Quantum|ATL PowerStor L500 Series Tape Library

User's Guide

6321100-03

Ver.3, Rel. 0

Quantum. | ATL

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Preface

This manual introduces the Quantum | ATL PowerStor L500 Series library and describes library operations, configuration, calibration, servicing, and basic troubleshooting

Audience

This manual is written for library operators and field service engineers.

Purpose

This manual provides information about the L500 Series library including:

- Installing the library
- Basic library operations
- Operator commands
- Service commands
- Troubleshooting

Document Organization

This manual is organized as follows:

- Chapter 1, Library Description, describes each of the major library components.
- Chapter 2, Installing the L500 Series Library, contains information to install, configure, and operate the tape library.
- Chapter 3, Operator Control Panel, provides an overall menu structure and descriptions of all control panel buttons and functions.

- Chapter 4, SCSI Interface, details the SCSI Protocol features for the tape library.
- Chapter 5, Troubleshooting Guidelines, provides basic troubleshooting guidelines for the tape library.
- Appendix , Library Specifications, provides all library specifications and requirements.
- Appendix , OCP Error Messages and Error Definitions, provides a description of all error messages and recommended operator actions.
- Appendix , Regulatory Statements, provides FCC and EC regulatory information.

A glossary and index are included to help you locate information in this guide.

Notational Conventions

This manual uses the following conventions:

Caution: Cautions indicate potential hazards to equipment and are included to prevent damage to equipment.

Note: Notes emphasize important information related to the main topic.

Warning: Warnings indicate potential hazards to personal safety and are included to prevent injury.

This manual uses the following:

- Right side of the library — Refers to the right side as you face the component being described.
- Left side of the library — Refers to the left side as you face the component being described.

Related Documents

Documents related to the L500 Series library are shown below:

PowerStor L500 Series Documentation

Document Number	Title	Description
6321102-xx	*ATL PowerStor L500 Series Library Unpacking Instructions*	Contains information necessary to receive and unpack the library
6322617-xx	*PowerStor Rack Mount Installation Instructions*	Contains information on the installation of the rack mount kit

SCSI-2 Specification

The SCSI-2 communications specification is the proposed American National Standard for information systems, dated March 9, 1990. Copies may be obtained from:

Global Engineering Documents
15 Inverness Way, East
Englewood, CO 80112
(800) 854-7179 or (303) 397-2740

Contacts

Quantum | ATL company contacts are listed below.

Quantum|ATL Corporate Headquarters

To order documentation on the L500 Series or other products contact:

Quantum | ATL
141 Innovation Drive
Irvine, CA 92612-5872
(949) 856-7800
(800) 284-5101

Technical Publications

To comment on this document, contact:

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Country	International Code + 1 + Customer Support Number
Australia	0011 + 1 + 949 - 477-7924
Canada	011 + 1 + 949 - 477-7924
China (PRC)	00 + 1 + 949 - 477-7924
France	00 + 1 + 949 - 477-7924
Germany	00 + 1 + 949 - 477-7924
Ireland	00 + 1 + 949 - 477-7924
Italy	00 + 1 + 949 - 477-7924
Japan	001 + 1 + 949 - 477-7924
Mexico	00 + 1 + 949 - 477-7924
Spain	07 + 1 + 949 - 477-7924
Sweden	009 + 1 + 949 - 477-7924
Switzerland	00 + 1 + 949 - 477-7924
United Kingdom	00 + 1 + 949 - 477-7924

Chapter 1
Library Description

This chapter provides an overall description of the PowerStor L500 Series library. The chapter consists of these sections:

- Library configurations
- Features and benefits
- Library components

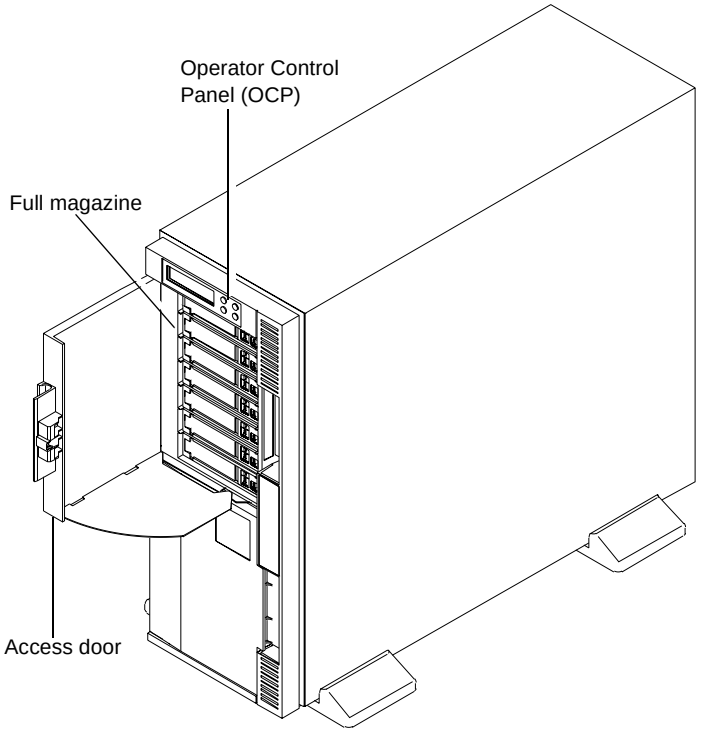
L500 Library Configurations

Overview

The L500 Series library (see figure 1) is a 14-cartridge, multi-mode library utilizing from one to three tape drives.

The library is a high-performance, high-capacity, streaming cartridge tape product designed for use on midrange and high-end computing systems.

Figure 1 PowerStor L500 Series Library (Tower)



Cabinet

The library is available in a rack-mount or tower configuration (see figure 2 and figure 3).

The cabinet houses all other components of the library. It has two doors on the front panel for accessing each magazine. The tape drive's SCSI ports, power receptacle, and power switch are located on the back panel (see figure 6).

Figure 2 Tower Configurations

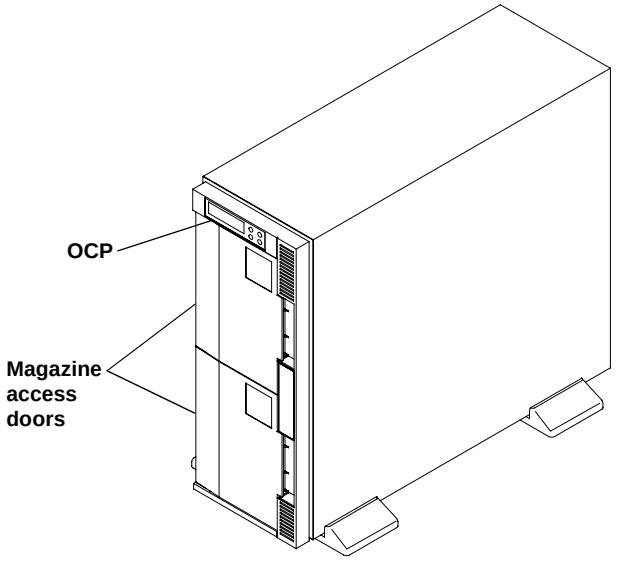
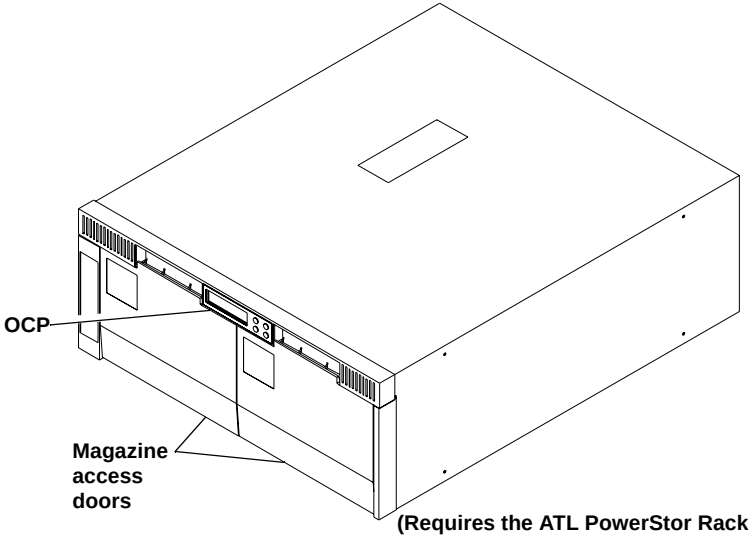


Figure 3 Rack Mount Configuration



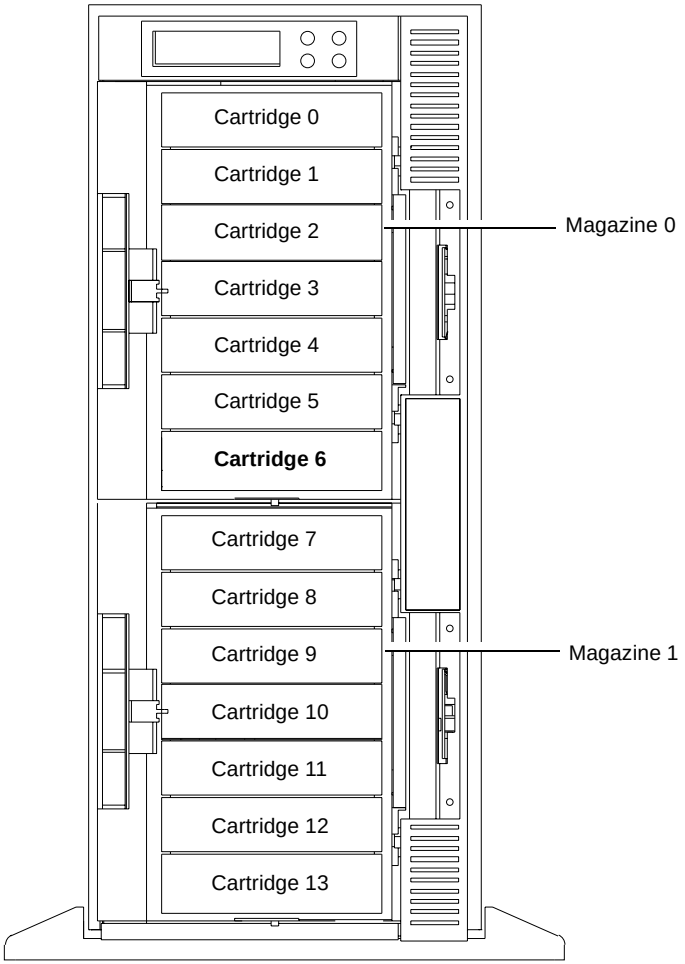
Element Numbering Convention

The storage array includes:

- Two 7-cartridge magazines
- Up to 3 tape drives

The cartridge array is shown in figure 4.

Figure 4 L500 Cartridge Array



Features

The L500 Series library provides the following features:

- Automatic tape operations
- Library status display via the OCP
  - Tape drive status and activity
  - Tape drive error status
  - Magazine slot status
  - Loaded tape cartridge conditions
- Mode control
  - Library: automatic random access to all cartridges
  - Autoloader: sequential access to cartridges in a single cycle
  - Autoloader: sequential access to cartridges in circular cycles
- User selection of cartridges to be loaded into the tape drive
- SCSI ID selection via the Operator Control Panel (OCP)
- Library and tape drive microcode updates via the SCSI bus or cartridge
- OCP display of device microcode and hardware revision numbers
- User directed tests for the library
- Embedded diagnostic software displays status for head cleaning, library operation, and tape drive operations.

Library Components

The L500 Series library consists of these major components

- Front panel
- Back panel
- Bar code reader (optional)
- Cartridge Handling Mechanism (CHM)
- Up to three tape drives
- Two 7-cartridge magazines
- Operator Control Panel

Front Panel

The front panel of the library has three main components:

- OCP
- Magazine 0 library door
- Magazine 1 library door

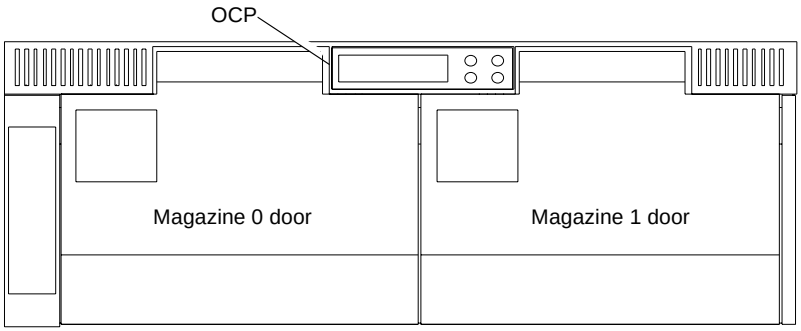
Operator Control Panel

The OCP consists of an LCD and four push-buttons (PREVIOUS, SELECT, NEXT, and ENTER). It displays up to two lines of characters, containing both messages and field codes. For more information on the OCP, see Chapter 3, “Operator Control Panel.”

Library Doors

Each library door on the L500 Series provides access to a 7-cartridge capacity magazine. The magazine to the left in the rack-mount version (top magazine in the tower version) is magazine 0. The magazine to the right in the rack-mount version (the bottom magazine in the tower version) is magazine 1 (see figure 5).

