channel Interface Information page

This page provides the World Wide Name for the library. To view the WWNs for the tape drive(s), see [page 123](#).

Viewing Network Information

To view network information:

1. Click on Info at the top of the page.
2. Click on Interface information.
3. Click on Network information. A page similar to [Figure 6-26](#) appears.



Figure 6-26 Remote management utility – Network Interface Information page

This page provides the following information:

- ▶ **MAC address** – The serial number of the library's Ethernet adapter card.
- ▶ **IP address** – The library's network address.

VIEWING LIBRARY INFORMATION

You can view the following information for the library:

- ▶ **Statistics** – View library system statistics, bar code label scanning statistics, cartridge storage element statistics, and tape drive statistics.
- ▶ **Sensors** – View current readings from the library's internal mechanical sensors.
- ▶ **Inventory** – View information for each cartridge location, including occupied status, bar code label information, and reservation status.
- ▶ **History** – View the library's event log.

Viewing Library Statistics

You can view the following types of library statistics:

- ▶ Library system statistics
- ▶ Bar code label statistics
- ▶ Storage element statistics
- ▶ Tape drive statistics

Viewing Library System Statistics To view library system statistics:

1. Click on Info at the top of the page.
2. Click on Library information.
3. Click on Statistics.
4. Click on Library Statistics. A page similar to [Figure 6-27](#) appears.



Figure 6-27 Remote management utility – Library Statistics page

[Table 6-2](#) describes the information on this page.

Table 6-2 Library system statistics

Statistic	Description*
Total Cycles	The number of times the robot has picked a cartridge and placed it in a slot or tape drive.
Total Pick Retries	The number of times the robot retried picking a cartridge.
Total Put Retries	The number of times the robot retried placing a cartridge.
Total PTE Retries	The number of times the robot performed a position to element (PTE) retry.
Total Rotate Retries	The number of times the robot retried rotating on the wrist axis.
Total Powerups	The number of times the library has been power cycled.

* Cumulative over the life of the library.

Viewing Bar Code Label Statistics To view bar code label statistics:

1. Click on Info at the top of the page.
2. Click on Library information.
3. Click on Statistics.
4. Click on Bar Code Label Statistics. A page similar to [Figure 6-28](#) appears.



Figure 6-28 Remote management utility – Bar Code Label Statistics page

[Table 6-3](#) describes the information on this page.

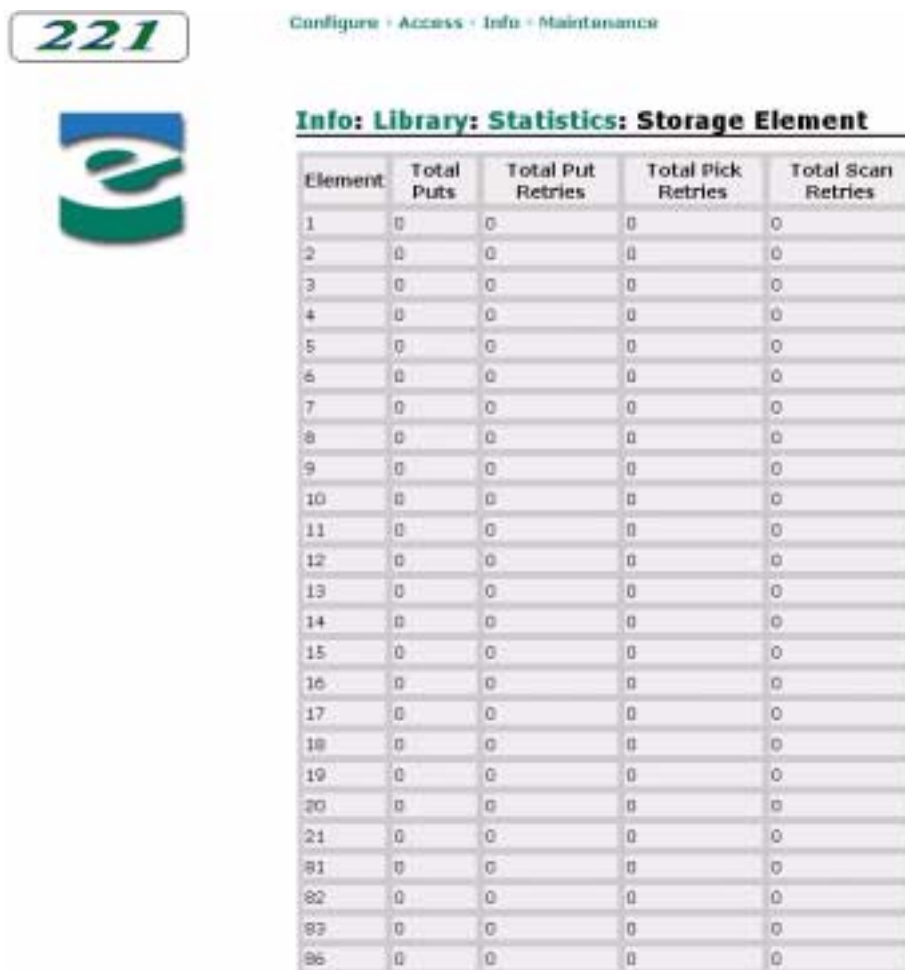
Table 6-3 Bar code label statistics

Statistic	Description
Total Scans	The number of times the robot scanned a bar code label.
Total Scan Retries	The number of times the robot retried scanning a bar code label.
Total Scan Failures	The number of times the robot failed scanning a bar code label. (The robot tries to scan a bar code several times before it logs a failure.)
Scan Retry Rate	The percentage of scans that required retries.

Viewing Storage Element Statistics Storage elements are physical locations in the library that can accept a cartridge (the magazine slots, fixed slots, tape drives, entry/exit port, and robot). To view storage element statistics:

1. Click on Info at the top of the page.
2. Click on Library information.
3. Click on Statistics.

4. Click on Storage Element Statistics. A page similar to [Figure 6-29](#) appears.



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Info: Library: Statistics: Storage Element

Element	Total Puts	Total Put Retries	Total Pick Retries	Total Scan Retries
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0

Figure 6-29 Remote management utility – Storage Element Statistics page

[Table 6-4](#) describes the information on this page.

Table 6-4 Storage element statistics

Field	Description
Element	The index number of the element for which the information is being displayed. (See page 69 for element index number assignments.)
Total Puts	The number of times the library placed a cartridge in the element.
Total Put Retries	The number of times the library retried placing a cartridge in the element.
Total Pick Retries	The number of times the library retried picking from the element.
Total Scan Retries	The number of times the robot retried scanning a bar code label on a cartridge at the element.

Viewing Tape Drive Statistics To view tape drive statistics:

1. Click on Info at the top of the page.
2. Click on Library information.
3. Click on Statistics.
4. Click on Tape Drive Statistics. A page similar to [Figure 6-30](#) appears.



Figure 6-30 Remote management utility – Tape Drive Statistics page

[Table 6-5](#) describes the information on this page.

Table 6-5 Tape drive statistics

Field	Description
Tape Drive	D1 is the tape drive closest to the fixed cartridge slots; D2 is located to the right of D1.
Total Loads	The number of times the library placed a cartridge in the tape drive since the first power-on.
Total Reloads	The number of times the library retried placing a cartridge in the tape drive since the first power-on.
Total Pick Retries	The number of times the library retried picking from the tape drive since the first power-on.

Viewing Sensor Readings

To view library sensor readings:

1. Click on Info at the top of the page.
2. Click on Library information.

3. Click on Sensors. A page similar to [Figure 6-31](#) appears.

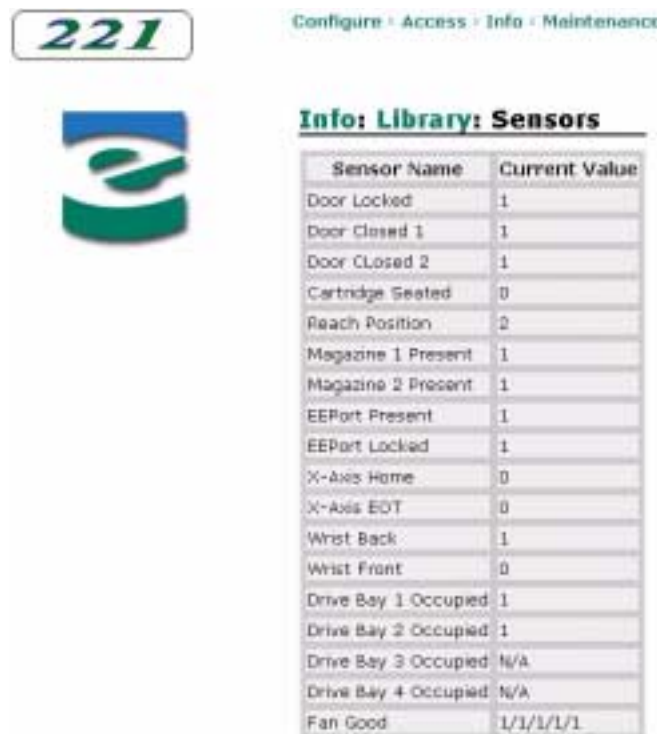


Figure 6-31 Remote management utility – Library Sensors page

[Table 6-6](#) describes the information on this page.

Table 6-6 Sensors

Sensor	Description
Door Locked	The door is locked (1) or unlocked (0).
Door Closed 1	The first door sensor is on (1) or off (0).
Door Closed 2	The second door sensor is on (1) or off (0).
Cartridge Seated	A cartridge is seated in the robot (1) or the robot is empty (0).
Reach Position	The robot fingers are closed (1) or open (2).
Magazine 1 Present	The right-side magazine is installed (1) or removed (0).
Magazine 2 Present	The left-side magazine is installed (1) or removed (0).
EEPort Present	The entry/exit port caddy is installed (1) or removed (0).
EEPort Locked	The entry/exit port is locked (1) or unlocked (0).
X-Axis Home	The robot is in the home position on the X axis (1) or not (0).
X-Axis EOT	The robot is at the EOT (end of travel) position on the X axis (1) or not (0).
Wrist Back	The robot wrist position is toward the back of the library (1) or not (0).
Wrist Front	The robot wrist position is toward the front of the library (1) or not (0).

Table 6-6 *Sensors (continued)*

Sensor	Description
Drive Bay 1 Occupied	There is a drive or drive blank installed in the drive bay (1) or the drive bay is empty (0). Note: Bay 1 is located next to the fixed slots.
Drive Bay 2 Occupied	There is a drive or drive blank installed in the drive bay (1) or the drive bay is empty (0).
Drive Bay 3 Occupied	N/A
Drive Bay 4 Occupied	N/A
Fan Good	The library and tape drive fans are operational (1) or have failed (0). The sensors are shown in the following order: Library/Drive 1/Drive 2/Drive 3/Drive 4. (Drive 3 and Drive 4 are not applicable.)



Viewing the Cartridge Inventory

The Library Inventory page allow you to view information the library maintains for each element. See [page 81](#) for information about the library's cartridge inventory.

To view the cartridge inventory:

1. Click on Info at the top of the page.
2. Click on Library information.

- Click on Inventory. A page similar to [Figure 6-32](#) appears.

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Info: Library: Inventory

Element	POVTA	Label	Label Valid	Label Error	Element Address	Host/Reserved	Reserve ID	SendVol Match	Warning
1	1/1/1/s/0	A00001L1	1	0	1	0/No	0	0	0
2	1/1/1/s/0	A00002L1	1	0	2	0/No	0	0	0
3	1/1/1/s/0	A00003L1	1	0	3	0/No	0	0	0
4	1/1/1/s/0	A00004L1	1	0	4	0/No	0	0	0
5	1/1/1/s/0	A00005L1	1	0	5	0/No	0	0	0
6	1/1/1/s/0	A00006L1	1	0	6	0/No	0	0	0
7	1/1/1/s/0	A00007L1	1	0	7	0/No	0	0	0
8	1/1/1/s/0	A00008L1	1	0	8	0/No	0	0	0
9	1/1/1/s/0	A00009L1	1	0	9	0/No	0	0	0
10	1/1/1/s/0	A00010L1	1	0	10	0/No	0	0	0
11	1/1/1/s/0	A00011L1	1	0	11	0/No	0	0	0
12	1/1/1/s/0	A00012L1	1	0	12	0/No	0	0	0
13	1/1/1/s/0	A00013L1	1	0	13	0/No	0	0	0
14	1/1/1/s/0	A00014L1	1	0	14	0/No	0	0	0
15	1/1/1/s/0	A00015L1	1	0	15	0/No	0	0	0
16	1/1/1/s/0	A00016L1	1	0	16	0/No	0	0	0
17	1/1/1/s/0	A00017L1	1	0	17	0/No	0	0	0
18	1/1/1/s/0	A00018L1	1	0	18	0/No	0	0	0
19	1/1/1/s/0	A00019L1	1	0	19	0/No	0	0	0
20	1/1/1/s/0	A00020L1	1	0	20	0/No	0	0	0
21	1/1/1/s/0	CLN401L1	1	0	21	0/No	0	0	0
81	1/0/1/e/0		0	0	81	0/No	0	0	0
82	1/0/1/d/1		0	0	82	0/No	0	0	0
83	1/0/1/d/1		0	0	83	0/No	0	0	0
86	1/0/1/r/0		0	0	86	0/No	0	0	0

Figure 6-32 Remote management utility – Library Inventory page

[Table 6-7](#) describes the information on this page.

Table 6-7 Inventory fields

Field	Description
Element	The index of the element for which the information is being displayed. (See page 69 for element index number assignments.)
P (Present)	The tape drive or magazine is installed (1) or not (0), or the entry/exit port is locked (1) or unlocked (0). Note: If the element references a slot, this flag indicates whether the corresponding magazine is installed.
O (Occupied)	The element contains a cartridge (1) or not (0).
V (Valid)	The Occupied field is accurate (1) or is questionable (0).

Table 6-7 Inventory fields (continued)

Field	Description
T (Type)	Indicates the type of element: s = cartridge slot d = tape drive e = entry/exit port r = robot
A (Accessible)	The tape drive is accessible (1) or not (0). The tape drive is accessible if it is installed in the drive bay and there is no cartridge loaded inside the drive. Note: This field applies only to tape drives. For all other elements, the value is 0.
Label	If the element contains a cartridge whose bar code label has been scanned, the Label field contains the bar code label contents.
Label Valid	The Label field is valid (1) or not (0).
Label Error	Displays 0 if the bar code scan was successful, or displays an error condition: 60 – The bar code scanner could not read the bar code label because there was no label on the cartridge. 62 – The bar code scanner could not read the label because the magazine is not present. 64 – The bar code scanner could not read the label because the label checksum is bad.
Element Address	The SCSI element address.
Host	The SCSI ID of the host that has reserved the element (if it is reserved). If the element is not reserved, this field is 0.
Reserved	Indicates whether the element is reserved by a host.
Reserve ID	The ID that the element is reserved under. This is a number assigned by a host when the reservation was made. If there is no reservation, this field is 0.
SndVol Match (Send Volume Match)	The cartridge label matched the template sent with the last SCSI SEND VOLUME TAG command (1) or did not match (0).
Warning	Displays 0 if there are no failures or errors associated with this element, or displays an error code. See Chapter 8 for a list of error codes and corrective actions.