Figure 5 Library Front Panel (Rack-Mount)

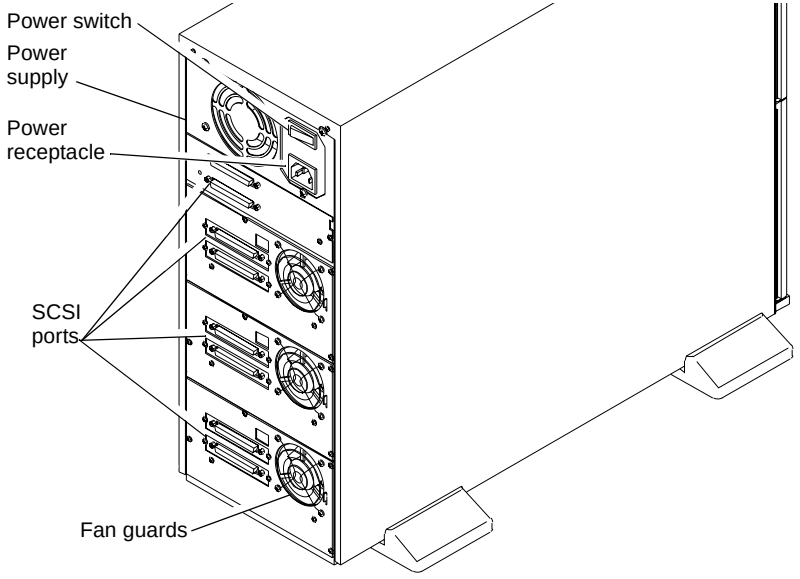


Back Panel

The back panel of the library (see figure 6) contains these components:

- Power supply
- Power switch
- Power receptacle
- SCSI ports
- Fan guards

Figure 6 Back Panel



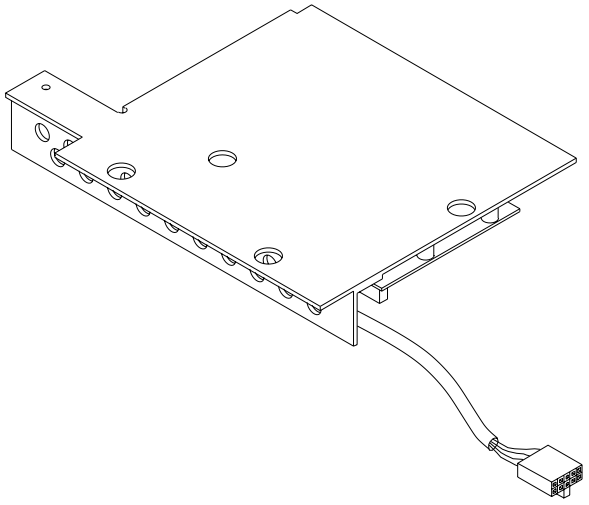
Bar Code Reader (Optional)

An optional feature on the L500 Series library is a bar code reader (see figure 7). Residing on top of the cartridge array, the bar code reader performs cartridge inventories in less than three minutes.

The bar code reader assembly is mounted above magazine 0 (tower version) or to the left of magazine 0 (rack mount version).

The reader's scan head communicates with the loader controller on an RS-422 communications link. During a cartridge inventory, the scan head illuminates and reads the bar code labels on the cartridges and transmits the results over the serial communications link to the loader controller.

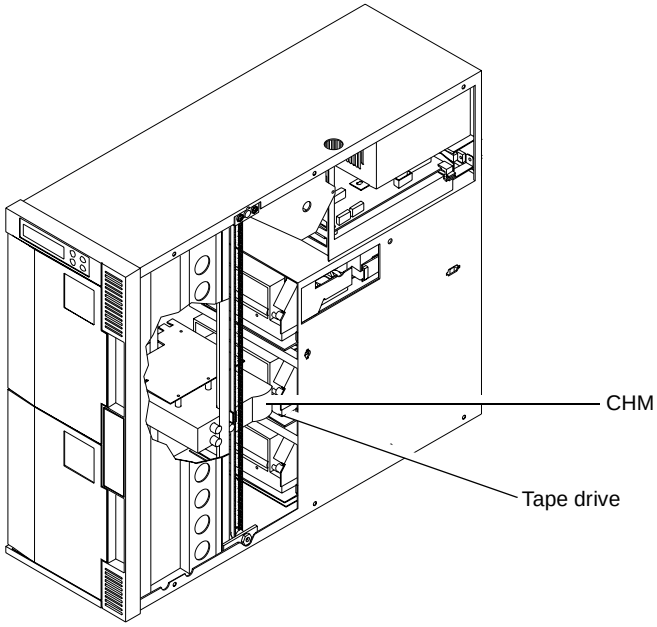
Figure 7 Bar Code Reader



Cartridge Handling Mechanism (CHM)

The Cartridge Handling Mechanism (CHM) is a compact bi-directional roller system that enables simple horizontal movement between cartridge bins and tape drives (see figure 8).

Figure 8 Cartridge Handling Mechanism



Cartridges are inserted or removed from the front of a magazine, while the CHM picks and places cartridges from the rear of a magazine.

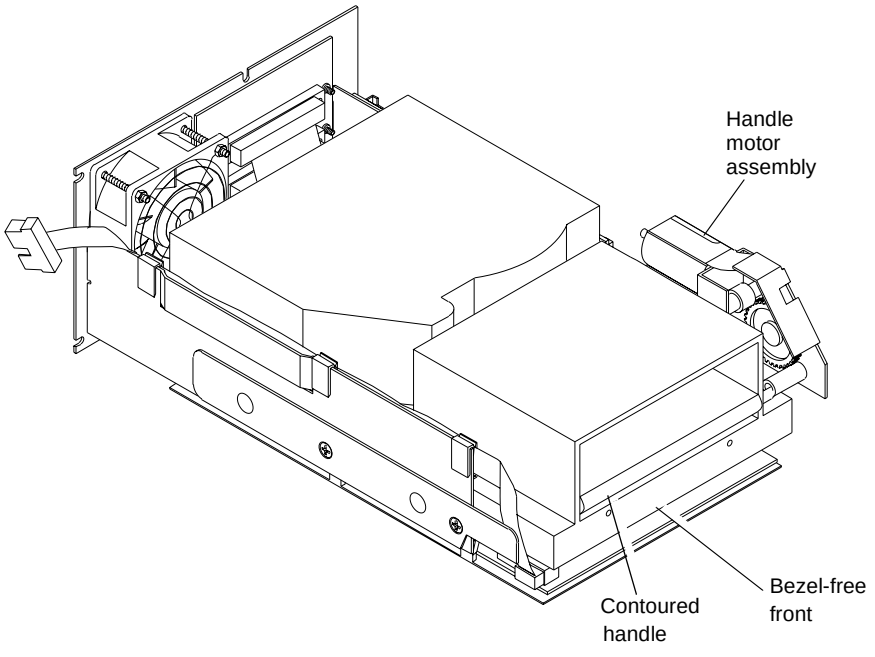
The CHM contains sensors that monitor cartridge location, gripper location and timing information. These sensors allow the library to operate as a random access system that provides direct, quick access to any cartridge in either magazine.

Tape Drives

The tape drives in the L500 Series library are bezel-free and have contoured handles. This enables each drive to fit comfortably into the compact bays of the library.

The library uses an electronic motor-driven ejection system which automates the tape ejection procedure.

Figure 9 Bezel-Free Tape Drive



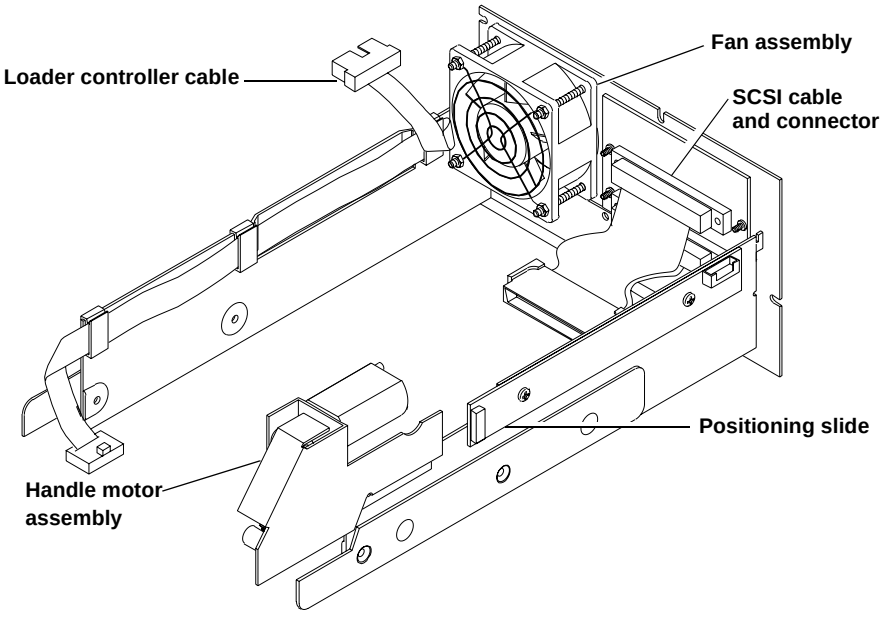
Drive Mounting Description

The tape drive is installed in the library using a drive bracket assembly. Four mounting screws secure the drive to the bracket. The mounting bracket components are:

- Fan assembly
- Loader controller cable
- SCSI interface cable and bulkhead connector
- Handle motor assembly and extender board
- Positioning slides

Replacement tape drives for L500 libraries are pre-assembled with the drive bracket assembly (see figure 10).

Figure 10 Drive Bracket Assembly



Supported Tape Cartridges

Tape cartridges reside within two removable 7-cartridge magazines, accessible through individual doors at the front of the unit. The library will operate with one or both magazines in place.

> **Note:** Both access doors must be closed during system operation.

The L500 Series library can write and read 2.6, 6.0, 10.0, 15.0 or 20.0 GB tape formats for 100% compatibility with earlier drives.

Dual 7-Cartridge Magazines

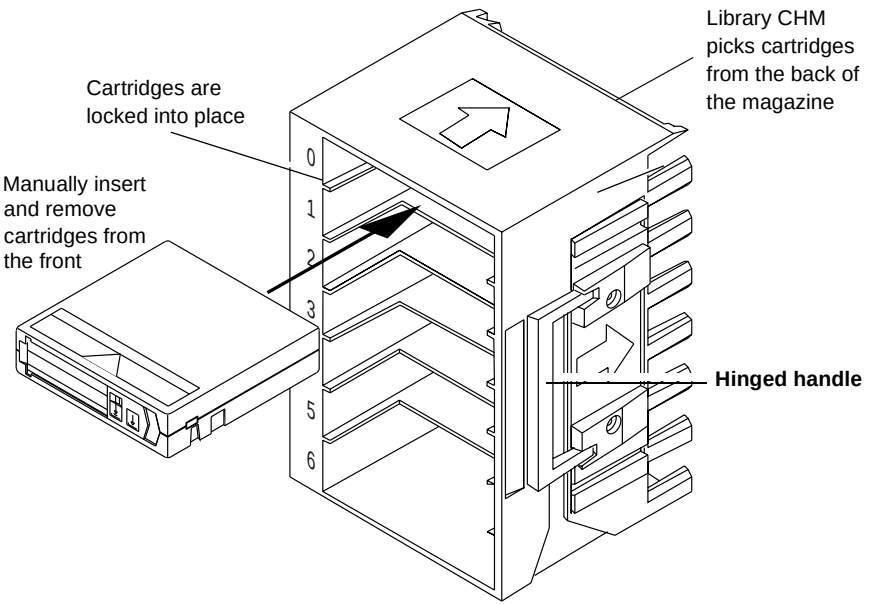
The library includes two 7-cartridge tape magazines (see figure 11). One slot in one of the magazines can be used to accommodate a cleaning cartridge. The magazine can also be removed and used for off-site storage.

Each magazine is keyed to prevent improper cartridge insertions. Once inserted, each cartridge is locked in place by a small metal tab. To remove a cartridge, simply push it until you hear a click, then release it. The cartridge will be partially ejected, making it easy to remove.

Note: The magazine should be removed when loading or unloading tape cartridges. A hinged handle is located on the side of the magazine to aid in removal and storage outside of the library.

Caution: Do not press on the metal retaining tabs after inserting a cartridge in a magazine.

Figure 11 Library Magazine



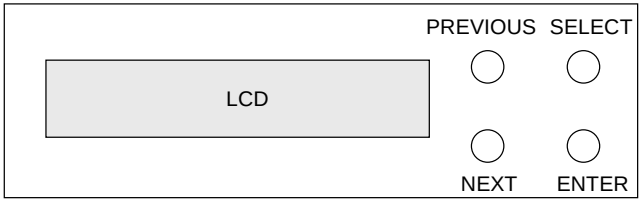
Operator Control Panel

The OCP is the operator interface of the L500 library. It consists of:

- LED display
- Four push-buttons

The OCP (see figure 12) is mounted behind the library bezel and attached to the ribbon cable connector.

Figure 12 Operator Control Panel



The LCD displays two lines of characters. The message content of either line can contain a mixture of text messages and field codes. Use the OCP to configure and operate the library or access library information.

Use the OCP to:

- View tape drive status and activity
- View error messages
- Check magazine slot status
- Check drive and loader controller configuration
- Lock or unlock the magazine doors
- Control how the library accesses cartridges
- Set the SCSI ID

See Chapter 3, “Operator Control Panel,” for more information on the OCP.

Chapter 2

Installing the L500 Series Library

This chapter contains information needed to install, configure, and operate the L500 Series library. The installation procedure is divided into the following general tasks:

- Selecting an installation location
- Receiving the library
- Unpacking the library
- Connecting the tape library
- Running the Power-On Self-Test (POST)
- Configuring the tape library
- Operating the tape library

Selecting an Installation Location

When selecting an installation location for the library, consider the following:

- Floor space
- Overhead clearance
- Installation surface strength and inclination
- Power and grounding
- Environmental specifications

Floor Space

Figure 13 shows the floor space requirements for setting up and operating the stand-alone library.

Figure 13 Floor Space Requirements (Tower Library)

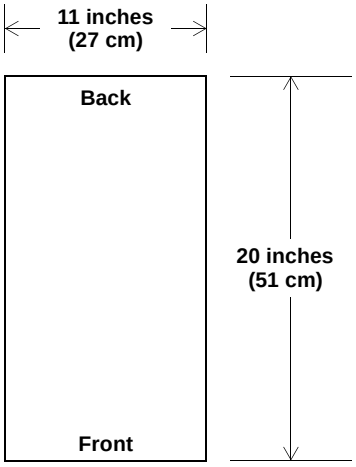
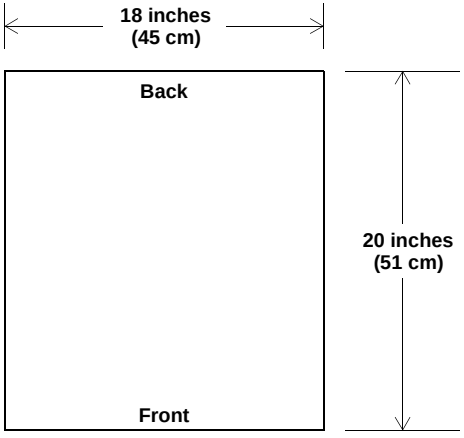


Figure 14 shows the rack space requirements for setting up and operating the rack mount library.

Figure 14 Rack Space Requirements (Rack Mount Library)



Overhead Clearance

The height of the stand-alone library is 18 inches (46 cm). The height of the rack mount library is 7 inches (18 cm).

To remove and replace the library enclosure, you need an overhead clearance slightly greater than the height of the library.

Surface Strength and Inclination

Place the library and rack on a clean, level surface. If the library will be placed on a desk or table, make sure it is sturdy enough to support the library's weight (76 lbs / 35 kg).

Power and Grounding

The electrical ratings for the library are 110 - 120 / 200 - 240 VAC, 50 Hz - 60 Hz, 1.6 A - 0.8 A, 140 W - 200 W.

Power Cord

A 110 / 120 VAC power cord is supplied with your unit. If your country / locale does not use 110 / 120 VAC, refer to the criteria listed below for parameters.

Warning: Do not attempt to modify or use an external 110 - 120 VAC power cord for 220 - 240 VAC input power. Modifying the power cord can cause personal injury and severe equipment damage.

The power cord used with this equipment must meet the following criteria:

- The power cord should be a minimum of 18 / 3 AWG, 60°C, Type SJT or SVT.
- UL and CSA Certified cordage rated for use at 250 VAC with a current rating that is at least 125% of the current rating of the product. In Europe, the cordage must have the HAR mark.
- The plug must be terminated in a grounding-type male plug designed for use in your country. It must also have marks showing certification by an agency acceptable in the country.

- The connector at the product end must be an IEC320 C13 (type CEE-22) female connector.
- The cord length must not exceed 14.5 feet (4.5 meters).

Environmental Specifications

The installation location should meet the following environmental specifications.

- Temperature: 50°F to 104°F (10°C to 40°C)
- Relative humidity: 20% to 80% non condensing
- Humidity gradient: 10% per hour
- Dry bulb (ambient) temperature: 50°F to 104°F (10°C to 40°C)
- Wet bulb (dew point) temperature: 77°F (25°C)
- Temperature gradient: 19.8°F (11°C) per hour across the range
- Temperature shock: 18°F (10°C) over two minutes
- Altitude: -500 to 30,000 feet (-150 to 9100 meters)
- Air: free of airborne contaminates; e.g., dust, paper particles

Receiving the Library

When receiving the library from the shipper, unpack the unit as close to the installation location as possible.

Inspect the shipping pallet and carton for damage that may have occurred during shipment. Report any damage to the shipper immediately.

Unpacking the Library

Warning: The library weighs up to 76 lbs (35 kg) when fully loaded. Two people should perform any steps that involve lifting or guiding the library. Use safe practices when lifting or guiding the library.

Caution: If you are installing the rack mount version of the library, be sure to use Quantum | ATL's PowerStor Rack Mount Installation kit. This kit provides the necessary support brackets and other hardware for properly mounting the library.

The unpacking instructions vary depending upon whether you ordered a stand-alone or rack mount library. If you received a stand-alone library, you should have only one shipping carton. Refer to the *PowerStor L500 Unpacking Instructions, PN 6321102*, included with the library.

If you ordered a rack mount library, you should have two shipping cartons. The large carton contains the library, and the smaller carton contains the PowerStor Rack Mount Installation Kit.

Install the rack mount kit in the rack, referring to the *PowerStor Rack Mount Guide, PN 6322617*, provided with the rack mount kit.

Caution: The library weighs 76 lbs (35 kg). Two people should perform any procedure that involves lifting or moving the library.

1. Open the top of the shipping carton by carefully cutting the packing tape.
2. Remove the two accessories boxes from the carton (see figure 15). One box is empty. The other box contains the accessories kit.

3 Remove the packing foam from the top of the library (see figure 16).

4 With two people lifting the library, remove it from the shipping carton.

5 Remove the library from the shipping bag.

6 Place the library in the installation location. If it is a rack mount library, place it in the rack.

Figure 15 Removing the Accessories Boxes

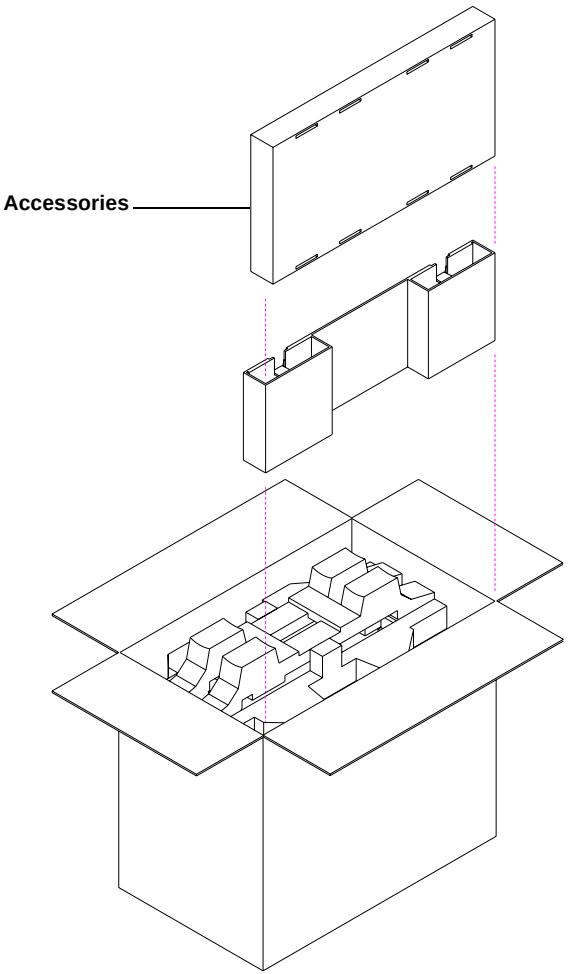
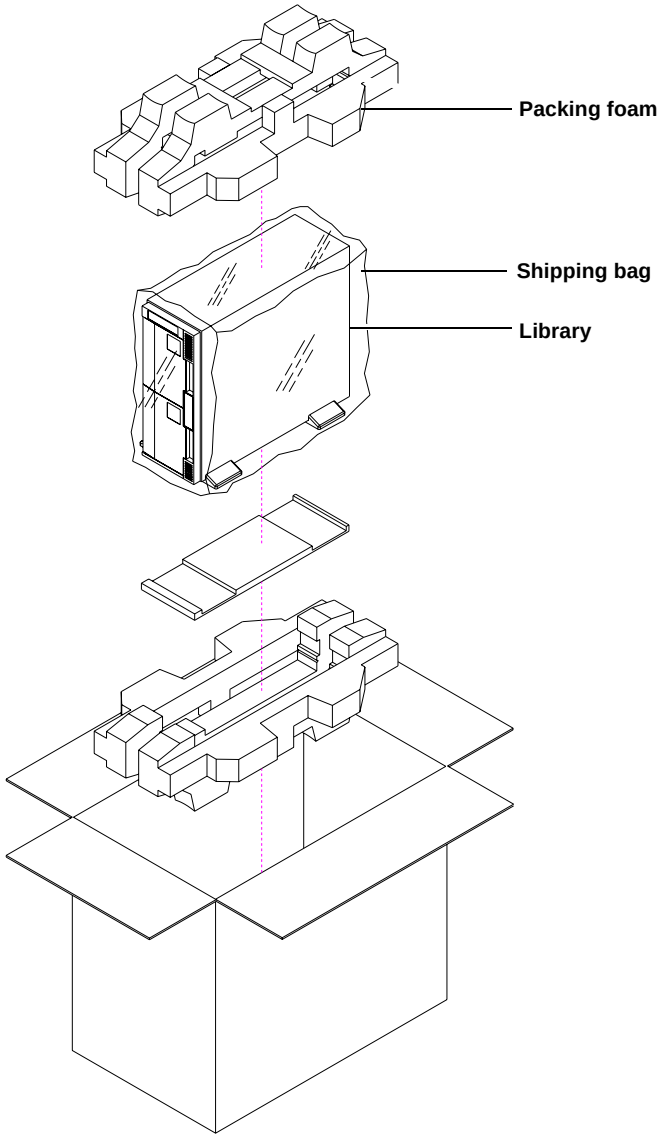


Figure 16 Removing the Library from the Shipping Carton



The library is now unpacked.

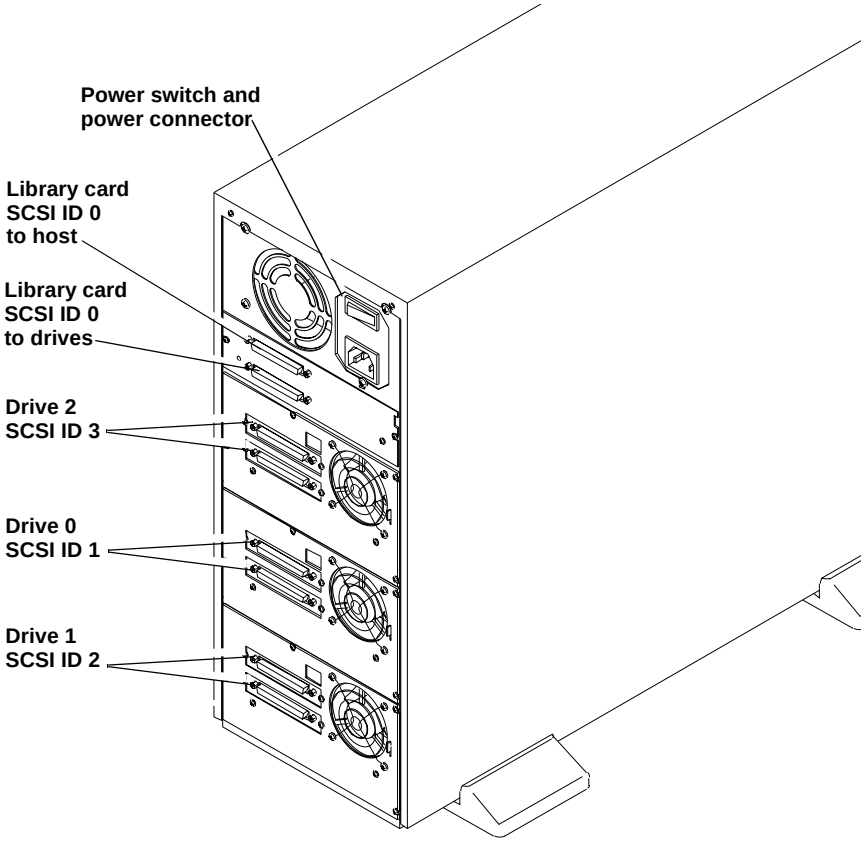
Caution: Do not attempt to open the front doors of the library when the library is turned off. These doors open only when the unit is turned on.

Connecting the Tape Library

Complete the following procedure to connect the power cord and SCSI signal cables to the tape library. Figure 17 shows the rear panel layout for a three-drive configuration.

Caution: Verify that the library card uses the same type of SCSI bus as the drives. For example, connecting a single-ended (SE) SCSI library to a differential (DIFF) SCSI adapter will cause a host system malfunction.

Figure 17 Tape Library Rear Panel Cable Connectors

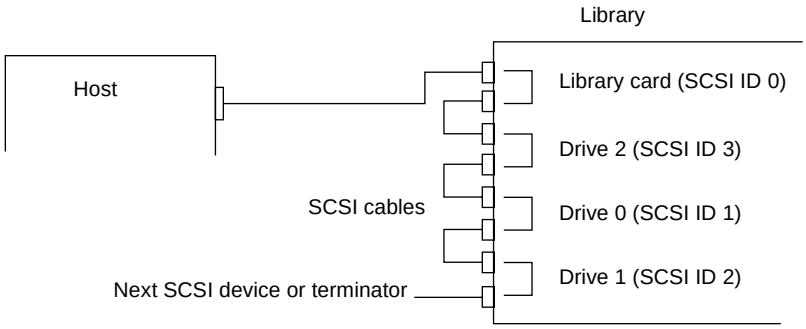


To connect the tape library:

1. Verify that the power switch is in the off position.
2. Connect one end of the SCSI cable to the SCSI cable connector on the library card, which is accessible from the back of the tape library.
3. Verify that the SCSI bus is terminated properly.

   Depending on the system configuration, the SCSI bus initiates at the host, connects to the library controller, and then to any other SCSI devices on the bus. It terminates at the last SCSI device on the bus. SCSI cabling connections are shown in figure 18.

Figure 18 Sample SCSI Cable Connection



4. Install the SCSI cables and tighten the screws to secure all cables.
5. Connect the power cord to the power connector on the back of the tape library (figure 17).
6. Connect the other end of the power cord to the AC power source.

Running the Power-On-Self-Test (POST)

To verify proper system installation:

1. Turn on the tape library. The POST begins automatically.

   Table 1 lists the tests that are run during POST, and displays the pass or fail messages associated with these tests.

Table 1 POST Pass/ Error Messages

POST Test - Description	Pass Message	Error Message
ROM EDC - Flash ROM EDC test	`DLTstor POST 1 EDC`	`POST Error in ROM EDC`
Micro RAM - Microprocessor Local RAM test	`DLTstor POST 2 Micro RAM`	`POST Error in Micro RAM`
UART - QUART test	`DLTstor POST 3 UART`	`POST Error in UART`
Other	`DLTstor POST 4 Other`	`POST Error in Other`

   Next, the drives and the library are initialized. The OCP displays:

   `Library Idle`

   `Library Init`

   `Library Idle`

   The OCP buttons are not active until the OCP displays `Library Idle`.

   If all the POST tests complete successfully and the drives and library are initialized, the library is ready for operation.

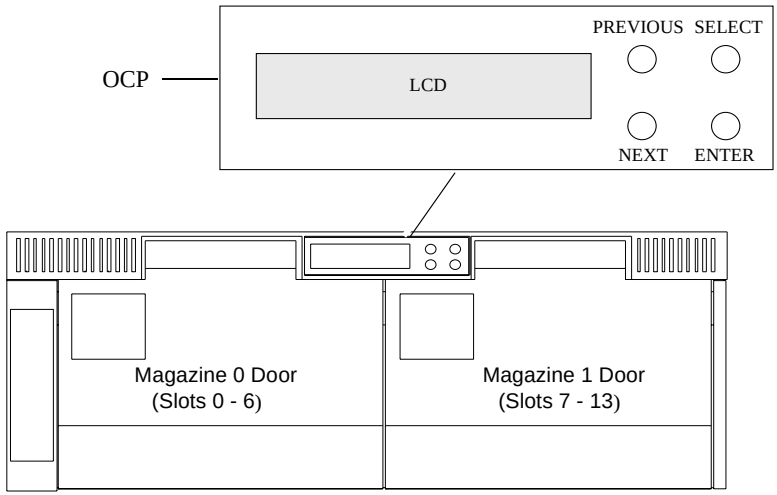
2. If the tests do not complete, run the POST again. Turn the power off, wait 10 seconds, then turn the power back on. If the tests still do not complete, the library needs service.