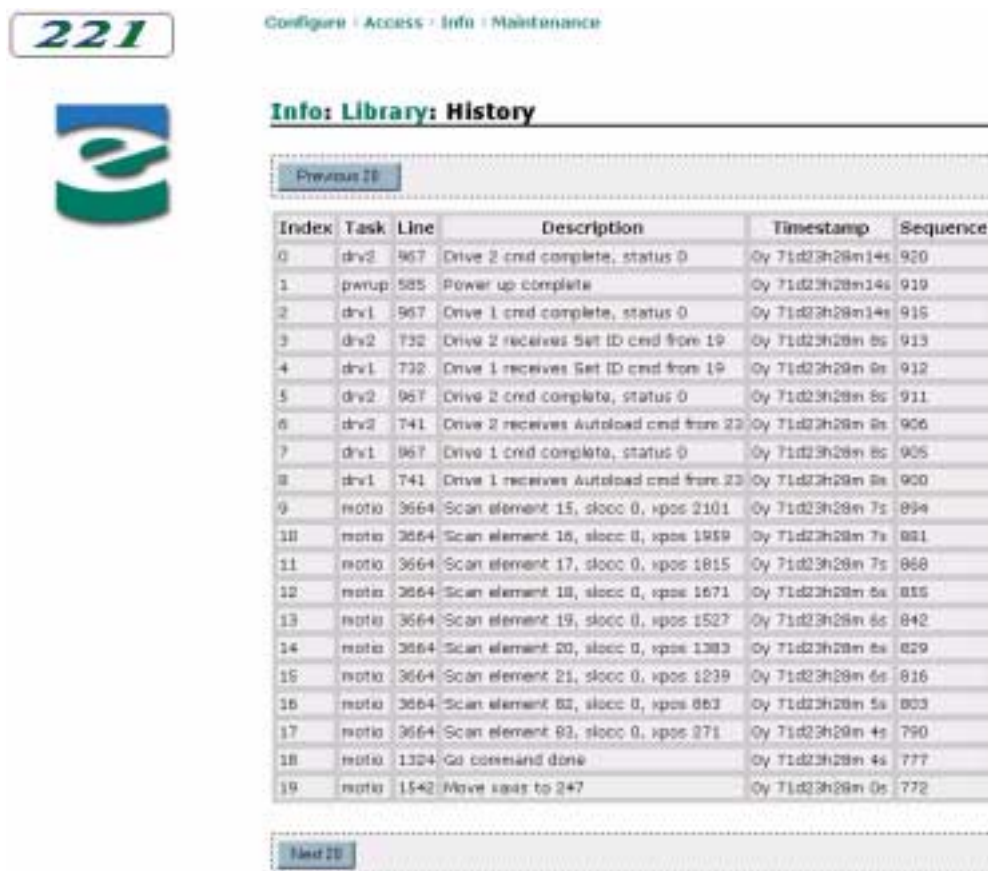
Viewing the Library History

The Library History page lists the most recent 600 events that have occurred in the library.

To view the library history:

1. Click on Info at the top of the page.
2. Click on Library information.

3. Click on History. A page similar to [Figure 6-33](#) appears.



Index	Task	Line	Description	Timestamp	Sequence
0	drv2	967	Drive 2 cmd complete, status 0	0y 71d23h28m14s	920
1	powerup	585	Power up complete	0y 71d23h28m14s	919
2	drv1	967	Drive 1 cmd complete, status 0	0y 71d23h28m14s	918
3	drv2	732	Drive 2 receives Set ID cmd from 19	0y 71d23h28m 8s	913
4	drv1	732	Drive 1 receives Set ID cmd from 19	0y 71d23h28m 8s	912
5	drv2	967	Drive 2 cmd complete, status 0	0y 71d23h28m 8s	911
6	drv2	741	Drive 2 receives Autoload cmd from 23	0y 71d23h28m 8s	906
7	drv1	967	Drive 1 cmd complete, status 0	0y 71d23h28m 8s	905
8	drv1	741	Drive 1 receives Autoload cmd from 23	0y 71d23h28m 8s	900
9	motio	3664	Scan element 15, sloc 0, xpos 2101	0y 71d23h28m 7s	894
10	motio	3664	Scan element 16, sloc 0, xpos 1959	0y 71d23h28m 7s	891
11	motio	3664	Scan element 17, sloc 0, xpos 1815	0y 71d23h28m 7s	888
12	motio	3664	Scan element 18, sloc 0, xpos 1671	0y 71d23h28m 6s	885
13	motio	3664	Scan element 19, sloc 0, xpos 1527	0y 71d23h28m 6s	882
14	motio	3664	Scan element 20, sloc 0, xpos 1383	0y 71d23h28m 6s	879
15	motio	3664	Scan element 21, sloc 0, xpos 1239	0y 71d23h28m 6s	876
16	motio	3664	Scan element 22, sloc 0, xpos 1095	0y 71d23h28m 5s	873
17	motio	3664	Scan element 23, sloc 0, xpos 951	0y 71d23h28m 4s	870
18	motio	1324	Go command done	0y 71d23h28m 4s	777
19	motio	1542	Move logs to 247	0y 71d23h28m 0s	772

Figure 6-33 Remote management utility – Library History page

Click on the Next 20 and Previous 20 buttons to scroll through the events.

[Table 6-9](#) describes the information on this page.

Table 6-8 Library history information

Field	Description
Index	The number of the event within the history buffer. The range is 0 (the most recent event) through 599. The most recent event is displayed first.
Task	The process that logged the event.
Line	The line number of the source code that logged the event.
Description	A description of the event.
Timestamp	The time, according to the library's internal clock, that the event took place.
Sequence	The sequence number of the event across all system buffers.

VIEWING TAPE DRIVE INFORMATION

From the Tape Drive Info page, you can view status information about the tape drive(s), including the serial number of each tape drive, its code level, and its operational status.

To view tape drive information:

1. Click on Info at the top of the page.
2. Click on Tape drive information. A page similar to [Figure 6-34](#) appears.



Figure 6-34 Remote management utility – Tape Drive Information page

[Table 6-9](#) describes the information on this page.

Table 6-9 Tape drive information fields

Field	Description
Drive ID	D1 is the tape drive closest to the fixed cartridge slots; D2 is located to the right of D1.
Serial Number	The tape drive's serial number.
WWN	The tape drive's world wide name (applicable only to Fibre Channel tape drives).
Flash	The code level of the tape drive's flash EEPROM.
Tape Format	The data format of the cartridge currently in the tape drive.
Cartridge Status	<p>The status of the cartridge, if any, in the tape drive:</p> <ul style="list-style-type: none"> Empty Ready No Tape Loading Ready Tape Reading Writing Tape in Motion Unloading Ready Tape Out Error Clean Drive No Comm Cleaning Unknown
Needs Cleaning	Indicates whether the drive needs cleaning.
Warning	Displays 0 if the drive is free of errors, or displays an error code. For information about LTO Ultrium error codes, refer to the LTO Ultrium tape drive documentation available from IBM Corporation or visit www.storage.ibm.com/tape/lto/oem/index.html .

ISSUING LIBRARY AND TAPE DRIVE COMMANDS

From the Remote Management utility, you can issue individual commands to the library and tape drive(s), run demos, perform diagnostic tests, calibrate the library, and reset the library and tape drive(s).

The commands are available from the Maintenance page. Click on Maintenance at the top of the page to view the Maintenance page. [Figure 6-35](#) shows the Maintenance page.



Figure 6-35 Remote management utility – Maintenance page

From the Maintenance page, you can make the following selections:

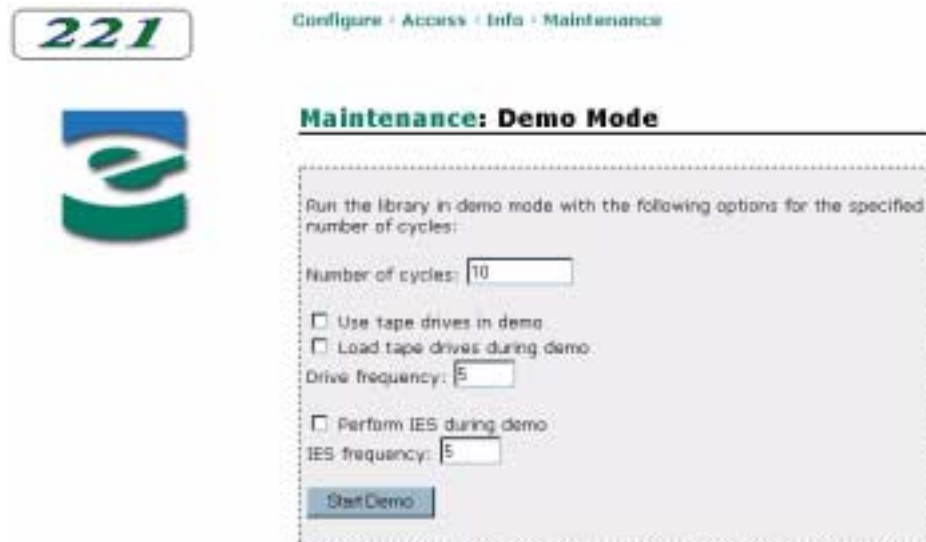
- ▶ **Run the library in demo mode** – Set options for running the library in a continuous demo mode, where the robot randomly moves cartridges between slots.
- ▶ **Run individual library commands** – Issue commands to run the library's self test, position the robot to specific locations, scan bar code labels, and move cartridges.
- ▶ **Perform library diagnostic tests** – Test individual library functions.
- ▶ **Run individual tape drive commands** – Issue commands to clean a tape drive and unload a cartridge from a tape drive.
- ▶ **Calibrate library elements** – Calibrate components in the library.
- ▶ **Reset the library and/or tape drive(s)** – Reset the library and tape drive(s) or an individual tape drive.

RUNNING LIBRARY DEMOS

To run a library demo:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.

3. Click on Run the library in demo mode. A page similar to [Figure 6-36](#) appears.



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Configure | Access | Info | Maintenance

Maintenance: Demo Mode

Run the library in demo mode with the following options for the specified number of cycles:

Number of cycles:

☐ Use tape drives in demo

☐ Load tape drives during demo

Drive frequency:

☐ Perform IES during demo

IES frequency:

Figure 6-36 Remote management utility – Demo Mode page

4. Enter the number of cycles for the demo.
5. If you want the tape drive(s) used in the demo, check the Use tape drives in demo box.
6. If you want tapes loaded into the tape drive(s), check the Load tape drives during demo box. Specify how often you want tapes loaded in the drive(s) in the Drive Frequency box.
7. If you want cartridge inventories performed during the demo, check the Perform IES during demo box. (IES is Initialize Element Status, the SCSI command that performs a cartridge inventory.) Specify how often you want a cartridge inventory performed in the IES frequency box.
8. Click on the Start Demo button.

Note: If you want to stop a demo in progress, click on the Stop button.

9. When the demo is finished, return the library to its original control mode.

ISSUING LIBRARY COMMANDS

You can issue the following library commands:

- ▶ **Self test** – Runs the library's self test. During the self test, the robot moves to Drive 1, rotates 180 degrees, moves to slot 1, rotates 180 degrees, then returns to Drive 1.
- ▶ **Position to element** – Moves the robot to a position you specify (in front of a tape drive, fixed cartridge slot, magazine slot, or the entry/exit port).

- ▶ **Park robot** – Moves the robot to the right side of the library, rotated toward the back (facing the tape drives). This position allows the packing material to be placed on the robot for shipping.
- ▶ **Home robot** – Moves the robot to its home position.
- ▶ **Scan bar code labels** – Causes the robot to scan the bar code labels on the cartridges in the range of locations you specify.
- ▶ **Move cartridge** – Causes the robot to move a cartridge from the source and destination you specify.

Running the Library Self Test

To run the library's self test:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.
3. Click on Run individual library commands.
4. Click on Self test.
5. Click on the Self Test button to begin the test.
6. When the test is finished, return the library to its original control mode.

Positioning the Robot to an Element

To position the robot to an element:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.
3. Click on Run individual library commands.
4. Click on Position to element. A page similar to [Figure 6-37](#) appears.



Figure 6-37 Remote management utility – Position to Element page

5. Specify the destination for the robot in the Element index box. See [page 69](#) for element index number assignments.
6. Click on the Position To Element button.
7. When finished, return the library to its original control mode.

Parking the Robot

To park the robot:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.
3. Click on Run individual library commands.
4. Click on Park robot.
5. Click on the Park button.

Homing the Robot

To move the robot to its home position:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.
3. Click on Run individual library commands.
4. Click on Home robot.
5. Click on the Home button.
6. When finished, return the library to its original control mode.

Scanning Bar Code Labels

To scan bar code labels:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.
3. Click on Run individual library commands.

- Click on Scan bar code labels. A page similar to [Figure 6-38](#) appears.



Figure 6-38 Remote management utility – Scan Labels page

- Specify the range of locations to scan in the Starting index and Ending index boxes. See [page 69](#) for element index number assignments.
- Click on the Scan Labels button.
- When finished, return the library to its original control mode.

Moving a Cartridge

To move a cartridge:

- Set the library's control mode to Remote (see [page 92](#)).
- Click on Maintenance at the top of the page.
- Click on Run individual library commands.
- Click on Move cartridge. A page similar to [Figure 6-39](#) appears.



Figure 6-39 Remote management utility – Move Cartridge page

- Specify the source and destination for the move in the Source element index and Destination element index boxes. See [page 69](#) for element index number assignments.

6. If the destination is a tape drive and you want the cartridge loaded into the drive, check the Load tape drive box.

! Important If you insert a data cartridge into a tape drive, be aware that the drive will not automatically eject the data cartridge. However, if you insert a cleaning cartridge into a tape drive, the cartridge will be ejected when the cleaning is finished.

7. Click on the Move Cartridge button.
8. When finished, return the library to its original control mode.

RUNNING LIBRARY DIAGNOSTIC TESTS

You can perform the following diagnostic tests to check individual library functions:

- ▶ **Continuously scan bar code labels** – The robot scans all of the cartridge slots.
- ▶ **Continuously pick and place a cartridge** – The robot takes a cartridge from a specified element and replaces it in the same location.
- ▶ **Continuously cycle an axis** – The robot moves on the specified axis: X axis (robot moves right and left), Wrist (robot rotates from front to back), and Picker (the robot's cartridge gripper moves in and out without a cartridge).
- ▶ **Continuously cycle a solenoid** – The solenoid that locks the door or the entry/exit port opens and closes.

Continuously Scanning Bar Code Labels

To test bar code label scanning:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.
3. Click on Perform library diagnostic tests.

- Click on Continuously scan bar code labels. A page similar to [Figure 6-40](#) appears.



Figure 6-40 Remote management utility – Scan Labels Diagnostics page

- Specify the number of cycles for the test.
 - Click on the Scan Labels button.
- Note:** To stop a test in progress, click on the Stop button.
- When finished, return the library to its original control mode.

Continuously Picking and Placing a Cartridge

To test cartridge picking and placing:

- Set the library's control mode to Remote (see [page 92](#)).
- Click on Maintenance at the top of the page.
- Click on Perform library diagnostic tests.
- Click on Continuously pick and place a cartridge. A page similar to [Figure 6-41](#) appears.



Figure 6-41 Remote management utility – Pick/Put Diagnostics page

- Specify the location of the cartridge in the Element Index box. See [page 69](#) for element index number assignments.

6. Specify the number of cycles for the test.
 7. Click on the Test Pick/Put button.
- Note:** To stop a test in progress, click on the Stop button.
8. When finished, return the library to its original control mode.

Continuously Cycling an Axis

To test a robot axis:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.
3. Click on Perform library diagnostic tests.
4. Click on Continuously cycle an axis. A page similar to [Figure 6-42](#) appears.



Figure 6-42 Remote management utility – Axis Diagnostics page

5. Click on the radio button next to the axis you want to test.
 6. Specify the number of cycles for the test.
 7. Click on the Test Axis button.
- Note:** To stop a test in progress, click on the Stop button.
8. When finished, return the library to its original control mode.

Continuously Cycling a Solenoid

To test a solenoid:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.
3. Click on Perform library diagnostic tests.

4. Click on Continuously cycle a solenoid. A page similar to [Figure 6-43](#) appears.



Figure 6-43 Remote management utility – Solenoid Diagnostics page

5. Click on the radio button next to the solenoid you want to test.
 6. Specify the number of cycles for the test.
 7. Click on the Test Solenoid button.
- Note:** To stop a test in progress, click on the Stop button.
8. When finished, return the library to its original control mode.

ISSUING TAPE DRIVE COMMANDS

You can issue the following tape drive commands:

- ▶ **Clean a tape drive** – Cleans the tape drive by inserting a cleaning cartridge into the drive and removing the cartridge when the cleaning is finished.
- ▶ **Unload a tape drive** – Unloads a cartridge from the tape drive.

Cleaning a Tape Drive

If a tape drive requires cleaning and you are not using the library's Autoclean option (see [page 107](#)), you can issue a command to clean the tape drive using a cleaning cartridge stored in the library.

To use this cleaning method, make sure that you have:

- ▶ Installed a cleaning cartridge in the appropriate slot. See [page 16](#).
- ▶ Activated the cleaning cartridge slot. See [page 107](#).
- ▶ Specified the number of cleaning cycles available on the cleaning cartridge. See [page 107](#).
- ▶ Turned off the Autoclean Option. See [page 107](#).

To clean the tape drive:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.
3. Click on Run individual tape drive commands.
4. Click on Clean a tape drive. A page similar to [Figure 6-44](#) appears.



Figure 6-44 Remote management utility – Tape Drive Cleaning page

5. Click on the radio button next to the drive you want to clean. (D1 is the tape drive closest to the fixed slots; D2 is located directly to the right of D1.)
6. Click on the Clean button. The robot places the cleaning tape in the tape drive. After the cleaning is finished, the robot returns the cleaning tape to its slot.

! Important If the tape drive ejects the cleaning cartridge immediately after loading it, you need to replace the cleaning cartridge. To order cleaning cartridges, contact Exabyte (see [page iv](#)).

7. When finished, return the library to its original control mode.

Unloading a Tape Drive

Under normal circumstances, cartridges are automatically unloaded (ejected) from the tape drive(s). However, if a tape drive problem occurs that requires intervention, you may need to unload a cartridge by issuing a command to the drive.

To unload a tape drive:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.
3. Click on Run individual tape drive commands.

- Click on Unload a tape drive. A page similar to [Figure 6-45](#) appears.



Figure 6-45 Remote management utility – Unload Tape Drive page

- Click on the radio button next to the drive you want to unload. (D1 is the tape drive closest to the fixed slots; D2 is located directly to the right of D1.)
- Click on the Unload button. The cartridge is ejected from the tape drive.

Note: To move the cartridge to a cartridge slot or the entry/exit port, use the Move Cartridge command (see [page 128](#)).

- When finished, return the library to its original control mode.

CALIBRATING LIBRARY ELEMENTS

Under normal operating conditions, you do not need to calibrate the library. However, if a problem occurs, you may be asked by Exabyte Technical Support personnel to calibrate the library as part of a troubleshooting procedure. You can calibrate the entire library, the entry/exit port, or an individual tape drive.

Calibrating the Library

To calibrate the entire library:

- Set the library's control mode to Remote (see [page 92](#)).
- Click on Maintenance at the top of the page.
- Click on Calibrate library elements.
- Click on Calibrate the library.
- Click on the Calibrate Library button to begin calibration.
- When calibration is complete, return the library to its original control mode.

Calibrating the Entry/Exit Port

To calibrate the entry/exit port:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.
3. Click on Calibrate library elements.
4. Click on Calibrate just the entry/exit port slots.
5. Click on the Calibrate EEPort button to begin calibration.
6. When calibration is complete, return the library to its original control mode.

Calibrating a Tape Drive

To calibrate a tape drive:

1. Set the library's control mode to Remote (see [page 92](#)).
2. Click on Maintenance at the top of the page.
3. Click on Calibrate library elements.
4. Click on Calibrate a tape drive. A page similar to [Figure 6-46](#) appears.



Figure 6-46 Remote management utility – Tape Drive Calibration page

5. Click on the radio button next to the drive you want to calibrate. (D1 is the tape drive closest to the fixed slots; D2 is located directly to the right of D1.)
6. Click on the Calibrate Tape Drive button to begin calibration.
7. When calibration is complete, return the library to its original control mode.

RESETTING THE LIBRARY AND TAPE DRIVE(S)

If the library or a tape drive has encountered an error and is not operating as expected after you have tried the recommended corrective actions, you may need to reset the library or the individual tape drive.

Resetting the library causes it to perform its power-on self-test and a full cartridge inventory. If the library is performing a cartridge move operation when it is reset, it completes the move operation before it performs the power-on self-test.

Resetting a tape drive causes the drive to perform its power-on self-test and rewind any loaded tape to the beginning.

! Important After a tape drive is reset, the drive rewinds the tape but does not eject the cartridge. Make sure that it is safe to overwrite the tape before performing a backup so that you don't lose previously recorded data.



Caution

Before resetting, make sure the library and tape drive(s) are not communicating across the SCSI bus. The reset may disrupt communications on the SCSI bus.

Resetting the Library

To reset the library:

1. Click on Maintenance at the top of the page.
2. Click on Reset the library and/or tape drives.
3. Click on Reset the library. A page similar to [Figure 6-47](#) appears.



Figure 6-47 Remote management utility – Reset Library page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. Click on the Reset Library button. The library performs the reset operation.

Resetting a Tape Drive

To reset a tape drive:

1. Click on Maintenance at the top of the page.
2. Click on Reset the library and/or tape drives.
3. Click on Reset a tape drive. A page similar to [Figure 6-48](#) appears.



Figure 6-48 Remote management utility – Reset Tape Drive page

4. If necessary, enter the remote manager password (see [page 105](#)).
5. Click on the radio button next to the tape drive you want to reset. (D1 is the tape drive closest to the fixed slots; D2 is located directly to the right of D1.)
6. Click on the Reset Tape Drive button. The library performs the reset operation.

NOTES

This chapter describes basic library maintenance tasks that you can perform on-site without the aid of a service technician. These tasks include:

- ▶ Installing or replacing a tape drive
- ▶ Cleaning the library
- ▶ Using touch-up paint on the housing
- ▶ Upgrading firmware and creating diagnostic listings

**Caution**

Unless you have a self-maintenance contract with Exabyte, do not attempt to replace any components in the library, other than the tape drives. If you do so, you will void your warranty.

INSTALLING OR REPLACING A TAPE DRIVE

This section describes how to install an additional tape drive in the library or replace an existing tape drive. You can order tape drives from Exabyte (see [page iv](#)). The tape drive will be shipped to you in the required drive carrier. You cannot install a tape drive into the library without a drive carrier.

-
- ! Important** If you are upgrading a library from SCSI to Fibre Channel or from Fibre Channel LTO Ultrium 1 to Fibre Channel LTO Ultrium 2, please contact Exabyte Technical Support (see [page iv](#)) to determine whether your library needs additional hardware upgrades.
-

PREPARING FOR REPLACEMENT

1. Obtain a #2 Phillips screwdriver.
2. Ensure that the environment is free of conditions that could cause electrostatic discharge (ESD). If possible, use an antistatic mat and grounded static protection wristband during installation. If a mat and wristband are not available, touch a known grounded surface, such as a computer's metal chassis.

3. Power off the library and disconnect the power cord.

**Warning**

Before performing this procedure, be sure that the library's power switch is in the off position and the power cord is disconnected from the outlet.

REMOVING THE SERVICE ACCESS COVER

If you are installing an additional tape drive in the library, follow these steps to remove the drive bay service access cover. If you are replacing a tape drive, skip to [“Removing the Tape Drive” on page 141](#).

1. From the back panel, use a #2 Phillips screwdriver to release the captive screw that secures the service access cover to the library (see [Figure 7-1](#)).
2. When the screw is loosened, remove the service access cover, as shown in [Figure 7-1](#).

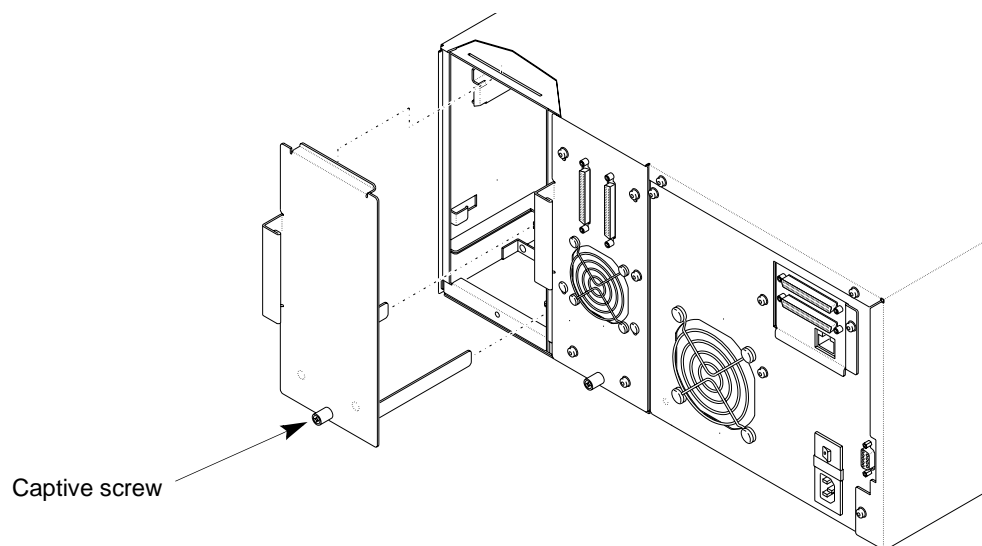


Figure 7-1 Removing the drive access cover

REMOVING THE TAPE DRIVE

If you are replacing an existing tape drive, follow these steps to remove the drive:

1. Disconnect the cable(s) and terminator, if present, from the back of the tape drive you are replacing. The connectors for the tape drives are accessible from the back panel (see [Figure 7-2](#)).

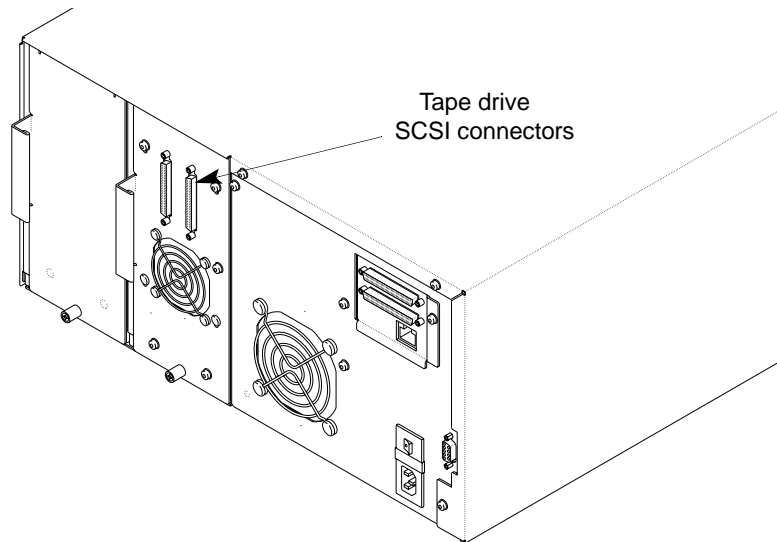


Figure 7-2 Tape drive SCSI connectors on the 221L library

2. From the back panel, use a #2 Phillips screwdriver to release the captive screw that secures the tape drive carrier to the library (see [Figure 7-3](#)).

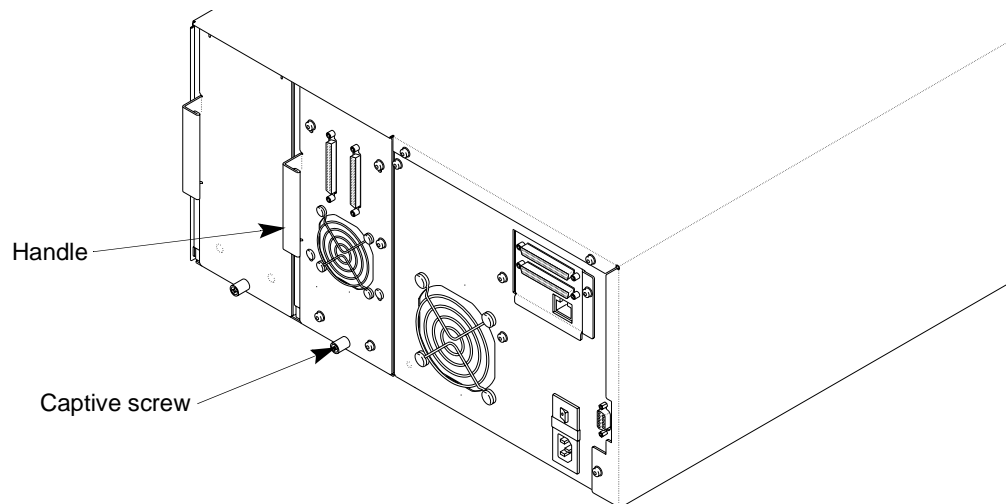


Figure 7-3 Location of captive screw and drive carrier handle

3. Remove the drive carrier by grasping the handle and pulling it directly out of the library.

! Important The drive carrier weighs 4.5 kg (10 pounds); make sure you support the bottom of the carrier as you remove it.

INSTALLING THE NEW TAPE DRIVE

1. Insert the tape drive so that the handle is at the left and the fan is at the bottom, as shown in [Figure 7-4](#). The tape drive should slide easily toward the front of the library.

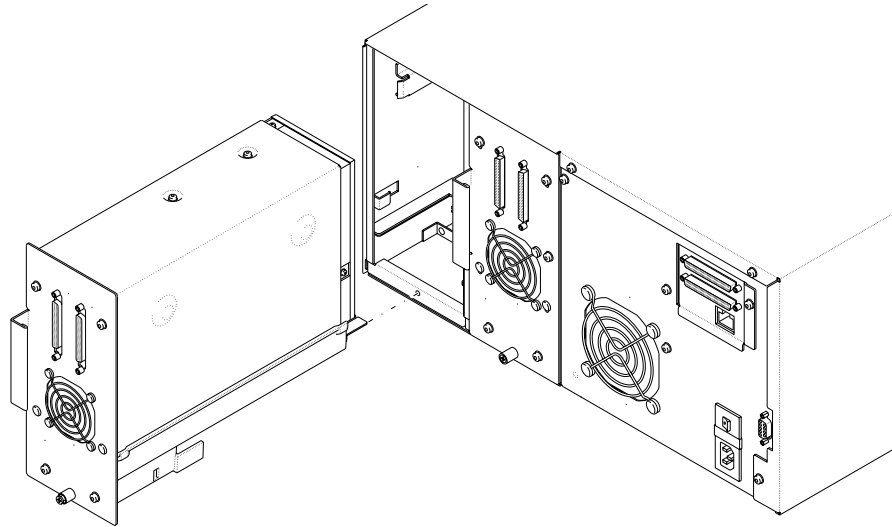


Figure 7-4 Sliding a tape drive into the library

2. Tighten the captive screw to 8.0 inch-pounds (9.2 kg-cm) of torque.
3. Connect the cables to the new tape drive.

Note: If you are installing an additional tape drive, refer to [page 18](#) for information about connecting to SCSI or [page 20](#) for information about connecting to Fibre Channel.



Caution

To avoid damaging the tape drive, make sure the library is powered off when you connect it to the SCSI bus.