Configuring the Tape Library

This section describes how to configure the library. Configuration consists of verifying SCSI ID settings for the library and all drives.

Figure 19 shows the location of the OCP on the front panel of the tape library. Verify all SCSI IDs using the OCP. If necessary, change the IDs (see Changing SCSI ID Settings).

Figure 19 Front Panel (rack mount)



The system uses SCSI IDs to identify or address devices, such as the library card and the tape drives, on the SCSI bus.If the library is one of multiple SCSI devices on the bus, use a SCSI ID that is unique from any other device or system ID on the SCSI bus.

Table 2 lists the default SCSI IDs. Figure 17 on page 22 shows physical SCSI device locations.

Table 2 SCSI ID Default Setting

SCSI ID	Device
0	Library controller
1	Drive 0
2	Drive 1
3	Drive 2

Caution: The library recognizes tape drive identification by physical position in the tape library.

Viewing SCSI IDs

Use the OCP to view the current SCSI ID settings:

1. Press SELECT until `SCSI ID?` is displayed.
2. Press NEXT to enter the `SCSI ID` menu. `View ID?` is displayed.
3. Press ENTER to view all SCSI IDs.
4. If the SCSI IDs listed are correct for the system configuration, press SELECT to return to the main menu. Otherwise, proceed to the next set of instructions to change drive SCSI ID settings.

Changing SCSI ID Settings

To change the current SCSI ID settings for a drive:

1. Press NEXT. `Set ID?` is displayed.
2. Press ENTER. `Set ID? Drive 0?` is displayed.
3. Press NEXT or PREVIOUS until the desired drive is displayed.
4. Press ENTER when the desired drive is displayed. The SCSI ID selections (0 through 15) are displayed.
5. Press NEXT or PREVIOUS until the desired SCSI ID is displayed.

6 Press ENTER. The desired drive and SCSI ID setting is then changed.

> **Note:** The SCSI ID change takes about 10 seconds to complete. No other library activity should occur at this time.

7 Repeat Steps 1 through 4 to verify the new SCSI ID. If the SCSI IDs listed are now correct for the system configuration, press SELECT to return to the main menu. Otherwise, proceed to the next set of instructions to change the library SCSI ID setting.

Changing the Library Card SCSI ID Setting

To change the current SCSI ID for the library card:

1 Press NEXT. `Set ID? Library?` is displayed.

2 Press ENTER and the SCSI ID selections (starting with 0 and continuing on through 15) are displayed.

3 Press NEXT or PREVIOUS to select the SCSI ID to be changed.

4 Press ENTER when the desired library SCSI ID is displayed.

5 To verify, refer to Viewing SCSI IDs on page 26

6 Press SELECT to return to the main menu.

> **Note:** Host power must be recycled for any library SCSI ID changes to take affect; however, library power does not have to be cycled if the changes were made via the OCP.

Operating the Tape Library

The magazine slots are labeled 0 through 6 (magazine 0) and 7 through 13 (magazine 1). The left magazine in the rack mount

version (top magazine in the tower version) is magazine 0. The right magazine in the rack mount version (the bottom magazine in the tower version) is magazine 1 (see figure 19).

Caution: Do not press on the metal tabs on the inside edge of the magazine slots when a tape cartridge is present.

Caution: Never apply labels to the top, bottom, or sides of tape cartridges. Doing so can cause cartridge jams in the tape library. Use the space on the front of the cartridge for labels.

Caution: Never attempt to manually move the CHM; damage to the library could occur. If the CHM must be moved, recycle power and wait until `Library Idle` is displayed on the OCP. The CHM will then be in its home position.

Note: Use slot 0 when performing a microcode update; use slot 13 when using the optional AutoClean mode. The cleaning tape should be stored in slot 13.

Note: Insert and remove all cartridges at the *front* of the magazine.

Inserting a Cartridge

To insert a cartridge into a magazine:

1. Verify that all library SCSI library activity has stopped (`Library Idle` should be displayed on the OCP).
2. To open the magazine door, using the OCP:
   a. Press SELECT until `EJECT/UNLOCK?` is displayed.
   b. Press NEXT. `Eject Cartridge?` is displayed.
   c. Press NEXT. `Unlock Doors?` is displayed.

d Press ENTER. `Are you sure?` is displayed.

e Press ENTER. `Open Doors!` is displayed.

> **Note:** This activity can take up to three minutes if the cartridge is to be removed from the drive and the end of data is at the end of the tape spool. Press any other button to stop the operation.

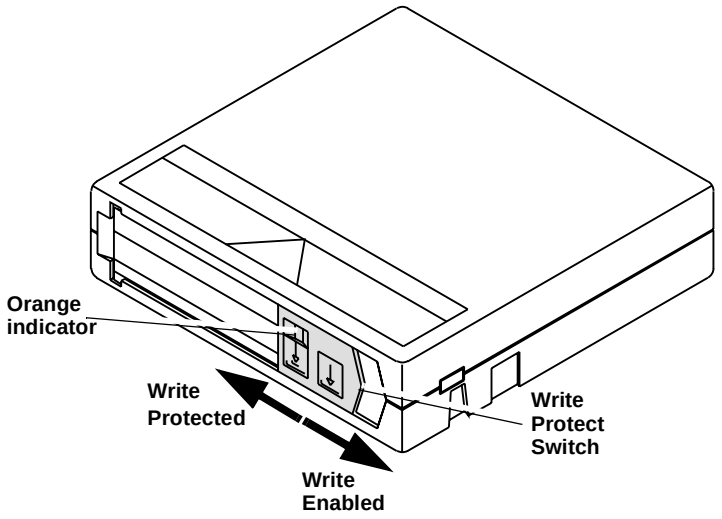
3 Open the door using the handle.

> **Note:** `Door Unlocked!` is always displayed when the door is unlocked. The only way library operation will be restored is to open and close one or both doors.

4 Set the write-protect switch to the desired position (see figure 20).

> **Note:** The tape is write-protected if the orange indicator is visible.
> The tape is write-enabled if the orange indicator is not visible.

Figure 20 Cartridge Write-Protect Switch

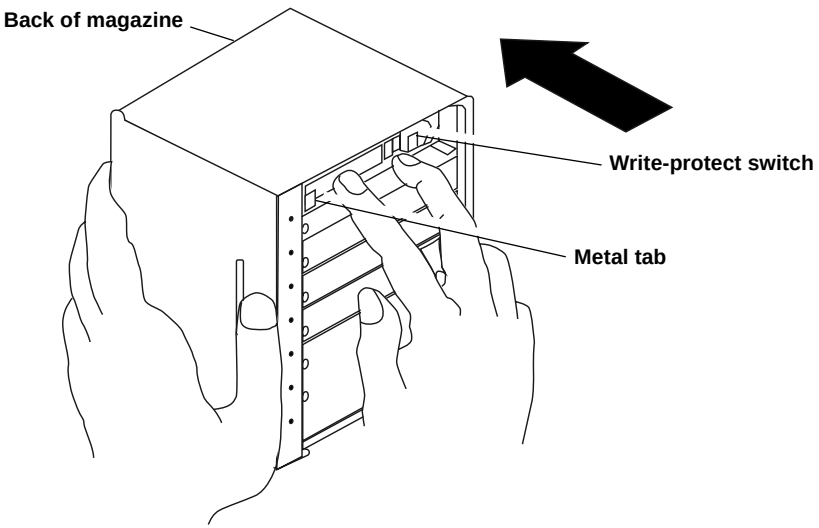


5 Orient the cartridge as shown in figure 21. The write-protect switch is on the right side of the cartridge, facing you.

6 Insert the cartridge into the magazine by pushing it into the slot until it latches. A small metal retaining tab pops out at the opening of the magazine slot, holding the cartridge in place (see figure 21).

Caution: Do not press the metal tab manually.

Figure 21 Inserting a Cartridge



7 Insert the magazine into the library.

8 Close the magazine door by pushing the door until it latches. The door will lock automatically after approximately five seconds.

9 The library then executes a scan magazine function.

Upon completion, `Eject/Unlock?` is displayed. If the optional bar code reader is present, it reads the cartridge bar code labels.

Removing a Cartridge from a Magazine

To remove a cartridge from the magazine:

1. Press in on the cartridge until it stops and you hear a click.
2. Release the cartridge. The slot has a spring-release action and will partially eject the cartridge for ease of removal.

Caution: When a cartridge is inserted in a magazine slot, a metal retaining tab pops up from the front edge of the slot to retain the cartridge. Do not press on the metal retaining tab. Always use the press-and-release technique to remove cartridges from the magazine (see figure 22).

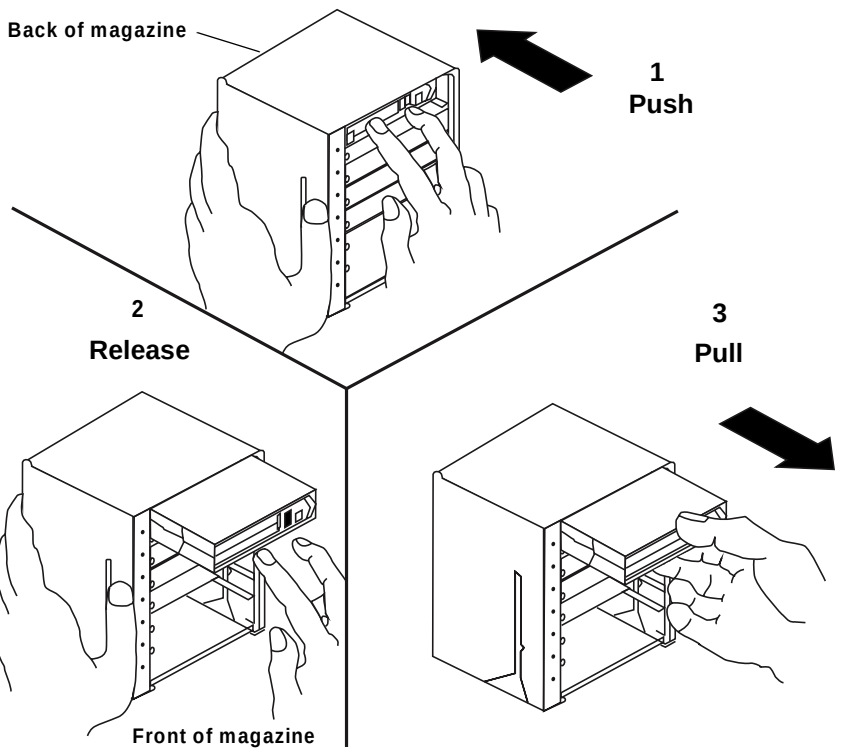


Figure 22 Removing a Cartridge from the Magazine

Using the Cleaning Cartridge

If the tape drive detects a failure during the calibration routine or if an unrecoverable hard error occurs while either writing or reading a tape, `Cln` is displayed.

> **Note:** Use slot 13 for storing the cleaning cartridge and when setting the AutoClean Mode to `Yes`.

- The `Cln` message indicates that the drive head may be contaminated and in need of cleaning.
- Repeated `Cln` messages with different data cartridges indicate a failure that may require drive replacement.
- If `Cln` appears on the display when a particular cartridge is used, it may be a media problem. Replace the tape cartridge.

> **Note:** Always use the cleaning cartridge to clean the drive. Do not use cleaning solvents or attempt to service the tape drive head.

The cleaning cartridge can be used 20 times. When the drive detects that a cleaning cartridge has expired, the drive rewinds and unloads the cartridge. If the cleaning routine is run on a cleaning cartridge that has not expired, `Cln` is cleared from the OCP after the tape rewinds and unloads. The `Cln` message is cleared when the tape drive successfully completes a cartridge calibration routine after a retry.

To limit use of a cleaning cartridge:

- Avoid touching leaders and media with bare fingers. Oils and grease from the skin are especially damaging and may cause a failure requiring drive replacement
- Maintain a clean work area for any tape product to help ensure drive reliability
- Select a site away from line printers, cardboard boxes or other sources of dust and debris
- Follow the handling and storage guidelines supplied with each cartridge

Chapter 3

Basic Library Operations

This chapter describes the overall menu structure of the Operator Control Panel (OCP). The following functions are described:

- Library status
- Eject / unlock
- Load
- SCSI ID
- Mode
- Information
- Code update
- Tests

Caution: Before executing a menu function command from the OCP, verify that there is no SCSI bus activity to the tape library or drives. Executing commands via the OCP and SCSI bus simultaneously may result in operation failure and / or drive unavailability.

OCP Functions

The OCP, located on the front panel of the library, controls all local functions.

The OCP consists of an LED display and four push-buttons:

- Previous—return to a previous option
- Next—advance through each option
- Select—return to the main menu options
- Enter—enter and execute commands in the current option

The LED display displays two lines of characters. Either line can contain a mixture of messages and / or field codes. Figure 23 shows the OCP buttons.; table 3 describes the menu structure for the OCP LED display.