4. Reconnect the power cord and power on the library, as described on [page 24](#). Calibration of the new tape drive occurs automatically during power on.

! Important Do not power on the library with an empty drive bay. Each drive bay must have either a tape drive or a service access cover.

The library is now ready to resume operation. If you replaced a SCSI tape drive, the new tape drive automatically assumes the SCSI ID of the old drive. If you installed an additional SCSI tape drive, set the SCSI ID for the drive as described on [page 32](#).

If you replaced a Fibre Channel tape drive, the new tape drive obtains its Loop ID as described on [page 34](#). If you installed an additional Fibre Channel tape drive, set the Loop ID for the drive as described on [page 35](#).

You may want to perform some hardware exercises to ensure that the library and the newly installed tape drive are communicating correctly (see [page 69](#)).

CLEANING THE LIBRARY



Caution

The library's internal components are lubricated at the factory and should not be cleaned or relubricated. To protect the internal components from dust, keep the library's door closed.

The only library components that should be cleaned are the tape drive(s) and the operator panel. Instructions for cleaning the tape drive(s) are provided on [page 63](#). To clean the operator panel, use wipes or cleaners appropriate for LCD screens or computer monitors.



Caution

To avoid scratching the operator panel, do not use abrasive cleaners, abrasive cleaning implements, harsh chemicals, or solvents.

USING TOUCH-UP PAINT ON THE HOUSING

A paint kit is available for touching up nicks and scratches on the finish. For ordering information, contact Exabyte (see [page iv](#)).

UPGRADING LIBRARY FIRMWARE AND CREATING DIAGNOSTIC LISTINGS

The library features an internal interface that provides access to the library's firmware. You access this interface, called Console, through the library's serial port. You can use Console to upgrade the library's firmware, create diagnostic listings, and view the password for LCD security.

As an alternative, you can use the library's Ethernet interface and an FTP utility to upgrade the library's firmware and create diagnostic listings.

This section describes how to do the following:

- ▶ Connect to the library's Console interface
- ▶ Upgrade library firmware via Console
- ▶ Create a diagnostic listing via Console
- ▶ View the LCD security password via Console
- ▶ Connect to the library's FTP interface
- ▶ Upgrade library firmware via FTP
- ▶ Create a diagnostic listing via FTP

CONNECTING TO THE LIBRARY'S CONSOLE INTERFACE

To access Console, you must have the following:

- ▶ A host computer that uses an RS232 serial port
- ▶ A straight-through 9-pin serial cable (not a null modem cable)
- ▶ Terminal emulation software, such as HyperTerminal

Note: Exabyte recommends using HyperTerminal, a standard communications package available with Microsoft Windows®.

Connecting the Serial Cable

Connect the 9-pin cable to a serial port on the host computer and to the serial port on the back of the library. [Figure 7-5](#) shows the location of the serial port.

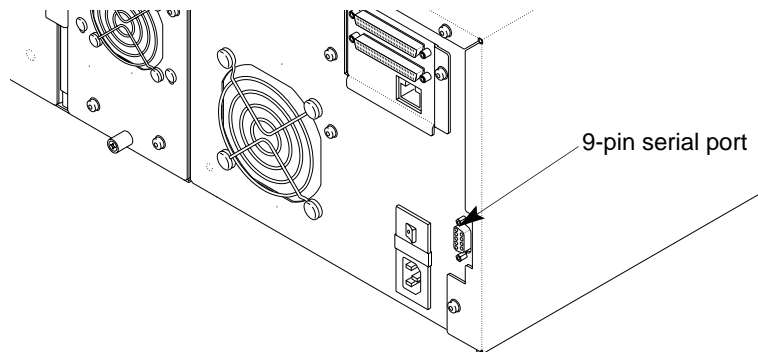


Figure 7-5 Location of serial port

Setting the Library's Baud Rate

Before accessing Console, you may need to change the baud rate for the library so that it matches the host computer's baud rate. The library's default rate is 9600.

To change the baud rate:

1. Press [MENU] to display the menus. Press the down arrow key until "Config Menu" appears, then press [ENTER]. The Baud Rate Menu displays the currently selected baud rate.

```

▶ B a u d   R a t e   M e n u
    9 6 0 0
  
```

2. Press [ENTER]. An informational message appears, then the following screen appears.

```

B a u d ?
    9 6 0 0 ↑
  
```

3. Use the up or down arrow key to select the baud rate that matches the baud rate of the host computer, then press [ENTER].

Accessing Console using HyperTerminal

Note: These instructions assume you are using HyperTerminal, a communications package available with Microsoft Windows. If desired, you can use a different terminal emulation software package.

To access Console using HyperTerminal:

1. From your computer, launch HyperTerminal.
2. In HyperTerminal's Connection Description screen, enter a name and choose an icon for this communications session.
3. In HyperTerminal's Connect To screen, choose the communications port you are using from the Connect Using field. Click OK.
4. In the Properties screen, make sure the fields contain the following values, then click OK.
 - ▶ Bits per second: (baud rate of the library)
 - ▶ Data bits: 8
 - ▶ Parity bits: none
 - ▶ Stop bits: 1
 - ▶ Flow control: none

5. Check the ASCII setup from HyperTerminal:
 - a. From the File menu, select Properties.
 - b. In the Properties screen, select the Settings tab.
 - c. In the Emulation mode field, select “ANSI.”
 - d. Click on the ASCII Setup button.
 - e. In the ASCII Setup screen, make sure none of the boxes have check marks. Uncheck the boxes, if necessary.
 - f. Click OK in the ASCII Setup screen.
 - g. Click OK again in the Properties screen.
6. The Console program should now appear in HyperTerminal’s main window. If necessary, type `redraw` and press Enter to refresh the screen.
7. If desired, type `help` and then press Enter to display Console’s Help screen, as shown in [Figure 7-6](#).

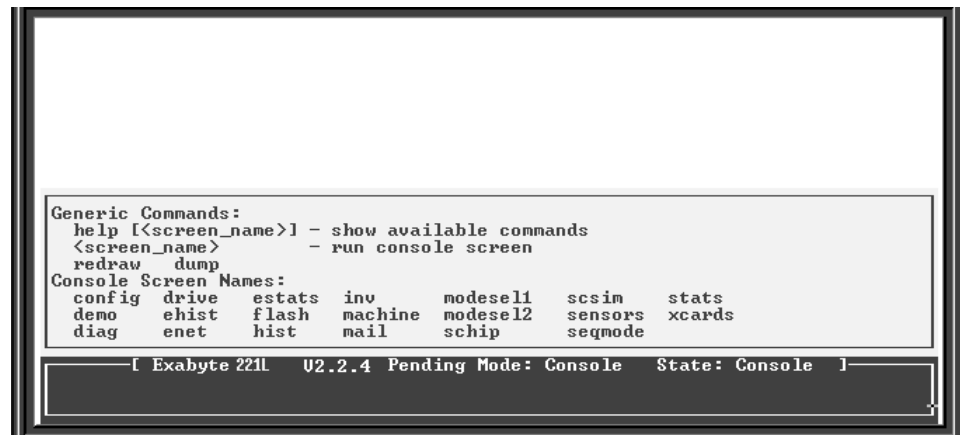


Figure 7-6 Console Help screen

Note: If garbled characters or no characters appear on the screen, make sure you have the same baud rate set for the host as you do for the library.

UPGRADING LIBRARY FIRMWARE VIA CONSOLE

**Caution**

Do not upgrade firmware unless Exabyte Technical Support has advised you to do so. If performed improperly, the upgrade procedure can render your library inoperable. Consult with Exabyte Technical Support (see [page iv](#)) before performing an upgrade.

To upgrade the library's firmware using the Console interface:

1. Obtain new firmware for the library. You can download new firmware from Exabyte's web site (www.exabyte.com), or you can contact Exabyte Technical Support.
2. Access Console by following the steps on [page 144](#).
3. If desired, you can use the SCSI READ BUFFER command to copy the current firmware to a disk. To do this, use a software application that can issue SCSI commands. For more information about the SCSI commands, refer to the *Exabyte 110L, 215, 221L, and 430 SCSI Reference*.
4. From Console, type `flash` and press Enter. This displays the Flash screen, as shown in [Figure 7-7](#).

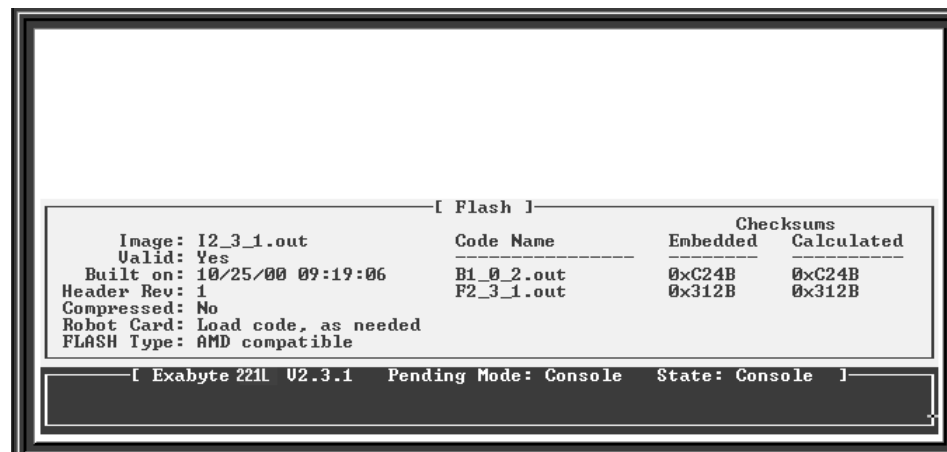


Figure 7-7 Console Flash screen

5. In the Flash screen, type `loadimage` and press Enter.
6. Use your terminal emulation software to specify the source location (path and filename) of the new firmware. For HyperTerminal, follow these steps:
 - a. Select the Transfer menu.
 - b. Select Send File.
 - c. In the Send File screen, enter the path and file name of the firmware or click on the Browse button to locate the file. Select XModem as the protocol.
 - d. Click on Send.

The system initiates the firmware upgrade and displays its progress on the screen. When the upgrade is successfully complete (in about four to five minutes), the library automatically performs a power-on reset.

**Caution**

Do not attempt to perform library operations or power down the library until after it automatically resets.

CREATING A DIAGNOSTIC LISTING VIA CONSOLE

If you report a problem to Exabyte Technical Support, you may be asked to create a diagnostic listing (also called a *dump*) via the Console interface. A diagnostic listing is created when you use a terminal emulation program (such as HyperTerminal) to send an ASCII text copy of the diagnostic buffer from the library to the host computer. This information can be used by support personnel to troubleshoot incidents with the library.

Note: These instructions assume you are using HyperTerminal, a communications package available with Microsoft Windows. If desired, you can use a different terminal emulation software package.

To create a diagnostic listing via Console:

1. Access Console by following the steps on [page 144](#).
2. Type `dump` and press **Enter**.
3. Select the Transfer menu, then select Capture Text.
4. In the Capture Text screen, enter the path and filename for the ASCII text file and press Enter.
5. Press Enter again to start transferring the ASCII text file.
6. When the transfer is complete, select the Transfer menu, then select Capture Text and Stop.

VIEWING THE LCD SECURITY PASSWORD VIA CONSOLE

You can view the password for LCD security (described on [page 49](#)) from the Configuration Information screen in the Console interface.

To view the LCD security password:

1. Access Console by following the steps on [page 144](#).
2. Type `config` and press Enter. The Configuration Information screen appears, as shown in [Figure 7-8](#). The password appears next to the LCD password field.

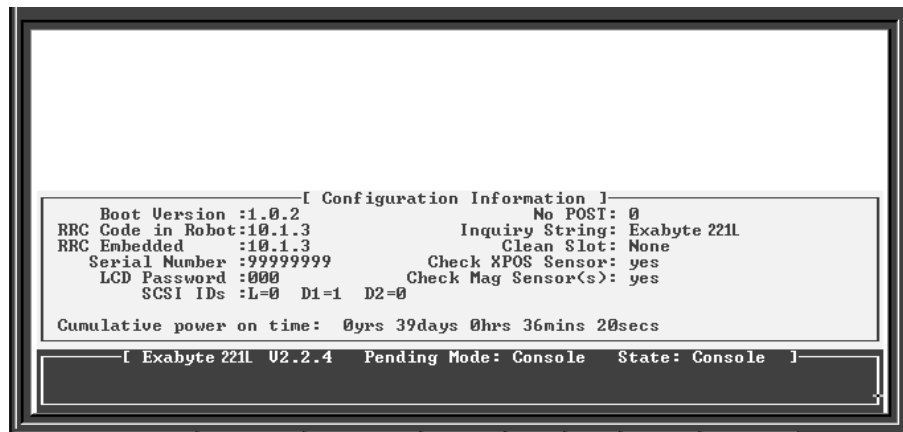


Figure 7-8 Console Configuration Information screen

CONNECTING TO THE LIBRARY'S FTP INTERFACE

This section describes how to connect your library to a host computer and use an FTP utility to upgrade library firmware or create a diagnostic listing.

To use an FTP utility with the library, you must have the following:

- ▶ A Category 5 (100BaseT connection) data-grade cable
- ▶ Software that supports RFC 959 file transfer protocol
- ▶ A host computer or network connection that uses a pin-through-hole RJ-45 shielded Ethernet connector

To access the library's FTP interface:

1. Connect the Ethernet cable as described on [page 22](#), and set Ethernet configuration options as described on [page 38](#). Make a note of the library's IP address.
2. From your host computer, activate the FTP utility you are going to use. Connect to the library using the library's current IP address.
3. Log into the library's FTP interface using the FTP user name and password you set during library configuration (see [page 41](#)). If you did not set an FTP user name and password for the library, use the defaults:

User name: *anonymous*
 Password: *Exabyte*

Note: The user name and password are case-sensitive.

UPGRADING LIBRARY FIRMWARE VIA FTP

**Caution**

Do not upgrade firmware unless Exabyte Technical Support has advised you to do so. If performed improperly, the upgrade procedure can render your library inoperable. Consult with Exabyte Technical Support (see [page iv](#)) before performing an upgrade.

To upgrade the library's firmware via FTP:

1. Obtain new firmware for the library. You can download new firmware from Exabyte's web site (www.exabyte.com), or you can contact Exabyte Technical Support.
2. Connect to the library's FTP interface by following the instructions in the previous section.
3. Use the `ls` command to list the files on the library.
4. If desired, you can make a copy of the current firmware by using a `get` FTP command.
5. Use the FTP command for your utility to transfer the new firmware to the library. For example, issue `put filename.out`, where "filename.out" is the name of the new firmware.

The system initiates the firmware upgrade and displays its progress on the library's LCD. When the upgrade has completed successfully, the library automatically resets.

**Caution**

Do not attempt to perform library operations or power down the library until after it automatically resets.

CREATING A DIAGNOSTIC LISTING VIA FTP

If you report a problem to Exabyte Technical Support, you may be asked to create a library diagnostic listing (also called a *dump*) via FTP. A diagnostic listing is created when you use an FTP utility to send a copy of the library's diagnostic buffer to a host computer. This information can be used by support personnel to troubleshoot incidents with the library.

To create a diagnostic listing via FTP:

1. Connect to the library's FTP interface by following the instructions on [page 149](#).
2. Make sure the FTP file transfer type is set to ASCII.
3. Use the FTP command for your utility to get the diagnostic listing. For example, issue `get libtrace.txt`.
4. If necessary, specify a destination location (path and filename) for the diagnostic listing.