Figure 23 OCP

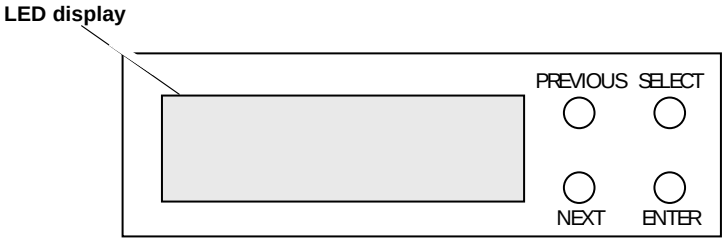


Table 3 OCP LCD Menu Structure

OCP Main Menu	OCP Submenus
STATUS?	• Library Init/Active/Idle (at POST) • Slot Status 0-13 (displays status of all slots) • Drv 0, Drv 1, Drv 2 (displays tape drive status)
EJECT/UNLOCK? (Pre-v34 firmware)	• Eject Cartridge? unloads cartridge from a drive • Eject Drive? ejects cartridge from each drive and returns it to its respective slot (if a drive has a cartridge in it) • Unlock Door? unlocks the door after the tape is ejected from each drive and returned to its respective magazine slot)
EJECT/UNLOCK? (v34+ firmware)	• Eject Cartridge? unloads cartridge from drive if cartridge is present. If cartridge is not present, Drive is Empty is displayed. • Eject Drive? ejects the cartridge from the drive and returns it to its slot (if the drive is loaded and Mode/SetUnloadCart is enabled) • Unlock Door unlocks the door either after the cartridge is ejected from the drive (if Mode/SetUnloadCart is enabled), or without ejecting the cartridge from the drive (if Mode/SetUnloadCart is disabled)
LOAD?	• Load Slot # To Drive #? loads cartridge from selected slot • From Slot # (loads cartridge from selected slot)

OCP Main Menu	OCP Submenus
SCSI ID?	• View ID (displays drive and library SCSI IDs). • Set Drive ID (sets drive SCSI ID) • Set Lib ID (sets library SCSI ID)
Mode? *NOTE: Requires V34+ firmware	• Random loads any cartridge from any magazine slot • Sequential autoloads cartridge from low to high magazine slot once • Sequential Circ autoloads cartridge from low to high magazine slot repeatedly • Autoload Cart (Y/N) (enable for Seq/SeqCirc modes) • EnableBarcode (Y/N) • AutoClean (Y/N) • SetUnloadCart* (Y/N) enable to unload tape drives and return cartridges to respective bins when Unlock Door? command is given. Y (enable) is the default. If disabled (N), cartridge is left in tape drive when Unlock Door? command is given.

OCP Main Menu	OCP Submenus
INFORMATION?	• Loader HW Rev (device rev level in decimal) • Loader FW Rev (firmware rev level in decimal) • Loader Mech Rev (loader rev in decimal) • Library HW Rev (device rev level in decimal) • Library FW Rev (firmware rev level in decimal) • Drive # FW Rev (drive firmware rev level in hex) • Loader Life Cycle Count (count from completion of loader 1 POST) • Current Cycles (from completion of POST)
CODE UPDATE	Drive # (starts the code update process) Update Drive (installs microcode from code update tape into a drive)
TESTS	• Elevator Test • Load/Unload Test • Long Ld/Unload Test

Table 4 OCP Button Descriptions

OCP Button	Description
PREVIOUS	Commands the library to: • Cycle backward within the main menu options • Cycle backward within a submenu Press repeatedly to return to the desired display.
NEXT	Commands the library to: • Proceed to the next main menu option • Proceed to the next submenu option Press repeatedly to cycle forward through the desired displays.
SELECT	Commands the library to: • Advance through the main menu options: STATUS?, EJECT/UNLOCK?, LOAD?, SCSI ID?, MODE?, INFORMATION?, CODE UPDATE?, and TEST? Press the Select button repeatedly to reach the option. • Escape out of a submenu and return to the main menu
ENTER	Commands the library to: • Enter an OCP main menu or submenu option • Execute a command

Status

The STATUS? option displays tape drive and magazine slot status.

When the system is first powered on, it conducts a power-on self-test (POST). Upon completion of the POST, the drives and the library are initialized.

At this time, the OCP main menu STATUS? options are described as “Library” options. The OCP buttons are not active during initialization. The following messages are displayed:

- `Library Init`
- `Library Active`
- `Library Idle`

If either status message, `Library init` or `Library Active`, appears on the LCD, the library is in the process of completing an activity. Wait until `Library Idle` appears before entering any commands.

Press NEXT to obtain status.

> **Note:** The STATUS? option gives status information only and there are no commands to be issued; therefore the ENTER button is not functional.

Table 5 lists possible STATUS? options and their respective messages.

Table 5 Status Options

Option	Description	Message	Note
`Slot Status`	Displays status of all magazine slots.	`Cartridge Status:` 0 6 7 13 □□□□□□□ □□□□□□□ where: ■ = cartridge present 0 1 2 = cartridge in drive 0, 1, or 2 - = empty slot (dash) m = missing t = in transit (cartridge in CHM)	
`Drv 0-Drv 2`	Displays tape drive status including tape drive error conditions and cartridge conditions.	Status: • `Empty` • `InFlux` (drive is becoming ready) • `Cln` (cleaning required) • `Code Update` (updating firmware) • `Calibrating` • `Unloading` • `Loading` • `Cleaning` • `Erasing` • `Writing` • `Reading` • `Seeking` • `Rewinding` • `Idle`	`COMP` - If the last read or write operation was data compressed, `COMP` is displayed in addition to the status message.[a]

Option	Description	Message	Note
Drv 0-Drv 2	Displays tape drive status including tape drive error conditions and cartridge conditions.	Error: • Hardware Error • Comm Error • Library Error	CLN - If the tape drive head requires cleaning, CLN is displayed in addition to the status message.
Slot 0123...13 Bar code: ___*	Displays specific slot status.	in Drive # Empty Full In transit Missing	If applicable, the second line of this message displays a bar code label entry.

a. When using an unrecorded tape, the tape drive defaults to native tape density if a write from the beginning of tape (BOT) is executed.

   If you execute a write from the beginning of tape (BOT) when using an unrecorded tape, the tape drive defaults to native tape density.

   If you execute a write from the BOT when using a recorded tape, all pre-recorded data (and density changes) are lost. This includes density changes because they are established when writing from the BOT.

Eject/Unlock

The EJECT/UNLOCK? option unlocks the library door and ejects a cartridge from the tape drive.

Caution: Do not press PREVIOUS, NEXT, SELECT or ENTER until the backup or other tape operations are stopped at the host; pressing these buttons while other operations are executing may result in operation or drive failure.

Table 6 lists possible EJECT/UNLOCK? options and their respective messages.

Table 6 Eject/Unlock Options

Option	Description	Message	Notes
Eject Cartridge?	Unloads the cartridge from the tape drive and reports on drive status	Eject Drive #? Drv # to Slot #? Library Idle Drive Empty Open Doors! Doors Unlocked!	The Eject function unloads the cartridge from the tape drive. The library door is unlocked.
Unlock Doors?	Ejects any cartridge that is in a drive then unlocks the library doors		

Opening the Library Doors

Caution: Never force the library door open. Wait until the `Open Doors!` message is displayed to verify that the library locking mechanism has completed the unlocking activity.

To open the library doors:

1. Press SELECT. `Eject/Unlock? i`s displayed.
2. Press NEXT. `Eject Cartridge?` is displayed.
3. Press NEXT. `Unlock Doors?` is displayed.
4. Press ENTER. `Are you sure?` is displayed.
5. Press ENTER to answer Yes.

The loader removes all cartridges from each drive and displays `Open Doors!` This activity can take up to three minutes if a rewind from end of tape is required.

The library doors are now unlocked.

Closing the Library Doors

To close the library doors, push each door closed until it latches. The door will lock automatically after approximately five seconds.

The library executes a scan magazine function.

Upon completion, `EJECT/UNLOCK?` is displayed. If the optional bar code reader is present, the cartridge labels are read.

Unloading a Cartridge from the Tape Drive

To unload a cartridge from the tape drive:

1. Press SELECT until `EJECT/UNLOCK?` is displayed.
2. Press NEXT. `Eject Cartridge?` is displayed.

3 Press ENTER. `Eject Cartridge? Eject Drive 0?` is displayed.

4 Press ENTER. One of the following messages is displayed:

- `Drive is Empty`
- `Drive NOT Present`
- `Eject to Slot 0?`

If `Drive is Empty` or `Drive NOT Present` is displayed, there is no cartridge to unload in drive 0.

5 Press NEXT. The system searches for a cartridge in the next drive.

6 Repeat steps 4 and 5 until the desired drive is displayed.

7 If `Eject to Slot 0?` is displayed, and slot 0 is the correct slot destination for the cartridge, press ENTER to unload the cartridge.

If slot 0 is not the correct slot destination, press NEXT until the correct slot is displayed. During the unloading process, the following occurs:

- The CHM moves to the drive. `Unload` is displayed.
- The cartridge is removed from the drive by the CHM. `Unload` is displayed.
- The CHM moves to the displayed slot position and inserts the cartridge into the magazine. `Unload` is displayed.
- After the cartridge is unloaded, `Library Idle` is displayed.

8 Press SELECT to return to the main menu.

Magazine Removal

To remove a magazine from the tape library:

1 Press SELECT until `Eject/Unlock?` is displayed.

2 Press NEXT. `Eject Cartridge?` is displayed.

3 Press NEXT. `Unlock Doors?` is displayed.

4 Press ENTER. `Are you sure?` is displayed.

5 Confirm that the tape drive is idle.

6 Press ENTER to answer Yes. `Open Doors!` is displayed.

> **Caution:** Never force the magazine doors open. Wait until `Open Doors!` is displayed to verify that the library locking mechanism has completed the unlocking activity.

7 Open one or both library doors.

8 Grasp the magazine and pull it out of the library.

9 To close the library doors, push each door closed until it latches. The doors will lock automatically after approximately five seconds.

   The tape library then executes a Scan Magazine function. Upon completion, `Eject/Unlock?` is displayed.

   If the optional bar code reader is present, the cartridge labels are read.

To remove or insert a cartridge in a magazine, see Loading a Cartridge on page 48.

Installing a Magazine

To install a magazine into the tape library:

1 Press SELECT until `EJECT/UNLOCK?` is displayed.

2 Press NEXT. `Eject Cartridge?` is displayed.

3 Press NEXT. `Unlock Doors?` is displayed.

4 Press ENTER. `Are you sure?` is displayed.

5 Confirm that the tape drive is idle.

6 Press ENTER. `Open Doors!` is displayed.

Caution: Do not force the library doors open. Wait until `Open Doors!` is displayed to verify that the library locking mechanism has completed the unlocking activity.

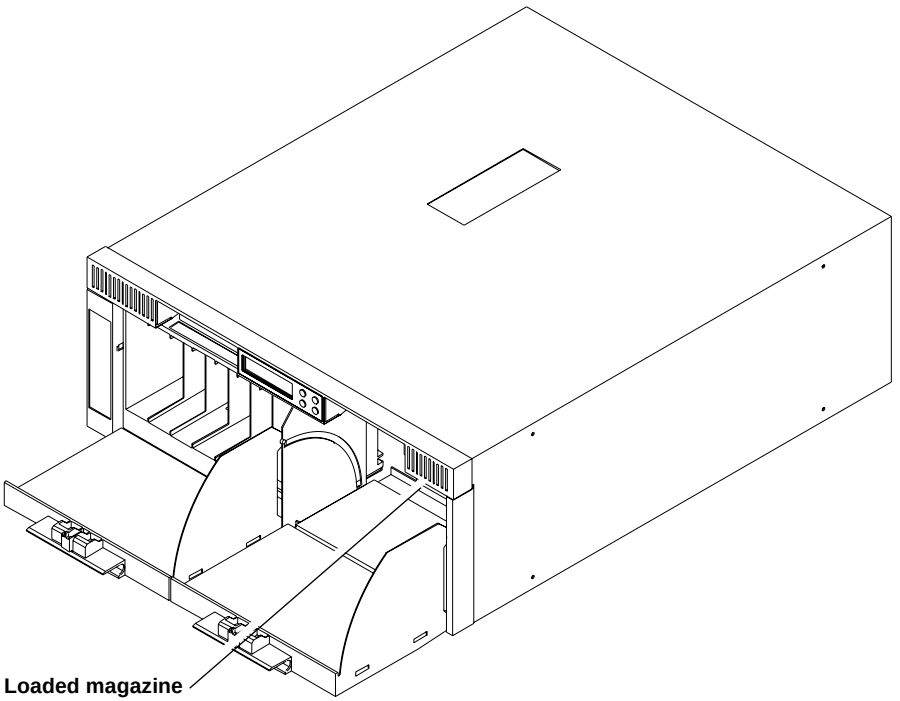
7 Open one or both library doors.

8 Position the magazine with the handle on the side opposite of the library door hinge.

9 Push on the front edges of the magazine and slide it fully into the magazine bay.

Note: Do not push on the cartridges when inserting the magazine into the library.

Figure 24 Tape Library (One Magazine Installed)



10 To close the library door, push the door closed until it latches. The door will lock automatically after approximately five seconds.

The library executes a scan magazine function. Upon completion, `Eject/Unlock?` is displayed. If the optional bar code reader is present, labels are read.

> **Note:** You can operate the library with one or both magazines installed. If one magazine is installed, it may occupy either magazine bay. However, both library doors must be closed during library operation.

Loading a Cartridge

The `LOAD?` option controls the loading of any cartridge into a tape drive.

You can activate the library via the SCSI bus, or via the OCP.

If the tape drive does not contain a cartridge, the `LOAD?` option loads a cartridge from the user's selected slot.

To load a cartridge from a magazine slot into a drive:

1 Press SELECT until `LOAD?` is displayed.

2 Press Enter. `Load Slot 0?` is displayed.

Press ENTER to load a cartridge from slot 0 into a drive. `Load Slot 0? To Drive 0?` is displayed.

To load the slot 0 cartridge into a different drive, press NEXT until the desired drive number is displayed.

3 Press ENTER. `Load Slot x? To Drive 0?` is displayed.

To load the cartridge into drive 0, press ENTER.

To load the cartridge into a different drive, press NEXT until the desired drive is displayed.

4 Press ENTER.

5 One of the following messages is displayed:

- `Drive 0 is Full`

  A cartridge is already installed in the drive. To continue, select an empty drive using NEXT or PREVIOUS or unload the cartridge from the full drive (see Unloading a Cartridge from the Tape Drive on page 43). Perform the load function again.

- `Slot x is Empty`

  There is no cartridge available in the selected slot. To continue, select a slot that contains the cartridge using NEXT or PREVIOUS, or insert a cartridge into the empty slot.

- `LOADING` or `UNLOADING` or `CALIBRATING COMP`

  The library is in the process of completing an activity. When the activity is completed, `Library Idle` is displayed.

- `IDLE COMP`

  The load function is complete.

Depending on the message displayed, take the appropriate action.

6 During the loading process, the following occurs:

a The CHM moves to the selected slot. `LOAD` is displayed.

b The cartridge is removed from the magazine and placed in the CHM. `LOAD` is displayed.

c The CHM moves to the displayed drive position and inserts the cartridge into the drive. `LOAD` is displayed.

d After the cartridge is inserted into the drive, `CALIBRATION` is displayed.

e After the cartridge is fully loaded and at BOT (beginning of tape), `Library Idle` is displayed.