UPGRADING TAPE DRIVE FIRMWARE AND CREATING DIAGNOSTIC LISTINGS USING LTO TOOL (221L)

To upgrade firmware and create diagnostic listings for the LTO tape drive(s), download LTO Tool from www.exabyte.com. LTO Tool allows you to upgrade firmware and perform diagnostics over the library's SCSI bus. Refer to the readme file provided with the program for installation instructions. Refer to the program's online help for instructions on performing upgrades and diagnostics.

You can obtain new tape drive firmware from Exabyte Technical Support (see [page iv](#)), or you can download new firmware at www.exabyte.com.



Caution

Do not upgrade firmware unless Exabyte Technical Support has advised you to do so. If performed improperly, the upgrade procedure can render your tape drive inoperable. Consult with Exabyte Technical Support (see [page iv](#)) before performing an upgrade.

NOTES

TROUBLESHOOTING AND ERROR CODES

This chapter provides basic troubleshooting information for the library and defines error codes that may appear on the library's operator panel.

TROUBLESHOOTING

This section provides suggestions for solving problems that may occur when you are installing and operating the library and the enclosed tape drive(s).

LIBRARY INSTALLATION PROBLEMS

If your library and application software are not communicating after installation, check the following:

- ✓ **SCSI IDs (221L).** Make sure that the SCSI IDs you selected for the tape drive(s) and library are not the same as the ID used by any other SCSI device on that bus, including the SCSI adapter card. Refer to [page 32](#) for information about setting the SCSI IDs.

! Important The 221L library and its tape drive(s) must each have a unique SCSI ID within each SCSI bus. Because you may have multiple buses, the library does not check for duplicate SCSI IDs. It is your responsibility to make sure you do not assign duplicate IDs within a bus.

- ✓ **SCSI bus connections (221L).** Make sure that you have connected the SCSI cables or terminators to the appropriate SCSI connectors on the back of the library. See [page 18](#) for more information. Make sure that all SCSI cables are securely connected at both ends.

- ✓ **LVD SCSI devices (221L).** Because the library is an LVD device, all other devices on the SCSI bus should also be LVD. These devices include the controller cards, cables, terminators, and any other devices on the SCSI bus. Do not mix LVD and HVD devices on the same bus.

Note: Although LVD SCSI is compatible with single-ended SCSI, Exabyte does not support single-ended devices on the library's LVD SCSI bus.

- ✓ **Wide SCSI devices (221L).** Because the library is a wide SCSI device, all other devices on the bus must be wide.
- ✓ **Number of tape drives on a SCSI bus (221L).** For best performance, avoid connecting more than two LTO tape drives on the same SCSI bus.
- ✓ **SCSI cable lengths (221L).** Make sure the SCSI cabling for any of the buses attached to the library does not exceed maximum lengths (see [page 18](#)).
- ✓ **Termination (221L).** Make sure the SCSI buses are properly terminated as described on [page 18](#). If another SCSI device previously terminated the SCSI bus and is no longer at the physical end of the bus, be sure to remove the terminator from that device.
- ✓ **Compatibility.** Make sure that your tape drive(s) and library are compatible with the adapter card and application software you plan to use. Visit Exabyte's web site at www.exabyte.com for compatibility information.
- ✓ **Adapter card installation.** Make sure that you installed your adapter card correctly. Refer to the documentation that came with your card for installation and troubleshooting instructions. Pay special attention to steps describing setting various jumpers and switches on the card. Make sure that the card is properly seated.
- ✓ **Fibre Channel connections (221L-FC).** Make sure that the GBICs and cables used to connect the library and tape drive(s) to the Fibre Channel loop are compatible. Make sure that the Fibre Channel cables are firmly connected to the library, tape drive(s), and Fibre Channel hub or switch.
- ✓ **Software installation.** Make sure that your application software is installed correctly. (Refer to the software documentation.) Pay special attention to steps that describe how to configure the software for use with the library and tape drive(s).
- ✓ **Control mode.** Make certain the control mode is set to SCSI or one of the sequential modes. See [page 54](#) for more information.

After checking the items above, reset the library as described on [page 66](#).

LIBRARY OPERATION PROBLEMS

If the library has been successfully operating in the past, but is now experiencing problems, check the following:

- ✓ **Control mode.** If you are using an application software package to control robot operations, the control mode must be set to SCSI. See [page 54](#) for more information.
- ✓ **Security.** Make sure that security is set correctly for the operation you are trying to perform. If security is enabled, you cannot perform many operations from the LCD and you cannot open the door. Security can be enabled from the LCD (see [page 49](#)), from the Remote Management utility (see [page 104](#)), or from your application software.
- ✓ **Door.** Make sure the door is closed securely.
- ✓ **Empty drive bay.** If you removed a drive from one of the bays, you must install a service access cover (see [page 139](#)).
- ✓ **Robot operation.** You can use the selections in the Command Menu and the Demo Menu (see [page 69](#)) to determine if the robot is functioning properly.
- ✓ **Firmware level.** Make sure your library contains the latest version of firmware. To check the current library code level, see [page 75](#). To determine whether you have the latest version, check the Exabyte web site at www.exabyte.com.

TAPE DRIVE OPERATION PROBLEMS

If you have been successfully operating the application software and library in the past, but are now experiencing problems reading and writing data, check the following:

- ✓ **Cartridge type.** Use the appropriate LTO Ultrium cartridges for your tape drive(s) (see [page 14](#)).
- ✓ **Write-protect switch.** If you are writing data, make sure the cartridge is write enabled (see [page 14](#)).
- ✓ **Cartridge age.** If the cartridge has been in use for a long time or if it has been used frequently, try using a new cartridge.
- ✓ **Cleaning.** Clean the tape drive as described on [page 63](#).

ADVANCED TROUBLESHOOTING

If you report a problem to Exabyte Technical Support, you may be asked to create a diagnostic listing. To create a diagnostic listing, you can use the library's serial port and Console interface program, or you can use the Ethernet port and an FTP utility. For more information about how to create diagnostic listings, see [page 143](#). To create diagnostics listings for the tape drive(s), use LTO Tool, available at www.exabyte.com (see [page 151](#)).

To report a problem to Exabyte Technical Support, see [page iv](#).

ERROR CODES

This section describes the error codes that can appear on the library's operator panel and provides corrective actions. These error codes do not reflect tape drive errors. For information about LTO Ultrium error codes, refer to the LTO Ultrium tape drive documentation available from IBM Corporation or visit www.storage.ibm.com.



Caution

Most library components can be replaced only by Exabyte-approved service providers. If you cannot find an obstruction or other obvious cause for the problem, contact your service provider. Unless you have a self-maintenance contract, do not attempt to replace any components other than tape drives. If you do, you will void your warranty.

For detailed information about SCSI error conditions, refer to the *Exabyte 110L, 215, 221L, and 430 SCSI Reference*.



Caution

Some corrective actions advise you to reset the library. Before resetting, make sure there is no SCSI activity on any connected SCSI bus, so you do not disrupt communications.

[Table 8-1](#) lists the library error codes in numerical order.

Table 8-1 Library error codes

Code	Description	Corrective Action
11	Source empty. There is no cartridge in the source location for a move command.	Install a cartridge in the source location or redirect the robot to another location.
12	Destination full. A cartridge already exists in the destination location for a move command.	Remove the cartridge from the destination or redirect the robot to another location.

Table 8-1 Library error codes (continued)

Code	Description	Corrective Action
13	Put failure. The robot could not place a cartridge because of mechanical problems.	<ul style="list-style-type: none"> Open the door and remove the magazines. Make sure there is nothing blocking the robot or the tape drive(s). Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, the robot may need to be replaced. Contact your service provider.
14	Pick failure. The robot could not pick a cartridge because of mechanical problems.	
15	No source element. No magazine was installed at the selected location.	<ul style="list-style-type: none"> Install a magazine or redirect the robot. If a magazine is already installed when either of these error codes displays, reset the library (see page 66). If the error persists, contact your service provider.
16	No destination element. No magazine was installed at the selected location.	
18	Source inside drive. The robot could not successfully pick a cartridge because it was still loaded in the tape drive.	<ul style="list-style-type: none"> Open the door and manually eject the cartridge from the tape drive (see page 67). Or, redirect the robot to another source location. If the error persists, contact your service provider.
30	R axis does not move. The robot could not move along the reach axis.	<ul style="list-style-type: none"> Open the door and remove the magazines. Look for anything that might be obstructing the gripper or the robot's path along the reach axis. Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If there are no obstructions and the error persists, the robot may need to be replaced. Contact your service provider.
32	Barcode module failure. The bar code module is not functioning properly.	<ul style="list-style-type: none"> Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, the bar code module may need to be replaced. You may need to supply a diagnostic listing; you may need new firmware. Contact your service provider.
34	RRC sensor failure. The robot gripper sensor failed.	<ul style="list-style-type: none"> Open the door and remove the magazines. Look for anything that might be obstructing the gripper or the robot's path along the reach axis. Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If there are no obstructions and the error persists, the robot may need to be replaced. Contact your service provider.
35	RRC communication failure. The library cannot communicate with the robot gripper command processor.	<ul style="list-style-type: none"> Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, the robot may need to be replaced. Contact your service provider.

Table 8-1 Library error codes (continued)

Code	Description	Corrective Action
36	RRC command reject. An invalid command was sent to the robot command processor.	<ul style="list-style-type: none"> Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, the robot may need to be replaced. Contact your service provider.
38	Cannot load drive. The robot cannot load the cartridge into the tape drive.	<ul style="list-style-type: none"> Open the door and remove the magazines. Look for anything that might be obstructing the robot along its reach axis. Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, contact your service provider.
41	W axis failed home. The library could not move the robot to the home position on the wrist axis.	<ul style="list-style-type: none"> Open the door and remove the magazines. Look for anything that might be obstructing the wrist axis rotation. Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, contact your service provider.
42	Wrist front sensor failed. The library could not determine the position of the robot on the wrist axis.	
43	Wrist back sensor failed. The library could not determine the position of the robot on the wrist axis.	
60	No label. The bar code scanner could not read the bar code label because there was no label on the cartridge or the label was unreadable.	<p>This error appears on the Label Information screen.</p> <ul style="list-style-type: none"> If the cartridge has a label, reposition or replace it (see page 14). If the label does not contain a checksum character, make sure the Verify Barcode Checksums option is off (see page 47). If the error persists, contact your service provider.
62	Not present. The bar code scanner could not read the bar code label because the designated element is not present.	<p>This error appears on the Label Information screen.</p> <p>If necessary, install a magazine or tape drive.</p>
64	Bad label checksum. The bar code scanner could not read the label because of a problem with the checksum character.	<p>This error appears on the Label Information screen.</p> <ul style="list-style-type: none"> If the label does not contain a checksum character, make sure the Verify Barcode Checksums option is off (see page 47). Check the label for damage and replace the label if necessary (see page 14). Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, contact your service provider.

Table 8-1 Library error codes (continued)

Code	Description	Corrective Action
70	Mbus failed. The robot command processor experienced an error.	<ul style="list-style-type: none"> Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, the robot may need to be replaced. Contact your service provider.
72	Front door is open. The door was open at an invalid time; or the door sensor is malfunctioning.	<ul style="list-style-type: none"> Close and lock the door. Reset the library (see page 66). If the error persists, the solenoid or door sensor may need to be replaced. Contact your service provider.
73	Stepper Move Fail. The firmware failed to complete a stepper move.	<ul style="list-style-type: none"> Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, contact your service provider.
74	Unoccupied drive bay. A tape drive or service access cover is not installed in the drive bay.	<ul style="list-style-type: none"> Install a tape drive or a drive carrier service access cover. If the error persists, contact your service provider.
75	Internal S/W error. Firmware error.	<ul style="list-style-type: none"> Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware.
77	Interface disabled. The library was not in the correct control mode when the operator sent a command.	<ul style="list-style-type: none"> Set the library to the correct control mode (see page 54).
87	EE caddy removed. The entry/exit port caddy was removed at an unexpected time.	<ul style="list-style-type: none"> Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, contact your service provider.
89	Caddy not available. The entry/exit port caddy was not inserted correctly.	<ul style="list-style-type: none"> Replace the caddy as described on page 57. If the error persists, contact your service provider.
91	Command aborted. A diagnostic command was aborted by the operator.	No corrective action required.
95	Drive removed. A tape drive was removed while the library was powered on.	Power off the library and install a tape drive or service access cover (see page 139).
97	Drive not present. A move was requested to a drive that is not installed.	<ul style="list-style-type: none"> Install a drive in the drive bay or send commands to another drive. If a drive is already installed when this message displayed, contact your service provider.

Table 8-1 Library error codes (continued)

Code	Description	Corrective Action
109	Check cleaning tape. A drive cleaning operation failed because the drive did not unload the cleaning cartridge within a reasonable amount of time or it unloaded the cartridge too soon.	<ul style="list-style-type: none"> ▪ If necessary, eject the cartridge from the tape drive and remove it manually (see page 67). ▪ Install a new cleaning cartridge into the fixed slot (see page 16) and set the number of cleaning cycles available on the cartridge (see page 45). ▪ Repeat the cleaning operation if necessary. ▪ If the error persists, contact your service provider.
116	Drive comm failed. The library is unable to communicate with the tape drive.	<ul style="list-style-type: none"> ▪ Check the tape drive SCSI ID and change it, if necessary. ▪ Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66).
117	Drive comm timeout. The library is unable to communicate with the tape drive.	<ul style="list-style-type: none"> ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
118	Drive load cmd fail. The library was unable to load a cartridge in the tape drive.	<ul style="list-style-type: none"> ▪ Open the door and remove the magazines. Look for anything that might be obstructing the robot's path along the horizontal axis. ▪ Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). ▪ If there are no obstructions and the error persists, the robot or a tape drive may need to be replaced. Contact your service provider.
119	Drive not ready. The tape drive did not return Ready status after a reset.	<ul style="list-style-type: none"> ▪ Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
120	Drive cmd error. The tape drive failed to respond to a command from the library.	<ul style="list-style-type: none"> ▪ Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
130	SCSI chip error: SCSI unexpected int; SCSI int stuck error. There was a SCSI chip failure.	<ul style="list-style-type: none"> ▪ Make sure all SCSI devices are of the same configuration (see page 18 for more information). ▪ Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). ▪ If the error persists, contact your service provider. You may be asked to supply a diagnostic listing; you may need new firmware or a new controller card.
131		
132		
133		
134		
135		
136		
137		

Table 8-1 Library error codes (continued)

Code	Description	Corrective Action
140	Flash erase fail. The library is unable to erase the flash EEPROM.	<ul style="list-style-type: none"> Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, contact your service provider.
141	Flash program fail. The library is unable to program the flash EEPROM.	
142	Checksum miscompare. The flash EEPROM checksum was bad.	
143	Invalid header data. The flash EEPROM header was invalid.	
144	Can't program RRC card. The RRC code load failed.	<ul style="list-style-type: none"> Reset the library (see page 66). If the error persists, contact your service provider.
194	All slots are full. The robot could not find an empty cartridge slot.	<ul style="list-style-type: none"> Open the door and remove at least one cartridge from a magazine or fixed slot. Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, contact your service provider.
195	All slots are empty. The robot could not find a cartridge to pick in Demo mode.	Open the door and insert at least one cartridge in a magazine.
198	Robot full before command. The robot, all slots, and all drives contain a cartridge when an Initialize Element Status command was requested.	<ul style="list-style-type: none"> Open the door and remove the cartridge from the robot gripper. Reset the library (see page 66).
199	Tape in drive. A cartridge is already loaded in the destination tape drive.	Eject the cartridge from the tape drive and remove it manually (see page 67). Note: This error only occurs when the library is operating in sequential mode.
200	X axis does not move. The robot could not move along the horizontal axis.	<ul style="list-style-type: none"> Open the door and remove the magazines. Look for anything that might be obstructing the robot's path along the horizontal axis. Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If there are no obstructions and the error persists, contact your service provider.
201	X axis has failed home. The robot could not return to the home position along the horizontal axis.	
202	X axis position sensor failed. The library could not complete a move along the horizontal axis.	