7 Press SELECT to return to the main menu.

SCSI ID

The SCSI ID? option displays the SCSI ID for all devices and allows existing SCSI IDs to be changed.

Make sure all devices on the same SCSI bus have different SCSI ID assignments. SCSI ID defaults are as follows:

- Drive 2 = SCSI ID 3
- Drive 0 = SCSI ID 1
- Drive 1 = SCSI ID 2
- Library controller = SCSI ID 0

Table 7 lists possible SCSI ID options and their respective messages.

Note: When changing a SCSI ID, wait at least 30 seconds before checking the ID. The CHM may not show the changed ID until the tape drive has been reset.

Table 7 SCSI ID Options

Option	Description	Message	Note
View ID?	Lists all SCSI IDs for the tape library and drives.	Lib 0 Drv0 1 Drv1 2 Drv2 N/A	This example shows the Library SCSI ID = 0, Drive 0 SCSI ID = 1, and Drive 1 SCSI ID = 2; Drive 2 is not available in the system.
Set ID?	Allows the user to select a device and change the SCSI ID setting.	Set ID?	The system is set to change the drive ID
		Set ID? Library?	Displays the library is to be changed
		Set ID? Library? ##?	Selects the library and SCSI ID to be changed
		Set ID? Drive#?	Displays the drive to be changed
		Set ID? Drive#? ##?	Selects the drive and SCSI ID to be changed

EEROM is maintained through power cycles. SCSI ID information that is stored in non-volatile RAM is saved until you manually change it. SCSI IDs do not automatically revert to their defaults.

Viewing the SCSI IDs

To view the status of the library and drive SCSI IDs:

1. Press SELECT until SCSI ID? is displayed.
2. Press NEXT. View ID? is displayed.

3 Press ENTER. The SCSI IDs for the tape library and associated drives are displayed.

4 Press SELECT to return to the main menu.

Setting a SCSI ID

To change an existing drive or library SCSI ID:

1 Press SELECT until SCSI ID? is displayed.

2 Press NEXT. View ID? is displayed.

3 Press NEXT. Set ID? is displayed.

4 Press ENTER. Set ID? Drive 0? is displayed.

5 Press ENTER to change the drive 0 SCSI ID. Set ID? Drive 0? 0? is displayed.

6 Press NEXT to continue without changing the drive 0 SCSI ID.

7 Press NEXT until the desired drive is displayed.

8 Press ENTER. Set ID? Drive x? 0? is displayed.

9 If the SCSI ID information on the OCP is correct, press ENTER.

10 Proceed through each device using NEXT or PREVIOUS.

11 Press ENTER to execute any changes.

12 To change the library controller SCSI ID, press NEXT. Set ID? Library? is displayed.

13 Press ENTER. Set ID? Library? 0? is displayed.

14 Press NEXT or PREVIOUS until the desired SCSI ID address is displayed.

15 Press ENTER to assign the new SCSI ID address. Set ID? is displayed.

16 Press SELECT to return to the main menu.

17 Cycle power at the host to activate the new SCSI ID in the system.

Mode

The MODE? option controls how the library accesses cartridges.

The ENTER button executes the “Selected” mode and toggles all other modes to “Not Selected.” The Enter button also toggles the “Yes” and “No” options.

Table 8 lists the Mode options and their respective messages.

Warning: The optional bar code reader contains a Class 1 LED. Do not look at the LED for extended periods of time; prolonged exposure may be harmful to the eyes.

Table 8 Mode Options

Option	Description	Message
Random	This command causes the library to automatically load any cartridge from any magazine in the load cycle.	Selected NOT Selected
Sequential	This command instructs the tape library to behave as an autoloader. Cartridges are loaded sequentially from the lowest magazine address and the lowest loaded slot position in that magazine. The loading and unloading of cartridges sequentially progresses to the last cartridge and then the tape library stops. To re-initiate this process either load a cartridge into the drive via the OCP or via a SCSI Command. This command works in conjunction with the Autoload Cart command. **Note:** The Sequential mode is functional only if the library is configured with a single drive.	Selected NOT Selected

Option	Description	Message
Sequential Circ	Primarily designed for testing purposes, this command instructs the tape library to behave as an autoloader. Cartridges are loaded sequentially from the lowest magazine address and the lowest loaded slot position in that magazine. The loading and unloading of cartridges sequentially progresses to the last cartridge and then the tape library restarts the sequential loading sequence again from the first available slot. This command works in conjunction with the Autoload Cart command. **Note:** The Sequential mode is functional only if the library is configured with a single drive.	Not Selected Selected
Autoload Cart	This command functions only in conjunction with Sequential or Sequential Circ. Upon issuance of this command, the library starts loading cartridges following an open/close door operation per Sequential or Sequential Circular mode. The library must be either in the Sequential or Sequential Circ mode for Autoload Cart mode to be functional.	N Y
Enable Barcode (optional)	When enabled, the optional bar code reader scans the cartridge bar code labels on power up and when the doors are closed. The bar code labels are read via the OCP Status display or a SCSI Read Element status command. To use, (a) press ENTER to Enable Bar Code: Y, and (b) make sure doors are closed.	N Y
AutoClean (optional)	When enabled, the library automatically cleans drives when required. The time that a SCSI Move Media command takes to complete increases from approximately 20 seconds to 60 seconds because the library must wait until calibration is complete. If cleaning is required, the typical time increases to a maximum of 10 minutes while the drive is cleaned. To use, (a) load the cleaning tape in slot 13, (b) press ENTER to enable AutoClean: Y.	N Y

Viewing a Mode

To view the current tape library modes:

1. Press SELECT until MODE? is displayed.
2. Press ENTER. A Random Selected message is displayed.
3. Press NEXT repeatedly. The status of the Sequential and Sequential Circ modes are displayed.
4. Continue pressing NEXT. Autoload Cartridge, Enable Barcode, and AutoClean modes are displayed.
5. Press SELECT to return to the main menu.

Setting a Mode

To set the current tape library modes:

1. Press SELECT until MODE? is displayed
2. Press ENTER. Random Selected is displayed.
3. Press NEXT repeatedly. Each mode option and status is displayed. The following modes are displayed:
   - Sequential NOT Selected
   - Sequential Circ NOT Selected
   - Autoload Cart: N
   - Enable Barcode: N
   - Autoclean: N
4. Press ENTER to toggle the mode options.

   The ENTER button executes the Selected mode and toggles all other modes to NOT Selected.

   For example, if you toggle the Sequential mode to Selected, the Random and Sequential Circ modes are automatically toggled to NOT Selected. The ENTER button also toggles each of the Y and N options.
5. Press SELECT to return to the main menu.

Information

The INFORMATION? option displays device revision number, software revision number, tape library cycle count and loader error count.

Table 9 lists possible Information messages.

Table 9 Information Messages

Information Type	Message	Note
Ldr Hw Rev	## .	Device hardware revision level in decimal
Ldr Fw Rev	## .	Device firmware revision level in decimal
Ldr Mech Rev	## .	Device mechanical revision level in decimal
Lib Hw Rev	## .	Library hardware revision level in decimal
Lib Fw Rev	## .	Library firmware revision level in decimal
Drive 0 Fw Rev	## h or NOT Present	Drive firmware revision level in hex
Drive 1 Rev	## h or NOT Present	Drive firmware revision level in hex
Drive 2 Rev	## h or NOT Present	Drive firmware revision level in hex

Information Type	Message	Note
Total Cycle (Library Life Cycle Count)	## .	This count starts from the completion of the library's first POST.
Current Cycles	## .	This count starts from the completion of the library's most recent POST.
Ldr Err:	## .	Loader error count

where the (.) signifies that the revision level is in decimal format; and where the (h) signifies that the revision level is in hex format.

T= Test and V= Release

Code Update

The CODE UPDATE? option shows each tape drive and installs new microcode for a tape drive via cartridge.

Table 10 lists possible Code Update messages.

Table 10 Code Update Messages

Option	Message	Note
Update Drive #	Update Drive 0 Update Drive 1- NOT Present Update Drive 2 - NOT Present	Displays installed drive microcode revision level

(.)	T = Test V = Release	Signifies that the revision level is in decimal format
(h)	T = Test V = Release	Signifies that the revision level is in hex format.

Viewing the Drive Microcode Revision Level

View the Information option of the OCP to obtain drive microcode revision levels. (See Information on page 55.)

Installing New Drive Microcode via Cartridge

For detailed microcode update procedures, contact Quantum | ATL Customer Support.

Tests

The TESTS? option controls the library internal self-test functions.

Use the following guidelines to move through the Tests option:

- If PREVIOUS or NEXT is pressed during a test, the next message test is displayed along with an appropriate message, "A Test is Active." When the original test is complete the next test will start.
- ENTER provides access to the TESTS? option. If ENTER is pressed during a test in progress, it will be terminated. Press ENTER to restart a test from the beginning, after the termination process completes.

Table 11 lists possible TESTS? options.

Table 11 Test Options

Option	Description	Message	Note
Elevator Test	Tests the tape library CHM function. This is a one cycle test.	ACTIVE or ABORTED	The CHM is positioned to each available data transfer element (drive) or data storage element (magazine slot). If a magazine is not present, the CHM cannot be positioned to those slots. This test is functionally equivalent to SCSI Position to Element commands.
Load/ Unload Test	Tests sequential loads and unloads cartridges into the tape drive. This is a one cycle test.	ACTIVE or ABORTED	This test unloads any cartridge in the drive, inserts a cartridge in the drive, and replaces the cartridges in their slots. The drive is left empty.
Long Ld/ Unload Test	Tests randomly loads and unloads cartridges into the tape drive continuously until stopped by the operator.	ACTIVE or ABORTED	This test loads and unloads the drive with cartridges from random slots.

Note: If ENTER is pressed while a test is in progress, it will terminate.

If ENTER is pressed during a terminated test, the test restarts from the beginning.

If NEXT or PREVIOUS is pressed during a test, the next message test is displayed along with an appropriate message, "<test name> Active" When the original test is completed the next selected test starts.

Chapter 4
SCSI Interface

This chapter details the SCSI protocol features for the L500 Series library. These features include:

- General SCSI bus operation
- SCSI message system

General SCSI Bus Operation

This section discusses general SCSI bus operation.

> **Note:** The SCSI specification refers to tape libraries as "medium changers."

> **Note:** Tape drive commands are not discussed in this manual but can be found in the SCSI Interface chapter of the specific product manual.

Data Transfer

The L500 Series library supports asynchronous and synchronous data transfers. The product has differential- and single-ended versions. Odd parity is generated during all information transfer phases where the device writes data to the SCSI bus, and checked during all information transfer phases where data is read from the bus. Parity checking can be disabled.

Disconnects from the SCSI bus are done on operations that take significant amounts of time such as Move Media commands. This allows other devices to access the bus. This disconnecting is configurable by use of the Disconnect-Reconnect Mode Parameters page.

Initiator/Target Operation

The library does not act as an initiator on the SCSI bus. Therefore, the device does not:

- Generate unsolicited interrupts to the host
- Initiate its own SCSI commands
- Assert bus reset

SCSI IDs and Logical Unit Numbers (LUNs)

The library has one logical unit. The library always appears as LUN 0.

If the LUN specified in the Identify message is invalid, the library accepts the Command Descriptor Block (CDB). Unsupported LUNS are handled in one of three ways:

- If the command is Inquiry, the target returns the Inquiry data with the peripheral qualifier set to 011, indicating that the target does not support the LUN in question.
- If the command is Request Sense, the target returns sense data. The sense key is Illegal Request with an additional sense code of Invalid Logical Unit Number.
- For any other command, the target terminates the Check Condition status, and generates the above sense data.

Unit Attention Condition

Queued Unit Attentions are implemented on this device, and are maintained separately for each Initiator. Unit Attentions are created in the following circumstances:

- Power on
- Bus reset

- Bus device reset message
- Media may have changed asynchronously
- Another initiator changed the mode parameters

It is not unusual for a firmware (microcode) update to complete two queued Unit Attentions. The firmware has a limited number of Unit Attention buffers. If an initiator does not clear queued Unit Attentions, the library stops generating new Unit Attentions for that Initiator-LUN (I-L) combination at some point, but existing ones are left queued.

Behavior Around Power-On and SCSI Bus Reset

All device SCSI lines go to high impedance when the library is powered off.

The library does not generate any spurious signals on the SCSI bus at power-on.

Within 5 seconds of power on, and within 250 milliseconds (typically under 4 ms) after a Bus Reset, the library responds to SCSI bus selections and returns appropriate, normal, responses. Tape motion commands are returned with Check Condition status, Sense Key Not Ready, until the media has been made ready.

The Hard Bus Reset option is implemented.

The library recognizes multiple bus resets in succession and bus resets of arbitrarily long duration. It recovers within the time limits specified above, following the last bus reset.

Other SCSI Functionality

Linked commands and untagged queuing are supported.

Bus Phases

The library conforms to the bus state transition table shown in the SCSI-2 standard, “Phase Sequences.” The information in the following sections also applies.

Attention Signal Response

The library responds to an ATN condition at least at every phase transition, as long as the initiator sets the ATN bit before the target un-asserts the REQ for the last byte of the previous phase. Generally ATN is recognized immediately by the library, and it changes the bus phase to Message Out.

Status Phase

The library enters the status phase just once per command, unless the initiator requests a retry. The only exception is during error cases when the device goes immediately to bus free, as defined in the SCSI-2 standard.

Possible status bytes that the library may return are as follows:

- Good (00): This status indicates the library successfully completed the command.
- Check Condition (02): A contingent allegiance condition occurred. The Request Sense command should be sent following this status to determine the nature of the event.
- Busy (08): The target is busy. This status is returned whenever the device is unable to accept a command from an otherwise acceptable initiator. The initiator should reissue the command at a later time.
- Intermediate Good (10h): This status is returned instead of Good status for commands issued with the LINK bit set. Following the return of this status, the library proceeds to the Command phase for the transfer of the next linked command.
- Reservation Conflict (18h): This status is returned by the library whenever a SCSI device attempts to access the library when it has been reserved for another initiator with a Reserve Unit command.
- Command Terminated (22h): This status is returned for a command that was terminated by a “Terminate I/O Process” message. This status also indicates that a contingent allegiance condition has occurred.

The Test Unit Ready command is used to determine whether the library would accept, for example, a Move Medium or a Position to Element command without returning Check Condition status.