Table 8-1 Library error codes (continued)

Code	Description	Corrective Action
203	X axis EOT fail. The library could not detect the end-of-travel sensor on the horizontal axis.	<ul style="list-style-type: none"> Open the door and remove the magazines. Look for anything that might be obstructing the robot's path along the horizontal axis. Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If there are no obstructions and the error persists, contact your service provider.
204	X axis home sensor fail. The library could not detect the horizontal axis home sensor (safe rotate position).	
205	X axis scan failed. The library could not complete a move along the horizontal axis.	
207	X axis cal fail. The robot position along the horizontal axis could not be calibrated.	
213	Invalid Xcard configuration. An invalid combination of expansion cards is installed in the library.	<ul style="list-style-type: none"> Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, contact your service provider. An expansion card may not be properly installed or the wrong card is installed.
214	Invalid Slot Config. The Maximum Number of Slots is set to 1 and the last slot is configured as a cleaning slot.	Change the Max Addressable Slot to a value greater than 1 (see page 48) or turn off the Clean Slot Option (see page 44).
220	OS failure. The library's operating system experienced an error.	<ul style="list-style-type: none"> Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, contact your service provider.
221	Could not set alarm. The library's operating system experienced an error.	
222	OS message failure. The library's operating system experienced an error.	
226	Mbus interrupt timeout. The robot command processor timed out before setting an interrupt.	<ul style="list-style-type: none"> Make sure the library and tape drive(s) are not being used by any host, then reset the library (see page 66). If the error persists, the robot may need to be replaced. Contact your service provider.
227	Mbus acknowledge failure. The robot command processor failed to respond to a command.	
230	DHCP server timeout. The Ethernet DHCP server could not assign an IP address for the library.	Set the network address to Static and set the desired IP address (see page 38).

SHIPPING THE LIBRARY

This chapter describes the process of returning the library for service.

If you need to return the library for service, first contact your service provider. If your service provider instructs you to return the library directly to Exabyte, contact Exabyte Technical Support (see [page iv](#)) to obtain a Return Materials Authorization (RMA) number and the shipping address. When you have the RMA number, follow the instructions in the following sections.

PREPARING THE LIBRARY FOR SHIPPING

To prepare the library for shipping:

1. Before powering off the library, select “Park and Unlock for Shipping” from the operator keypad. The robot moves to the correct position to accommodate the packing materials, and the door unlocks.
2. Remove all cartridges from the magazines and fixed slots. Make certain the robot gripper, the entry/exit port, and the tape drive(s) do not contain cartridges. If you need to eject a cartridge from a tape drive, see [page 67](#).
3. Power off the library.
4. Remove the power cord, the cables, and any terminators. Do not ship these items if you are returning the library to the factory.
5. If you have a rack-mounted library, continue with the following section. If you have a standalone library, go to [“Packing the Library” on page 165](#).

REMOVING THE LIBRARY FROM THE RACK

If the library is installed in a rack, remove it as follows:

1. From the back of the library, use a T-20 TORX driver to remove the three screws that secure the retention bracket to the rack shelf, as shown in [Figure 9-1](#).

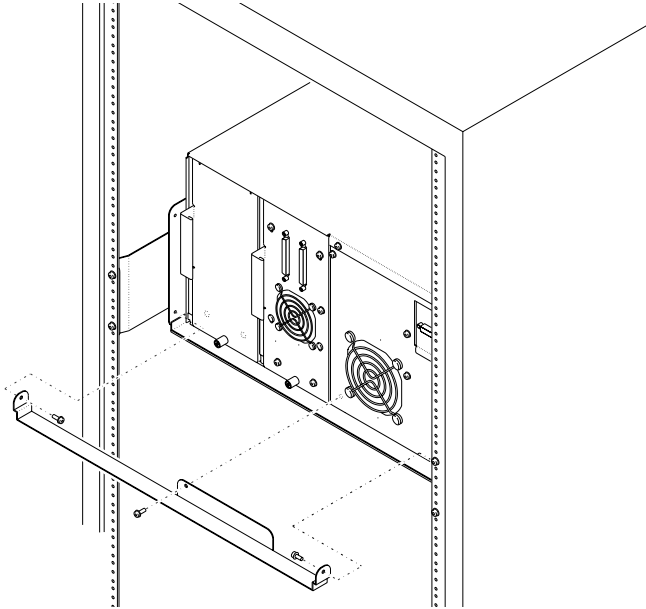


Figure 9-1 Removing the retention bracket

2. From the back, slide the library off of the rack shelf, as shown in [Figure 9-2](#).



Warning

The library weighs 75.5 pounds (34.2 kg). Two people are needed to move or lift the library. Most of the weight is toward the back of the library.

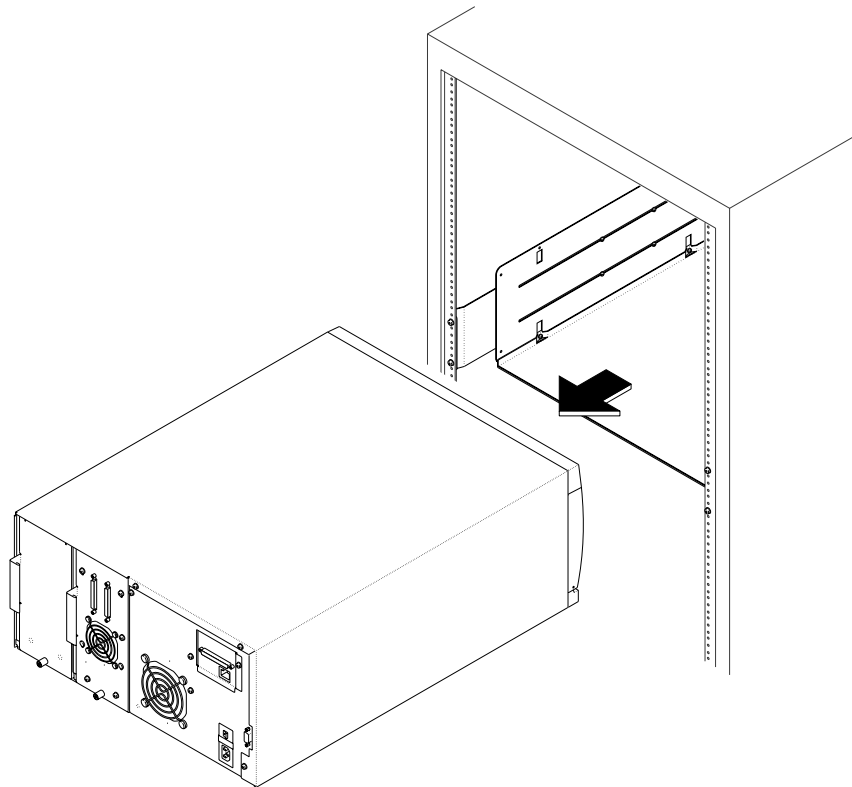


Figure 9-2 Removing the library from the rack

PACKING THE LIBRARY

Use the original packing materials to pack the library (shipping containers, robot packing piece, and antistatic bag). You will also need packing tape and banding material.



Caution

To avoid damaging the library and voiding your warranty, be sure to use the original shipping materials (or replacement materials obtained from your vendor) when repacking and shipping the library. Do not use the shipping carton and packing materials to ship items other than a library.



Warning

The library weighs 75.5 pounds (34.2 kg). Two people are needed to move or lift the library. Most of the weight is toward the back of the library.

To pack the library:

1. Secure the robot with the robot shipping brace, as follows:
 - a. Remove the magazine on the left side of the library.
 - b. Place the robot's shipping brace inside the magazine so it is centered vertically and horizontally, as shown in [Figure 9-3](#).

- c. Install the magazine in the library, so that the cut-out in the shipping brace fits around the robot.
- d. Close the library's door.

Note: Be sure to install and ship both magazines in the library.

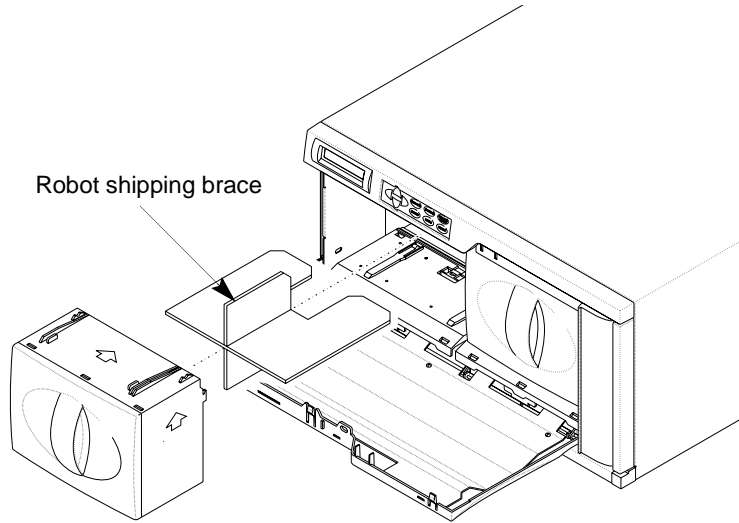


Figure 9-3 *Installing the robot shipping brace in the magazine*

- 2. Place the box and two bottom cushions on the pallet, as shown in [Figure 9-4](#).
- 3. Place the library on top of the bottom cushions, then place the antistatic bag over the library, as shown in [Figure 9-4](#).
- 4. Place the two top cushions on the library, as shown in [Figure 9-4](#). (Use the alignment holes in the packing pieces as a guide.)
- 5. If you are shipping accessories with the library, place the accessory box on top of the cushions, as shown in [Figure 9-4](#).

! Important If you are shipping the library for repair, do not include the accessories.

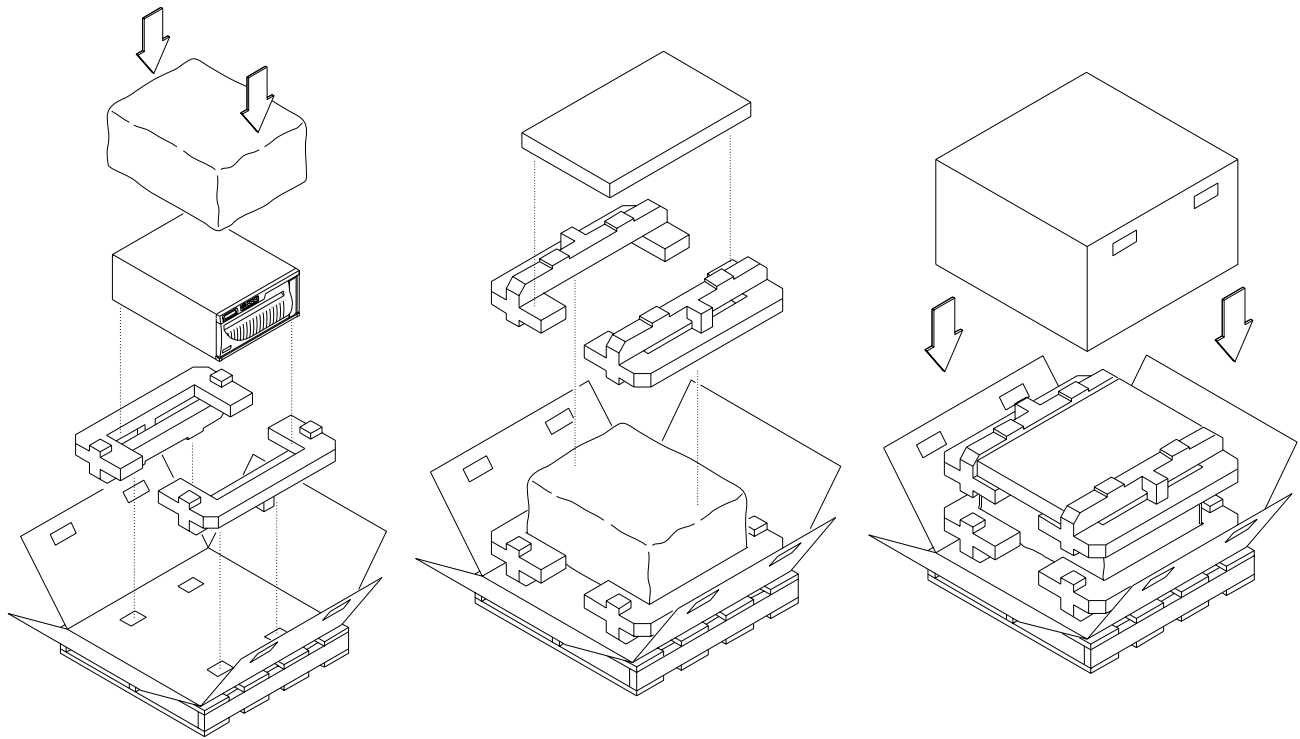


Figure 9-4 Packing the library for shipment

6. Lay the necessary paperwork in the top of the accessory box.
7. Fold the side flaps up and place the carton over the library, as shown in [Figure 9-4](#).
8. Insert the four plastic clips into the openings in the sides of the carton and press the tabs into the handle, as shown in [Figure 9-5](#).

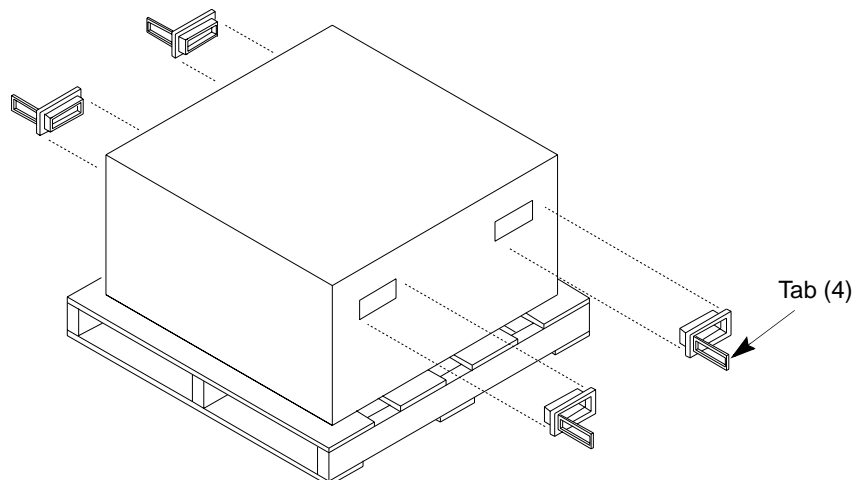


Figure 9-5 Installing the clips on the shipping carton

9. Place the outer sleeve over the entire box, as shown in [Figure 9-6](#).

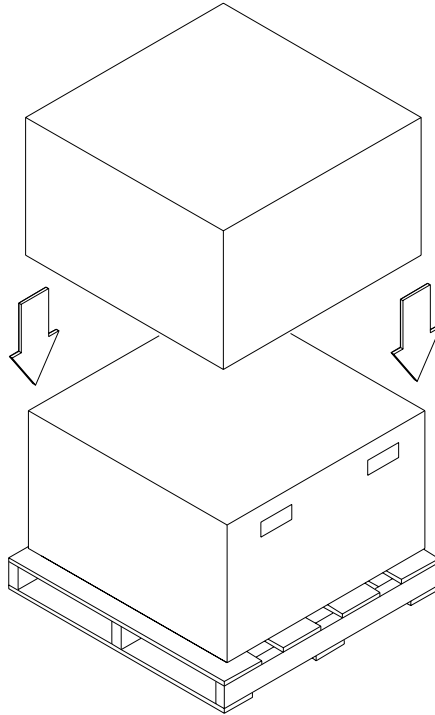


Figure 9-6 Sliding the outer sleeve over the shipping carton

10. Place the shipping label on the box.
11. Secure the box to the wooden pallet using banding material, as shown in [Figure 9-7](#).