Bus Free

There are several situations when the device may go to Bus Free unexpectedly, as defined in the SCSI-2 standard (see sections 4.1.1 and 4.3):

- An internal hardware or firmware fault that makes it unsafe for the device to continue operation without a full reset (similar to a power-up reset)
- ATN asserted or bus parity error detected during non-tape data transfers

Bus Parity Errors

Bus parity errors (i.e. single bit errors) are very serious because they imply the possibility of undetected double-bit errors on the bus, which most likely would result in undetected data corruption. On properly configured SCSI buses, parity errors should be extremely rare. If any are detected, they should be addressed quickly by improving the configuration of the SCSI bus. A well configured SCSI system in a normal environment should be virtually free of bus parity errors.

Bus parity errors cause the library to either retry the operation, go to Status phase, or go to bus free and prepare Sense Data (see section 6.1.1 in the SCSI-2 specification). Retrying of parity errors during Data Out Phase when writing is normally not done, but can be enabled by changing the EnaParErrRetry parameter in the VU EEROM Mode Page. This feature is disabled by default due to negative impacts on device performance (also, the data stream on writes cannot be pipelined).

Chapter 5

Troubleshooting Guidelines

This chapter provides troubleshooting procedures for the L500 Series library including:

- Proper OCP operation
- Basic problems
- Operation failure
- Error conditions
- Power problems

Proper OCP Operation

Chapter 5 provides detailed Operator Control Panel (OCP) information. Note the following:

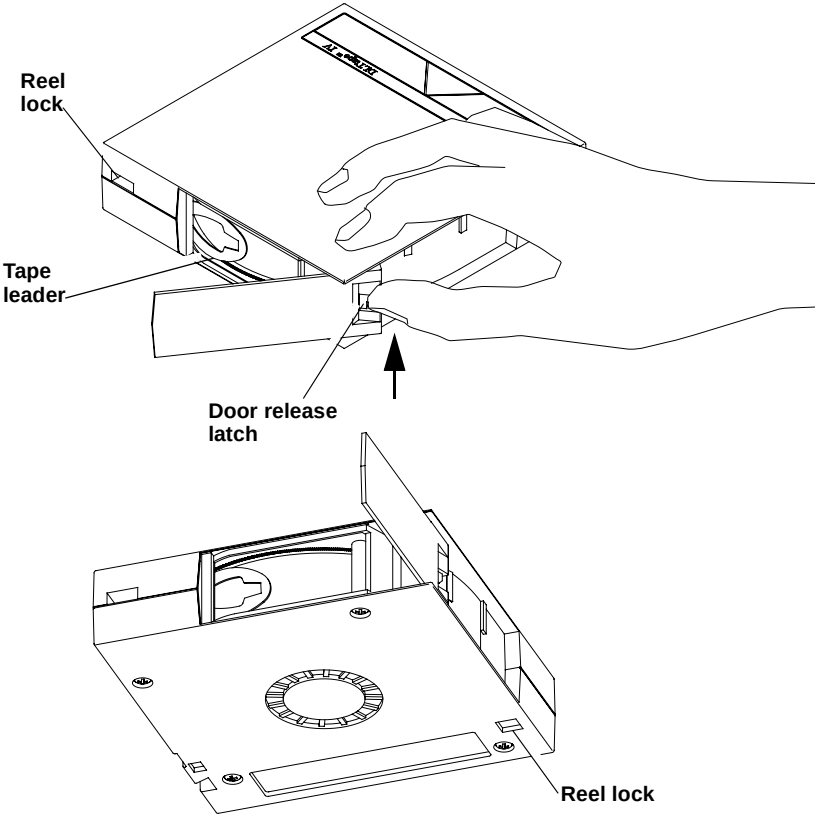
- Do not execute a menu function from the OCP when commands are being issued to the drive or library via the SCSI bus. Ensure there is no SCSI bus activity to the tape library or the drives. Doing so can result in operation failure or drive unavailability.
- Do not press the SELECT, PREVIOUS, NEXT, or ENTER buttons until backup or other tape operations are stopped at the terminal. Doing so can result in operation failure or drive unavailability.

Avoiding Basic Problems

Follow these guidelines when you operate the tape library to avoid problems:

- Do not touch the exposed magnetic tape. If the tape leader is not in the correct position, use a new cartridge.
- Check the tape leader in the cartridge by lifting the cartridge latch that opens the door, exposing the leader. Be sure the leader is in the position shown in figure 25.
- Be sure the receiver is fully closed and the current slot is correct for the starting cartridge.

Figure 25 Opening the Cartridge Door



Operation Failure

Some manual operations, if performed incorrectly, may cause write operations to fail. For example:

- Loading any write-protected cartridges when executing write operations
- Selecting the incorrect cartridge slot from which to initialize operations

If an error occurs, read the display to help determine the problem. Call your Quantum | ATL Customer Support representative.

Power Problems

If the OCP is not on, or your system does not recognize the library:

- Ensure that the power cord is firmly attached to both the library and the power outlet.
- Verify with your system manager that the tape library configuration is correct.

Appendix A

Library Specifications

This chapter provides the following about the L500 Series library:

- Physical specifications
- Performance specifications
- Power specifications
- Environmental specifications
- Vibration and shock specifications
- Electromagnetic interference (EMI) susceptibility
- ESD failure level limits
- Power distributed harmonics
- Acoustic noise emissions
- Regulatory requirements
- Drive reliability factors

Physical Specifications

Table 12 provides physical specifications for the rack-mount and tower versions of the library.

Table 12 Physical Specifications

Description	Rack-Mount	Tower
Height	7.0 inches (178 mm)	18.0 inches (457 mm)
Width	17.75 inches (450 mm)	10.5 inches (267 mm)
Length	20.0 inches (508 mm)	20.0 inches (508 mm)
Weight (loaded with 3 drives)	70 pounds (32 kg)	76 pounds (35 kg)

Performance Specifications

Performance specifications for the library are dependent upon data type, SCSI bus limitations and the system configuration. For drive performance specifications, refer to the specific tape drive product manual.

Power Specifications

Table 13 provides power specifications for the L500 series library.

Table 13 Power Specifications

Description	Range
Voltage	100-120 / 200-240 VAC
Frequency	50 Hz to 60 Hz
Amperage	1.6 A to 0.8 A
Power Consumption	140 W to 200 W (average running)

Environmental Specifications

The L500 library performs well in a normal temperature and humidity controlled office environment. Table 14 provides environmental specifications for the library.

Table 14 Environmental Specifications

Operating	
Temperature	10°C to 40°C (50°F to 104°F)
Relative humidity	20% to 80% noncondensing
Humidity gradient	10% / hour
Dry bulb temperature	10°C to 40°C (50°F to 104°F)
Wet bulb temperature	25°C (77°F)
Temperature gradient	11°C / hour (19.8° F / hour) across the range
Temperature shock	10°C (18° F) over two minutes
Altitude	-150 m to 9100 m (-500 ft. to 30,000 ft.)
Power-On (No tape in unit/unpacked for 72 hours)	
Relative humidity	10% to 90% non condensing
Humidity gradient	10% / hour
Temperature gradient	15°C / hour (27°F / hour) across the range
Temperature shock	15°C (27°F) over two minutes
Non-Operating	
Temperature	-40°C to 66°C (-40°F to 151°F)
Relative humidity	10% to 95% non condensing
Humidity gradient	10% / hour
Dry bulb temperature	-40°C to 66°C (-40 to 150.8°F)

Wet bulb temperature	46°C (115F)
Temperature gradient	20°C / hour with 5°C margin (36°F / hour with a 9°F margin) across the range
Temperature shock	15°C with 5°C margin (27°F with a 9°F margin) over two min.
Shipping	
Relative humidity	10% to 95% non condensing
Humidity gradient	10% / hour
Dry bulb temperature	-40°C to 66°C (-40°F to 151°F)
Wet bulb temperature	46°C (115°F)
Temperature gradient	25°C / hour with 5°C margin (45°F / hour with a 9°F margin) across the range
Temperature shock	15°C with 5°C margin (27°F with 9°F margin) over two min.

Operating Vibration and Shock Specifications

Table 15 Vibration Specifications (Operating)

Table 15 provides operating vibration specifications for the library; Table 16 provides operating shock specifications.

Operating		
Vibration Type	Sine	Sweep
Frequency range	5-500-5 Hz	Upward and downward sweep
Acceleration level	0.25 G	Between 22.14 Hz and 500 Hz
	0.010" DA	Between 5 Hz and 22.14 Hz (crossover)
Operating (overstress)		

Application	X, Y, and Z axes	Sweep rate; 1 octave per minute
Vibration Type	Sine	Sweep
Frequency range	5-500-5 Hz	Upward and downward sweep
Acceleration level	0.50 G	Between 31.2 Hz and 500 Hz
	0.010" DA	Between 5 Hz and 31.2 Hz (crossover)
Application	Vertical axis(top / bottom)	Sweep rate; 1 octave per minute

Table 16 Shock Specifications (Operating)

Operating	
Pulse shape	1/2 sine pulse
Peak acceleration	5 G
Duration	10 ms
Application	X, Y, and Z axes, once in each axis

Non-operating Vibration and Shock Specifications

Table 17 provides non-operating vibration specifications for the library; Table 18 provides non-operating shock specifications.

> **Note:** Non operating specifications do not include tape cartridge or magazine components.

Table 17 Vibration Specifications (Non-operating)

Non-operating (un-packaged)		
Vibration Type	Sine	Sweep
Frequency range	10-500-10 Hz	Upward and downward sweep
Acceleration level	1 G	10-500-10 Hz
Application	X, Y, and Z axes	Sweep rate; 1/2 octave per min.
Vibration type	Random vibration	
Frequency range	10-500 Hz, X, Y, and Z axes	
Vibration levels	2 G(rms) $_{in}$ X, Y, and Z axes	
PSD envelope	0.008 G^2 / Hz	

Nonoperating (packaged)	
Vibration type	Random vibration
Frequency range	5 to 300 Hz, vertical (Z); 5 to 200 Hz horizontal (X, Y)
Vibration levels	1.0 G(rms) in X, Y, and Z axes

Table 18 Shock Specifications (Non-operating)

Nonoperating (unpackaged)	
Pulse shape	½ sine pulse
Peak acceleration	75 G
Duration	2 ms
Application	X, Y, and Z axes once on two side faces and bottom
Nonoperating (repetitive/ packaged)	
Excitation type	Synchronous vertical motion; 1 in excursion
Shock (bounce) cycles	14,200 total
Application	Half cycles each in X and Y orientations; 7100 cycles in the X orientation, 7100 cycles in the Y orientation
Non-operating (drop/packaged)	
Test type	Drop shock
Drop height	18 inch
Application	10 drops total; 3 edges, 1 corner

Electromagnetic Interference (EMI) Susceptibility

Emission standards and limits are as follows:

EMI Emissions

- FCC Part 15B, Class A(US / Canada)
- EN55022, Class A / EN50082-1 (CE Mark)
- VCCI, Class A (Japan)
- AS / NZS 3548, Class A (Australia / New Zealand)

Conducted Emissions

Table 19 lists the conducted emission limits.

Table 19 Conducted Emission Limits

Frequency Range = 0.15 to 30 MHz	Limits dB Quasipeak	Average
0.15 to 0.050	79	66
0.50 to 30	73	60

Radiated Emissions

Table 20 lists the limits of radiated interference field strength, in the frequency range from 30 MHz to 1000 MHz at a test distance of 10 meters, for Class A equipment.

Table 20 Radiated Emissions (30 MHz to 1000 MHz)

Frequency Range = 30 MHz to 1000 MHz	Quasi-Peak Limit dB (uV/m) @ 10 meters
30 MHz to 230 MHz	40
230 MHz to 1000 MHz	47

Radiated Susceptibility

The radiated susceptibility limits for high frequency electric fields, 26 MHz to 1000 MHz, are:

- 3 V / m (rms) 80% modulated 1 kHz
- No errors, no screen distortion. S / W recoverable errors
- No hardware failure

The transient voltage is the actual peak voltage above the normal AC voltage from the power source.

The voltage limits for power and data cables are:

- 2 kV S / W recoverable errors
- No hardware failures

The power cable voltage limits are:

- 2.0 kV common mode (no errors allowed)
- 1.0 kV differential mode (S / W recoverable errors, no hardware failure)

ESD Failure Level Limits

Table 21 lists the ESD failure level limits for normal operator access areas.

Table 21 ESD Failure Level Limits

Failure Type	Equipment	Failure Level	Allowable Errors
Hard	Office	To 12 kV	No operator intervention (soft recoverable allowed)
Hardware	Office	To 15 kV	No component damage - operator intervention allowed (soft / hard errors allowed)

Power Distributed Harmonics

The library meets EN61000-4-3 and JEIDA power line emission requirements.

Acoustic Noise Emissions

Table 22 and Table 23 list the acoustic noise emission levels.

Table 22 Nominal Acoustic Noise Emissions

Acoustics - Declared Values per ISO9296 and ISO 7779/EN27779

Product	Sound Power Level			Sound Pressure Level		
	LwAd B			LpAm, dBA (bystander position)		
	Idle	Operate (Streaming)	Operate (Loading)	Idle	Operate (Streaming)	Operate (Loading)
TH6WF-ZZ	5.5	5.7	5.9	48	49	51

Current values for specific configurations are available from Quantum | ATL representatives.
1B = 10 dBA.

Table 23 Acoustic Noise Emissions for German Declaration Law

Schallemissionswerte - VorläufigeWerteangaben nach ISO 9296 und ISO 7779/DIN EN27779:

Gerfdt	Schalleistungspegel			Schalldruckpegel		
	LwAd B			LpAm, dBA (Zuschauerpositionen)		
	Leerauf	Betrieb (Streaming)	Betrieb (Loading)	Leerauf	Betrieb (Streaming)	Betrieb (Loading)
TH6WF-ZZ	5.5	5.7	5.9	48	49	51

Aktuelle Werte für Ausrüstungsstufen sind über die Quantum | ATL Equipment Vertretungen erhältlich.
1 B = 10 dBA

Reliability Factors

The mean interval between failures of the library unit, less the tape drives, is:

- 185,000 Power-On Hours (POH) Mean Time Between Failures (MTBF),

or

- 1,000,000 Mean Load / Unload Cycles Between Failures (MCBF),

where a failure is charged against one or the other, but not both.