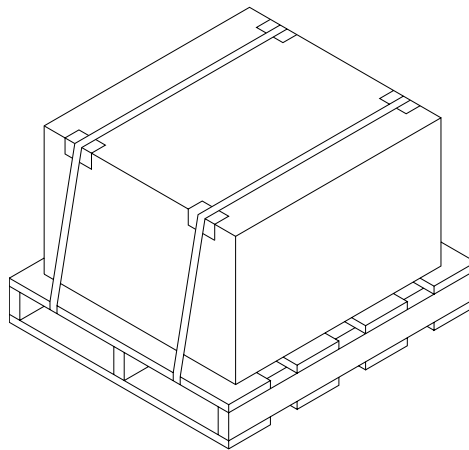


Figure 9-7 Strapping the shipping carton to the pallet

A

LIBRARY SPECIFICATIONS

This appendix provides the following information about the library:

- ▶ Storage capacity
- ▶ Size and weight
- ▶ Performance specifications
- ▶ Power specifications
- ▶ Environmental specifications
- ▶ Shipping specifications
- ▶ Safety and regulatory agency compliance

STORAGE CAPACITY

The maximum storage capacity of the library depends on the type and number of cartridges installed, as shown in [Table A-1](#).

Table A-1 Maximum library storage capacity

Data Cated Type	Maximum Capacity per Cartridge ^a	Maximum Library Capacity (21 Data Cartridges ^a)
LTO-1	200 GB	4.2 TB
LTO-2	400 GB	8.4 TB
LTO-3	800 GB	16.8 TB

^a Assuming a 2:1 compression ratio.

SIZE AND WEIGHT

The library's dimensions and weight are listed in [Table A-2](#).

Table A-2 Dimensions and weight

Length	61.21 cm (24.10 inches)
Width	43.82 cm (17.25 inches)
Depth	21.97 cm (8.65 inches)
Weight	34.2 kilograms (75.5 pounds) with two tape drives, two cartridge magazines, and no cartridges installed

PERFORMANCE SPECIFICATIONS

This section describes the following performance specifications for the library:

- ▶ Data transfer rate
- ▶ Tape drive performance
- ▶ Self-test times
- ▶ Cartridge inventory times
- ▶ Move complete time
- ▶ Robot reliability

DATA TRANSFER RATE

The data transfer rate for the library depends on the model and number of tape drives installed, as show in [Table A-3](#).

Note: Compression, capacity, and throughput will vary dependent upon type of data and system configuration.

Table A-3 LTO Ultrium library transfer rate

Tape Drive	Maximum Data Transfer Rate (Two Tape Drives)
LTO Ultrium 1	30 MB per second (native), 216 GB per hour (compressed ^a)
LTO Ultrium 2	70 MB per second (native), 504 GB per hour (compressed ^a)
LTO Ultrium 3 ^b	160 MB per second (native), 1.1 TB per hour (compressed ^a)

^a Assuming a 2:1 compression ratio.

^b Ultra160 SCSI bus. All sustained data rates are dependent on the capabilities of the SCSI bus (for example, an Ultra2 SCSI bus is limited to less than 40 MB/second).

TAPE DRIVE PERFORMANCE

When installed in the library, the tape drives perform within their specifications. For more information about tape drive performance specifications, refer to the LTO Ultrium tape drive documentation available from IBM Corporation.

SELF-TEST TIMES

Power-on Self-Test Time Each time the library is powered on, it performs a power-on self-test (POST). During POST, the library:

- ▶ Loads firmware code into RAM
- ▶ Powers on the tape drive(s)
- ▶ Verifies the SCSI IDs (221L)
- ▶ Sets Loop IDs and obtains world wide names (221L-FC)
- ▶ Engages the solenoid latch on the door
- ▶ Moves the robot to the home position
- ▶ Performs a complete cartridge inventory

If the cartridges are properly installed, the library is ready for operation. If any cartridge is not properly installed, the library reports an error and the robot returns to the home position.

The POST time is measured from the time the library is powered on until the library indicates Ready status. The time required for POST is 57 seconds. If the POST Bar Code Scan option is enabled (see [page 46](#)), the library scans all of the bar code labels. Using this option increases the time for POST by 27 seconds.

Self-Test Time Once the library is powered on, it performs a self-test each time the door is opened and closed. During a self-test, the library:

- ▶ Engages the solenoid latch on the door
- ▶ Moves the robot to the home position
- ▶ Performs a complete cartridge inventory

If the cartridges are properly installed, the library is ready for operation. If any cartridge is not properly installed, the library reports an error and the robot returns to the home position.

The time for this self-test is measured from the time the door is closed and locked until the library indicates Ready status. The time required for a self-test is 31 seconds. If the POST Bar Code Scan option is enabled (see [page 46](#)), the library scans all of the bar code labels. Using this option increases the time for the self-test by 27 seconds.

CARTRIDGE INVENTORY TIMES

A library application can issue a command to the library to check all storage locations for cartridges. Storage locations include the magazine slots and the fixed cartridge slots. After checking the storage locations, the library updates its cartridge inventory.

If the library scans the bar code labels on the cartridges, the average cartridge inventory time is 46 seconds. If the library does not scan bar code labels, the average cartridge inventory time is 23 seconds.

MOVE COMPLETE TIME

Move complete time is measured from the time the library receives a move command to the time the library returns status to the initiator indicating that the move is complete. A move is measured from a slot to a tape drive or from a tape drive to a slot. The average move complete time for the library is 12 seconds. Move complete time includes the following:

- ▶ Average time for the robot to pick the cartridge from the source slot or tape drive (3 seconds)
- ▶ Average time for the robot to move the cartridge to the destination slot or tape drive (4 seconds)
- ▶ Average time for the robot to place the cartridge in the destination slot or tape drive (5 seconds)

ROBOT RELIABILITY

The mean cycles between failures (MCBF) for the library's robot is 1,000,000 cycles. This value does not include failures attributable to a tape drive, data cartridges, or the data cartridge magazines.

During one full cycle, the robot completes the following actions:

- ▶ Picks the cartridge from a cartridge slot.
- ▶ Places the cartridge in a tape drive.
- ▶ Removes the cartridge from the tape drive.
- ▶ Replaces the cartridge in the cartridge slot.

POWER SPECIFICATIONS

This section describes the following power specifications for the library:

- ▶ AC input voltages and power consumption
- ▶ Power cord specifications

AC INPUT VOLTAGES AND POWER CONSUMPTION

The library includes an internal power supply that is capable of accepting 100 to 240 VAC at 50 to 60 Hz. The library has automatic AC input voltage selection. The library is capable of continuous operation when the AC power experiences intermittent operation, voltage surges, and voltage spikes.

The power consumption of the library varies depending on the function being performed, as shown in [Table A-4](#).

Table A-4 AC power consumption (AC true power)

	221L	221L-FC
Average While Idle	110 watts	130 watts
Average While Operating	125 watts	125 watts
Maximum While Operating	165 watts	175 watts
Average Heat Output While Operating ^a	427 BTU/hour	427 BTU/hour

^a Based on the AC true power consumption.

POWER CORD SPECIFICATIONS

The library is shipped with two power cords: One for use in the US and Canada, and one for use in Europe.

The US/Canada power cord is a 2.1-meter (7-foot), three-conductor, 18 AWG power cord for 120-volt use. The power cord has a molded NEMA 5-15P male connector on one end and a molded IEC 320/EN60320 female connector on the other end. The power cord is UL Listed and CSA Certified.

The European power cord is a 2.5-meter (8.2-foot), three-conductor power cord for 230 to 250-volt use. The power cord has a CEE 7 Standard VII, dual earthing male connector on one end, and an IEC 320 C13 female connector on the other end. The cordage is CENELEC HD-21. The power cord is VDE approved.

Requirements for International 220 VAC Power Cord

If you plan to use the library in a location other than the US/Canada or Europe, you must supply a power cord that meets the following specifications.

- ▶ The power cord must have a grounded attachment plug of the proper type, rating, and safety approval for the intended country.
- ▶ The power cord must have an IEC 320/EN60320 female connector on one end.
- ▶ The cordage must be harmonized to CENELEC publication HD-21. The electrical characteristics and rating must be minimum H05VVF3G0.75 (6 A).

ENVIRONMENTAL SPECIFICATIONS

This section describes the following environmental specifications for the library:

- ▶ General environmental specifications
- ▶ Particulate contamination limits
- ▶ Acoustic noise limits
- ▶ Shock and vibration limits

GENERAL ENVIRONMENTAL SPECIFICATIONS

Table A-5 lists general environmental specifications for the library.

Table A-5 *Environmental specifications*

Specification	Operating ^a	Storage ^b or Non-Operating ^c	Transportation ^d
Ambient Temperature Range	+10° C to +35° C (+50° F to +95° F)	–20° C to +60° C (–4° F to +140° F)	–20° C to +60° C (–4° F to +140° F)
Temperature Variation ^e (Thermal Gradient)	1° C per minute; max 10° C per hour (2° F per minute; max 18° F per hour)	1° C per minute; max 20° C per hour (1° F per minute; max 36° F per hour)	1° C per minute; max 20° C per hour (2° F per minute; max 36° F per hour)
Relative Humidity	20% to 80%; Non-condensing	10% to 90%; Non-condensing	10% to 90%; Non-condensing
Wet Bulb	26° C (79° F) max	29° C (84° F) max	29° C (84° F) max
Altitude	–304.8 m to +3,048 m (–1,000 ft to +10,000 ft)	–304.8 m to +3,048 m (–1,000 ft to +10,000 ft)	–304.8 m to +12,192 m (–1,000 ft to +40,000 ft)

^a All operating specifications include a data cartridge. These measurements assume that the library is installed in accordance with the instructions in this manual.

^b The library is in its original packaging. The packaging is designed to protect the library from the condensation caused by extreme temperature variations (15° C or more). **When the library is moved from a cold storage environment to a warm operating environment, it must acclimate in its packaging for at least 12 hours before opening to prevent serious condensation damage from occurring.**

^c The library has been unpacked.

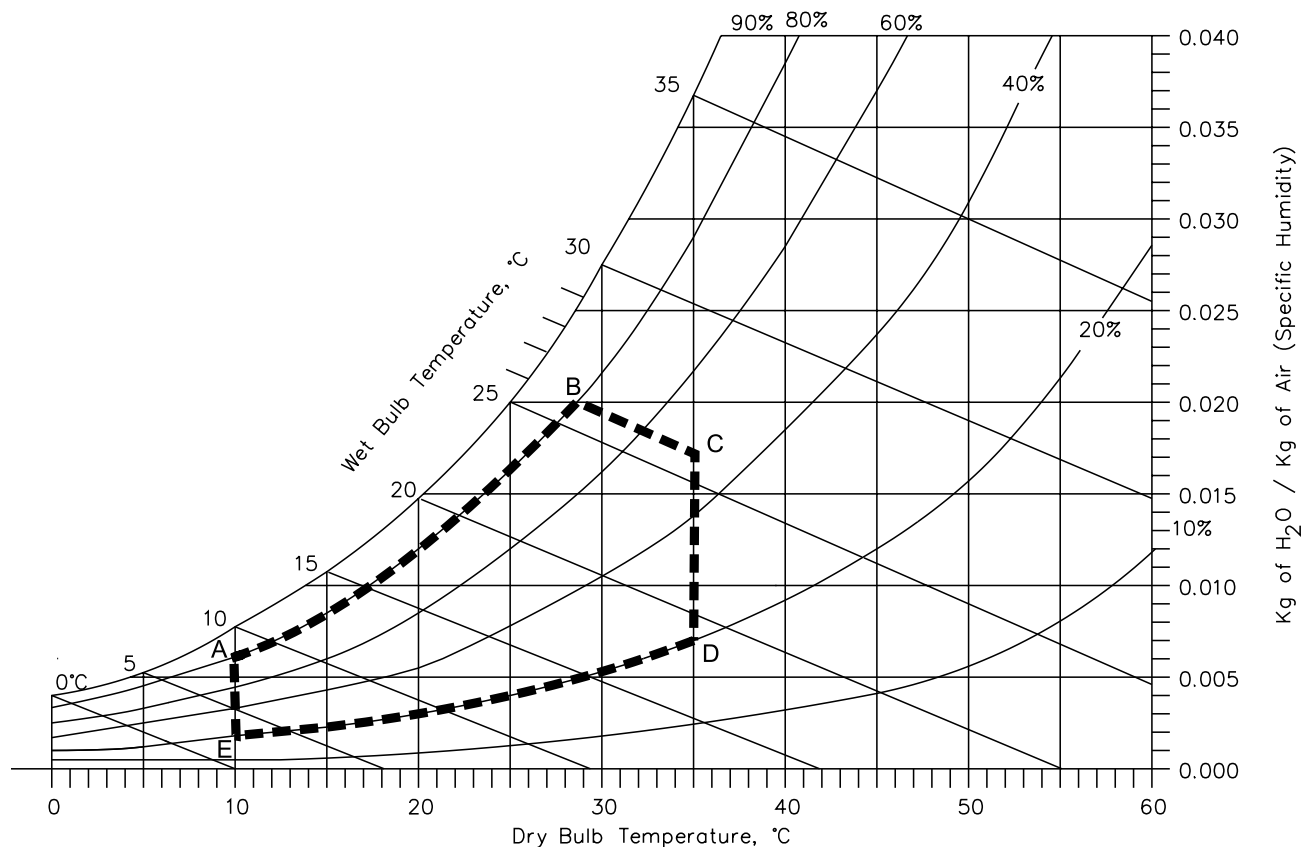
^d The library has not been unpacked. The transportation period does not exceed 72 hours.

^e The data cartridges' temperature and humidity must be allowed to stabilize in the specified ambient environment for 24 hours.

Figure A-1 is a psychrometric chart that indicates the operating temperature and humidity ranges for the library. The dotted line represents the operating environment limits. Table A-6 defines the temperature and humidity points shown in Figure A-1.

Table A-6 Temperature and humidity points for psychrometric chart

Point	Dry Bulb Temperature	Relative Humidity
A	10° C	80%
B	29° C	80%
C	35° C	50%
D	35° C	20%
E	10° C	20%

**Figure A-1** Temperature and humidity ranges for library operation

PARTICULATE CONTAMINATION LIMITS

The ambient operating environment for the library should not exceed the particulate counts specified for the tape drives. For more information, refer to the LTO Ultrium tape drive documentation available from IBM Corporation.

ACOUSTIC NOISE LIMITS

The overall, averaged A-weighted sound pressure level (in decibels) for the library does not exceed the upper limits specified in [Table A-7](#).

Table A-7 Acoustic noise limits

Operating Mode	Lp _A ^a
The library is powered on and idle.	48 dBA
The library is operational (the robot is moving); the tape drives are operating in streaming mode.	55 dBA ^b

^a L_{pA} is the average A-weighted sound pressure level over the following frequency range: 5 Hz to 12.5 KHz.

^b Represents a maximum sustained operational level.

SHOCK AND VIBRATION LIMITS

The library will operate normally after experiencing shock loads as specified in [Table A-8](#). 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 will operate normally.

Table A-8 Shock limits

Operating ^a	Storage ^b or Non-Operating ^c	Transportation ^b	Handling
3g for 5 msec ^d	20g for 8 msec ^e	ISTA Procedure 1D	Drop and Topple per IEC 68-2-31

^a The library is unpacked and is picking and placing cartridges from the data cartridge magazine and tape drives.

^b The library has not been unpacked.

^c The library has been unpacked, but no power has been applied.

^d A minimum of 20 shock pulses were applied to the vertical axis. The shock pulses were half-sine waves and were applied at a rate not exceeding one shock per second.

^e A minimum of three 20g shock pulses were applied to each of the library's six sides.

[Table A-9](#) lists the vibration specifications for the library during operation, non-operation, storage, and transportation. The operating specifications indicate the amount of vibration the library can withstand while the enclosed tape drives are reading and writing data.

Table A-9 Vibration limits

Random Vibration ^a Applied During Operation	
1 Hz	PSD = 0.0000040 g ² /Hz
5 Hz	PSD = 0.0000270 g ² /Hz
10-150 Hz	PSD = 0.0004048 g ² /Hz
200-400 Hz	PSD = 0.0001079 g ² /Hz

Table A-9 *Vibration limits (continued)*

Random Vibration^b Applied During Non-Operation^c and Storage^d	
1 Hz	PSD = 0.0003 g ² /Hz
3 Hz	PSD = 0.00055 g ² /Hz
12-100 Hz	PSD = 0.01 g ² /Hz
400 Hz	PSD = 0.000003 g ² /Hz
Transportation^d	
ISTA Procedure 1D	
Swept Sine Applied During Non-Operation^e and Operating^f	
5 to 500 to 5 Hz	

^a A 0.3 G rms random vibration spectrum is applied to the vertical axis for a minimum of 20 minutes per axis

^b A 1.06 G rms random vibration spectrum is applied to each of three orthogonal axes for a minimum of 20 minutes per axis.

^c The library has been unpacked, but is not operating.

^d The library is packaged in its original shipping container.

^e Three sweeps at one octave per minute are applied to each axis at 0.75 g (0 – peak) input.

^f Three sweeps at one octave per minute are applied to the vertical axis at 0.3 g (0 – peak) input.

SHIPPING SPECIFICATIONS

The library's carton and internal packing pieces are designed so that the enclosed library does not receive a shock greater than 20 g when the carton is dropped on the bottom or sides from a height of 8 inches (20.3 cm). The library's shipping carton passes the tests described in the International Safe Transit Association (ISTA) Procedure 1D.

[Table A-10](#) lists the weights and dimensions of the library when it is packed in the shipping carton.

Table A-10 *Shipping weight and dimensions*

Shipping Weight^a	Dimensions (Length x Width x Depth)
Without accessory kit 110.5 lbs. (50.1 kg)	30 × 30 × 21 inches (72.6 × 76.2 × 53.3 cm)
With accessory kit 121.0 lbs (54.9 kg)	

^a Including two LTO Ultrium tape drives and two cartridge magazines.

Packing instructions are provided in [Chapter 9](#). To avoid damaging the library, use the original shipping carton and packing materials (or replacement packaging obtained from your vendor) when repacking and shipping the library. The shipping carton and packing materials are not intended to be used for shipping items other than or in addition to a library.

SAFETY AND REGULATORY AGENCY COMPLIANCE

This section describes the library's compliance with safety and regulatory agency standards.

! Important To comply with the following regulations and standards, you must use shielded cables and provide adequate grounding of the SCSI bus and the input power when installing the library in an office or industrial environment.

SAFETY AGENCY STANDARDS

The library complies with and is certified to the applicable requirements of the following domestic and international product safety standards:

- ▶ UL Standard 1950, 3rd Edition, Information Technology Equipment including Electrical Business Equipment
- ▶ CSA Standard C22.2 No. 950-95, Safety of Information Technology Equipment including Electrical Business Equipment
- ▶ IEC 950 (EN 60950), Safety of Information Technology Equipment including Electrical Business Equipment

LASER SAFETY STANDARDS

221L The 221L library complies with the following laser safety standards:

- ▶ 21 CFR 1010.10 and 1040.11, Class I for laser products
- ▶ IEC 825-1, Safety of Laser Products, Part 1: Equipment Classification, Requirements and User's Guide

221L-FC The 221L-FC library is a Class 1 laser device that uses internal laser transceiver modules. The transducer modules use a shortwave, 850 nm laser for use with multi-mode optical fiber cables.

Note: Class 1 laser products are not considered hazardous.

The 221L-FC library complies with the following laser safety standards:

- ▶ DHHS regulation 21 CFR 1010.10 and 1040.11, Class 1 laser products
- ▶ EN 60825-1 (IEC 60825-1), Safety of Laser Products, Part 1, Equipment Classifications, Requirements and User's Guides
- ▶ EN 60825-2 (IEC 60825-2), Safety of Laser Products, Part 2: Safety of Optical Fibre Communication Systems
- ▶ EN 60950 (IEC 60950), 2nd Edition, 1991, including Amendments 1 (1992), 2 (1993), 3 (1995), and 4 (1996)
- ▶ CB Scheme Report and Certificate valid and conforming with IEC 60950 2nd Edition, including Amendments 1 (1992), 2 (1993), 3 (1995), 4 (1996) and all group deviations listed in the latest revision of CB Bulletin No. 86A I
- ▶ UL Approved to UL 1950 3rd Edition
- ▶ CSA Approval through the use of the UL marking in compliance with CSA C22.2 950 1995 3rd Edition
- ▶ TUV Approval for the "GS" mark in compliance with EN 60950 2nd Edition 1991 including Amendments 1 (1992), 2 (1993), 3 (1995), 4 (1996)

RADIATED AND CONDUCTED RADIO FREQUENCY EMISSIONS (EMI)

The library meets the requirements for radiated and conducted emissions as defined by the following standards:

- ▶ FCC Rules and Regulations, Part 15, Class A: Radio Frequency Devices, Subpart B: Unintentional Radiators



Caution

According to FCC regulations, changes or modifications to the library that are not expressly approved by Exabyte may void the user's authority to operate the library.

- ▶ 221L-FC: FCC, CFR 47, Ch. I, Part 15, Subpart B, Class A using the EN 55022 (CISPR 22) Class A limits and the ANSI C63.4 procedures
- ▶ 221L-FC: EN 50140: Radiated RF Immunity 80 to 1000 MHz at 3 V/m
- ▶ 221L-FC: EN 50141: Conducted Immunity 15 to 30 MHz at 3 V/m
- ▶ 221L-FC: EN 55024: 1998, Information Technology Equipment
- ▶ Industry Canada Notice, ICES-003, Class A, Digital Apparatus
- ▶ CISPR Publication 22, (EN 55022), Class A
- ▶ AS/NZ 3548, Class A in accordance with EN 55022 Class A (Australia and New Zealand)

- ▶ VCCI Class A (Japan)
- ▶ BSMI CNS 13438, Class A (Taiwan)

警告使用者：
 這是甲類的資訊產品——在居住的環境中使用時——可能會造成射頻干擾——在這種情況下——使用者會被要求採取某些適當的對策——

ELECTROSTATIC DISCHARGE (ESD) IMMUNITY

The library complies with EN 61000-4-2:1995, Electromagnetic Compatibility (EMC), Part 4: Testing and Measurement Techniques, Part 2: Electrostatic Discharge (ESD) Immunity.

Exabyte has extended testing as follows:

- ▶ Up to 12,000 volts (V) air discharge applied to all non-metallic surfaces
- ▶ Up to 8,000 V direct discharge applied to all metallic/conductive surfaces

In each case, there is no degradation or non-recoverable loss of function due to damage of equipment or firmware.

RADIATED RADIO FREQUENCY FIELD IMMUNITY

The library complies with EN 61000-4-3:1996 and ENV 50204:1995, Electromagnetic Compatibility (EMC), Part 4: Testing and Measurement Techniques, Part 3: Radiated Radio-Frequency Immunity.

The library will continue to operate without error while being exposed to an electromagnetic field of 3V/m.

ELECTRICAL FAST TRANSIENT (EFT)/BURST IMMUNITY

The library complies with EN 61000-4-4: 1995, Electromagnetic Compatibility (EMC), Part 4: Testing and Measurement Techniques, Section 4: Electrical Fast Transient/Burst Immunity.

The library will continue to operate without error when exposed to EFT of $\pm 1,000$ V on the AC power ports and ± 500 V on the I/O ports.

SURGE IMMUNITY

The library complies with EN 61000-4-5:1995, Electromagnetic Compatibility, Part 4: Testing and Measurement Techniques, Section 5: Surge Immunity.

The library will continue to operate without error after being subjected to surges up to $\pm 2,000$ V.

CONDUCTED RADIO FREQUENCY FIELD IMMUNITY

The library complies with EN 61000-4-6:1996, Electromagnetic Compatibility (EMC), Part 4: Testing and Measurement Techniques, Section 6: Conducted Radio Frequency Immunity.

The library will continue to operate without error while being exposed to a field of 3 V_(rms). The field is 80% amplitude modulated (AM) with a 1 kHz signal.

VOLTAGE DIPS, INTERRUPTIONS, AND VARIATIONS IMMUNITY

The library complies with EN 61000-4-11:1994, Electromagnetic Compatibility (EMC), Part 11: Voltage Dips, Short Interruptions, and Voltage Variations Immunity.

The library will continue to operate without error after being exposed to a 30% voltage dip for 500 ms. The library will be self-recoverable or can be restored by the operator after being exposed to a 95% voltage dip for 10 ms and after an interruption of 5 seconds.

HARMONIC CURRENT EMISSIONS

The library meets the requirements for harmonic current emissions as defined by EN 61000-3-2: 1995, Electromagnetic Compatibility (EMC) Part 3: Limits, Section 2: Limits for Harmonic Current Emissions for equipment with an input current ≤ 16 A per phase.

VOLTAGE FLUCTUATIONS AND FLICKER

The library meets the requirements for voltage fluctuations as defined by EN 61000-3-3: 1995, Electromagnetic Compatibility (EMC) Part 3: Limits, Section 3: Limits of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤ 16 A.

NOTES

B |

WRITE ONCE, READ MANY (WORM) CAPABILITY

OVERVIEW

Certain records retention and data security applications require a Write Once, Read Many (WORM) method for storing data on tape. To meet this data storage requirement, a new WORM feature is now available on the Exabyte 221L and 221L-FC Libraries when you have an LTO-3 tape drive installed.

Note: Only the LTO-3 tape drive has WORM capability. It is not available on the LTO-2 or LTO-1 tape drives.

No physical hardware changes are required to make the tape drive compatible with the WORM feature; however, appropriate WORM-capable drive firmware must be installed. See [“Requirements” on page 185](#) to determine the firmware requirements.

WORM MEDIA

Because standard read/write media is incompatible with the WORM feature, a specially formatted WORM tape cartridge (see [Figure B-1](#)) 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.

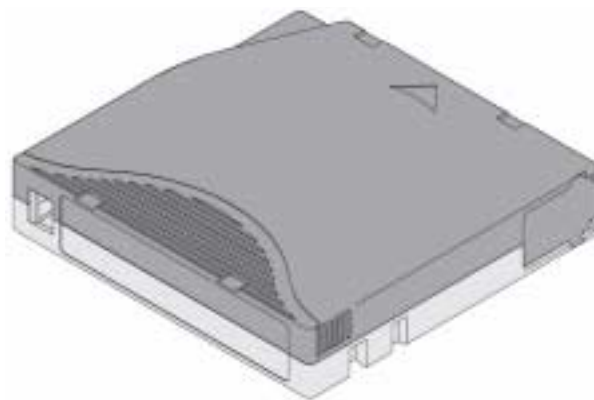


Figure B-1 Ultrium 3 WORM Tape Cartridge

Table B-1 lists WORM media specifications.

Table B-1 WORM tape cartridge specifications

Tape Cartridge	Case Color	Native Data Capacity
Ultrium 3 WORM	Two toned colored cartridge ^a	400 GB (800 GB at 2:1 compression)

^a The two-toned coloring allows you to easily distinguish WORM cartridges from Write/Read cartridges.

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 an IBM Ultrium 3 400 GB 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 LTO-3 tape 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.

WORM MEDIA ERRORS

The following conditions cause WORM media errors to occur:

- ▶ Information in the servo manufacturer's word (SMW) on the tape must match information from the cartridge memory (CM) module in the cartridge. If it does not match, a media Error Code **7** will post on the LTO-3 drive's single-character display (SCD).
- ▶ Inserting a WORM tape cartridge into a tape drive that is not compatible with WORM causes the cartridge to be treated as an unsupported medium. The tape drive will report a media Error Code **7**.
 - ▶ Only LTO-3 tape drives have WORM capability. Inserting a WORM cartridge into an LTO-2 or an LTO-1 tape drive will produce the above error.
 - ▶ If you are using an LTO-3 tape drive and receive the above error, upgrading your LTO-3 tape drive's firmware to the correct code level will resolve the problem. The firmware must be at version 54xx or higher and is available as a free download at www.exabyte.com/downloads.

REQUIREMENTS

The WORM feature requires the following:

- ▶ LTO-3 generation of tape drive—the WORM feature is not available on earlier generations of LTO tape drives (LTO-2 or LTO-1)
- ▶ WORM-capable drive firmware release 54xx or higher
- ▶ Special WORM tape cartridges

You can use LTOTool to determine the firmware level currently in the tape drive. Refer to the readme file provided with the program for installation instructions. Refer to the program's online help for instructions on determining the tape drive firmware level.

If your tape drive has an earlier version of firmware, you can download the updated firmware by visiting the download page on the Exabyte web site at www.exabyte.com/downloads.

Note: Refer to “Upgrading Library Firmware and Creating Diagnostic Listings” on page 143 for instructions on upgrading the tape drive's firmware.

TAPEALERT FLAGS

Table B-2 shows the new TapeAlert flags associated with the WORM cartridge. Refer to the *Exabyte 110L and 221L SCSI Reference* for additional information about TapeAlert.

Table B-2 TapeAlert flags associated with the WORM media

Parameter Code		Description	Set	Clear	Type
In Hex	In Decimal				
3Bh	59	(WORM Medium – Integrity Check Failed) Set when the drive determines that the data on tape is suspect from a WORM point of view.		L	Critical
3Ch	60	(WORM Medium – Overwrite Attempted) Set when the drive rejects a Write operation because the rules for allowing WORM writes have not been met.	E		Critical

ERROR CODES

Tape drive errors associated with the new WORM capability result in either a Medium Error (Sense Key 3h) or a Data Protect error (Sense Key 7h). The tape drive returns this error information in response to a SCSI REQUEST SENSE command. Refer to the tape drive SCSI reference for additional information about the error codes returned by the REQUEST SENSE command.

[Table B-3](#) shows the new ASC/ASCQ error codes for Sense Key 3h (Medium Error).

Table B-3 ASC/ASCQ error codes for a Medium Error (SK 3) with WORM media

ASC	ASCQ	Description
04h	10h	Logical Unit Not Ready, Auxiliary Memory Not Accessible.
11h	12h	Auxiliary Memory Read Error
30h	0Dh	Medium Error/WORM Medium – Integrity Check: Set when the drive rejects a Read operation because the current cartridge is a Suspicious WORM cartridge, and the WTRE bit is set to 0.

[Table B-4](#) shows the new ASC/ASCQ error codes for Sense Key 7h (Data Protect).

Table B-4 ASC/ASCQ error codes for a Data Protect error (SK 7) with WORM media

ASC	ASCQ	Description
30h	0Dh	Data Protect/WORM Medium – Integrity Check: Set when the drive rejects a Write operation because the current cartridge is a Suspicious WORM cartridge.
30h	0Ch	Data Protect/WORM Medium – Overwrite Attempted: Set when the drive rejects a Write operation because the rules for allowing WORM writes have not been met.

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