Quantum | ATL does not warrant that predicted mean interval between failures is representative of any particular unit installed for customer use. Actual figures vary from unit to unit.

Appendix B

OCP Error Messages and Error Definitions

Table 24 lists the OCP Error messages, descriptions, and recommended operator actions.

Table 24 OCP Error Messages

OCP Display	Description	Recommended Operator Action
`Drive Stuck in Flux`	This indicates that the drive power during initialization exceeded the timeout allowed for that operation. The drive was still in the "Flux" state when the timeout occurred.	Unload drive and retry the operation. If the operation fails again, contact an authorized field service engineer.
`Cartridge Fault Door Unlocked`	The initial scan of the magazine slots and the tape drives indicates that there are more cartridges in the system than there are slots to store them.	Remove excess cartridges.
`Remove Cart from CHM`	This indicates that the unit detected either too many cartridges in the system or a homeless cartridge was found in the CHM.	Remove excess cartridges and restart.

OCP Display	Description	Recommended Operator Action
Drv x In Flux or Drv x HwError or Doors Unlocked	These error messages appear when the OCP is used to initiate a system test routine. Each message indicates a reason why the test can not be initiated.	Correct problem and retry.
LDR ERR: <x> or DLC ERR: <x>	The error code was returned by the loader process. Error code descriptions are listed in “Library Error Definitions” on page -86.	
DRIVE ERROR!	An error occured communicating with the tape drive(s).	
Cleaning FAILED	The attempted cleaning cycle failed.	Check for a valid cleaning cartridge in the required slot and that the cleaning cartridge has not expired.
CLN slot Empty	A cleaning cartridge was not found in the required slot (highest numbered slot in unit).	Insert cleaning cartridge in the highest numbered slot in the unit and retry the operation.
CLN Tape Expired	The cleaning cycle was not completed because the cleaning cartridge has expired.	Replace the cleaning cartridge.

OCP Display	Description	Recommended Operator Action
NOT a CLN Tape	The cartridge in the cleaning slot is not a cleaning cartridge.	Insert a cleaning cartridge in the cleaning slot.
CUP FAILED! CUP Timeout	The requested Code Update operation failed and the unit timed out during the code update process.	Retry the operation. If the operation fails again, contact an authorized field service engineer.
Ldr/Drv Timeout In Retry	The command aborted after the maximum number of retries was exceeded.	Cycle the library power and try the operation again. If the operation fails again, contact an authorized field service engineer.
Loader Timeout In Retry	The command aborted after maximum number of retries was exceeded.	Cycle the library power and try the operation again. If the operation fails again, contact an authorized field service engineer.
Prepos Timeout In Retry	The command aborted after maximum number of retries was exceeded trying to preposition the CHM.	Cycle the library power and try the operation again. If the operation fails again, contact an authorized field service engineer.
** Ldr Err <xx> *** Attention Needed	An error code xx was returned from the loader. If the command was severe, the doors will unlock and "Attention Needed" is appended to the error message.	See "Library Error Definitions" on page -86 for a description of error codes and the appropriate actions.

Table 25 lists the error code, error type, and descriptions.

Table 25 Library Error Definitions

Error Code	Error Type	Description
80H		This status indicates no error has occurred.
81H	Fatal	Invalid command error. This error indicates that the loader received an undefined command or an invalid parameter to a command.
82H	Fatal	Undefined error code.
83H	Fatal	Undefined error code.
84H	Not Fatal	A cartridge is in transit after a reset or power up. This error will occur whenever a power-cycle or reset occurs during a move. The loader controller will insure that the cartridge is fully loaded into the CHM and will then proceed with power-on self-test. The library controller will be responsible for initiating the CHM to move the cartridge either to its home location, if known, or to the drive before issuing the EXTENDED SCAN MAGAZINE command.
85H	Fatal	Did not find pusher home position during mechanical initialization.
86H	Fatal	Did not find PUSHPOS 1 during mechanical initialization.
87H	Fatal	Timed-out while moving a cartridge into or out of the CHM during mechanical initialization.

Error Code	Error Type	Description
88H	Fatal	Timed-out while finding the CHM's home position during mechanical initialization.
89H	Fatal	Timed-out while attempting to find PUSHPOS 2 during mechanical initialization.
8AH	Fatal	Did not leave DRIVPOS during mechanical initialization.
8BH	Fatal	No drive handle installed, or timed-out while closing the drives handle during mechanical initialization.
8CH	Fatal	Timed-out during pusher test - did not leave home position.
8DH	Fatal	Timed-out during pusher test to find pusher home position.
8EH	Fatal	Timed-out during pusher test or while at CHM home position leaving pusher home position while moving, towards PUSHPOS2.
8FH	Fatal	Undefined error code.
90H	Fatal	No cartridge was present in the drive during a cartridge unload.
91H	Retry command	Timed-out while attempting to find PUSHPOS 1 (Position in front of the drive before unloading a cartridge from drive onto the CHM).

Error Code	Error Type	Description
92H	Retry command	Timed-out opening drive handle during cartridge unloads. The library controller determines if the drive is still in unloaded state after receiving this error code. If the drive is still in the unloaded state, then reissuing the command can retry the command. If the drive is not still in the unloaded state, then another unload command must be issued to the drive prior to retrying this command.
93H	Reissue command for retry	Timed-out attempting to find the pusher home position during a cartridge unload.
94H	Reissue command for retry	Timed-out while moving a cartridge from the drive onto the CHM. If this error occurs, the loader controller will try to move the cartridge back into the drive. Note that receipt of this error code implies the cartridge has been put back into the drive.
95H	Retry command	Timed-out while moving the CHM from the drive load position to the slot position during a cartridge unloads. The command can be retried by issuing a SCAN MAGAZINE command followed by reissuing the UNLOAD command.
96H	Reissue command for retry	Timed-out finding PUSHPOS 1 during a cartridge unload.

Error Code	Error Type	Description
97H	Reissue command for retry if error occurs as part of UNLOAD command.	Timed-out while unloading a cartridge into a slot during a cartridge unload. This error can also occur during an EXTENDED SCAN MAGAZINE command. If it does occur during an EXTENDED SCAN MAGAZINE, it means a cartridge that was in the magazine, is now on the CHM. To recover from this, a SCAN MAGAZINE should be issued followed by an UNLOAD command.
98H	Recoverable by issuing a SCAN MAGAZINE command.	Timed-out while attempting to find the pusher home position during a cartridge unload. This error actually occurred after the cartridge was successfully placed back into the magazine so the move is effectively completed.
99H	Retry command	Timed-out while moving the CHM to DRIVPOS during a cartridge unload. This error can be retried by issuing a SCAN MAGAZINE followed by reissuing the UNLOAD command.
9AH	Retry command	Timed-out finding PUSHPOS 2 during a cartridge unload command.
9BH	Retry command	Could not unlock the door during an unlock door command.
9CH	Retry command	Did not find all valid slot positions during a SCAN MAGAZINE command.
9DH	Reissue command for retry	Timed-out did not leave cartridge type window during a SCAN MAGAZINE command.

Error Code	Error Type	Description
9EH	Retry command	Timed-out leaving DRIVPOS during a SCAN MAGAZINE command.
9FH	Retry command	Could not lock the door during a door lock command or during a scan command if door is unlocked.
A0H	Fatal	Cartridge already in drive during a LOAD CARTRIDGE command.
A1H	Fatal	No cartridge in the selected slot during a LOAD CARTRIDGE command.
A2H	See Description	Timed-out while moving CHM to slot position during a LOAD CARTRIDGE command. This error can be retried by issuing a SCAN MAGAZINE command, followed by reissuing the LOAD CARTRIDGE command.
A3H	Reissue command for retry	Timed-out attempting to find the PUSHPOS 1 during LOAD CARTRIDGE command.
A4H	Retry command	Timed-out moving cartridge from the slot onto the CHM during a LOAD CARTRIDGE command.
A5H	Retry command	Timed-out finding pusher home position during LOAD CARTRIDGE command.
A6H	See Description	Timed-out moving the CHM to drive-load position during a LOAD CARTRIDGE command. This error can be retried by issuing a SCAN MAGAZINE command, followed by reissuing the LOAD CARTRIDGE command.

Error Code	Error Type	Description
A7H	Retry command	Timed-out while opening the drives handle during a LOAD CARTRIDGE command.
A8H	See Description	Timed-out moving cartridge from the CHM into the drive during a LOAD CARTRIDGE command. If this occurs as the only error, then this error can be retried. The drive controller must first unload the cartridge from the drive. Then it can reissue the command. If this error occurs as the second error after either a 94H or an A9H error, then this error is considered fatal.
A9H	Retry command	Timed-out while attempting to find PUSHPOS 2 to push cartridge completely into the drive during a LOAD CARTRIDGE command.
AAH		This code is not an error and will never be returned in the status error bytes. It is utilized in the error trace buffer as an indicator every time a thousand cycles has occurred.
ABH	See Description	Timed-out finding PUSHPOS 1 (rack waiting position in front of the drive). This error can be retried. The library controller must first unload the cartridge from the drive then, reissue the command.
ACH	Retry command	Timed-out closing drive handle. This error can occur during a LOAD CARTRIDGE command or after error 94 if the loader controller tries to move the cartridge back into the drive.

Error Code	Error Type	Description
ADH	Fatal	Timed-out leaving drive load position to move to drive park position.
AEH	Fatal	Timed-out while moving a cartridge back into a slot after error A4. This error could only happen if the loader controller tries to move a cartridge from the slot onto the CHM and it fails. The loader controller would then try to move the cartridge back into the slot. If that fails, this error is generated.
AFH	Fatal	Undefined error code.
B0H	Fatal	Undefined error code.
B1H	Fatal	Stand-alone mode.
B2H	See Description	Door open without getting a command. After power up this command can occur as the loader remembers the state of the door. This is an informational type error and does not require recovery.
B3H	See Description	Unit was reset or powered up. This is an informational type error and does not require recovery.
B4H	See Description	Timed-out while prepositioning the CHM during a prepositioning command. This command can be retried by issuing a SCAN MAGAZINE command followed by reissuing the PREPOSITION command.

Error Code	Error Type	Description
B5H	See Description	Did not find all expected slots during a CHM movement. This error can occur during a load or unload of a cartridge or a PREPOSITION command. This error can be retried by issuing a SCAN MAGAZINE command, followed by reissuing the original command.
B6H	Reissue Operate Handle command for retry	Timed-out while opening the drive handle, after operate handle command was received.
B7H	Fatal	UART test failure.
B8H	Reissue Operate Handle command for retry	Timed-out while closing the drive handle after operate handle command was received.
B9H	Fatal	Undefined error code.
BAH	Fatal	Undefined error code.
BBH	Fatal	RAM error.
BCH	Fatal	ROM error.
BDH	Fatal	CTC error.
BEH	Fatal	Undefined error code.
BFH	Fatal	Undefined error code.

Appendix C

Regulatory Statements

FCC STATEMENT

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 the instruction manual, may cause harmful interference to radio communications.

Any changes or modifications made to this equipment may void the user's authority to operate this equipment.

Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

INDUSTRY CANADA (DIGITAL APPARATUS) Interference-Causing Equipment Standard ICES-003 Issue 2

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

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

CISPR-22 WARNING!

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

ACHTUNG!

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmassnahmen verantwortlich ist.

ATTENTION!

Ceci est un produit de classe A. Dans un environment domestique, ce produit peut causer des interférences radioélectriques. Il appartient alors à l'utilisateur de prendre les mesures appropriées.

NOTICE FOR USA AND CANADA ONLY

If shipped to USA, use the UL LISTED power cord specified below for 100-120 V operation. If shipped to Canada, use the CSA CERTIFIED power cord specified below for 100-120V operation.

Plug Cap	Parallel blade with ground pin (NEMA 5-15P configuration)

Cord	Type: SJT, three 16 AWG (1.5 mm^2) or 18 AWG (1.0 mm^2) wires
Length	Maximum 15 feet (4.5m)
Rating	Minimum 10 A, 125 V

ATTENTION

LIRE LA REMARQUE DANS LE MODE D'EMPLOI.

REMARQUE

CETTE REMARQUE NE CONCERNE QUE LES ÉTATS-UNIS ET LE CANADA.

En cas d'envoi aux États-Unis, utiliser le cordon d'alimentation CERTIFIÉ UL et convenant pour 100-120 V.

En cas d'envoi au Canada, utiliser le cordon d'alimentation CERTIFIÉ CSA et convenant pour 100-120 V.

Fiche	Broches parallèles avec une broche de mise à la terre (configuration NEMA 5-15P)
Cordon	Type: SJT, trifilaire 16 AWG (1.5 mm^2) ou 18 AWG (1.0 mm^2)
Longeur	Maximum 15 pieds (4.5m)
Capacité	Minimum 10 A, 125 V

Quantum | ATL

DECLARATION OF CONFORMITY

According to EN45014

Manufacturer's Name: Quantum|ATL

Manufacturer's Address: 141 Innovation Drive
Irvine, CA 92612-3040
USA

Declares that the Product(s):

Product Description	Tape Cartridge Library
Product Name:	PowerStor L500
Model Number(s):	L500
Product Options:	All

Conforms to the following EC Directives and EC Standards:

Low Voltage Directive 73/23/EEC
Product Safety: EN60950:1992, + A1, A2, A3, A4, A11

EMC Directive 89/336/EEC
EMC:
EN55022:1998, Class A
EN61000-3-2:1995, Class A
EN61000-3-3:1994
EN55024:1998
EN61000-4-2:1995
EN61000-4-3:1995
EN61000-4-4:1994
EN61000-4-5:1994
EN61000-4-6:1996
EN61000-4-8:1993
EN61000-4-11:1994

Authorizing Signature:

Mitchell Gilbert
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Date Issued: 02/20/2001

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CE

Glossary

A

Access time The interval between the time a request for data is made by the system and the time the data is available from the drive.

Actuators Robotic components inside the library that move cartridges.

Archiving The tape library provides long-term storage of important information on magnetic tape. DLTtape media has a 30-year shelf-life.

AutoClean A user-defined mode in which the library automatically performs drive cleaning tasks as needed.

Autoload A user-defined mode in which the library automatically moves cartridges in the load port to empty storage bins as soon as the load port door is closed.

C

CHM The Cartridge Handling Mechanism, also referred to as the elevator, or robot, is the means for transporting tape cartridges.

B

Backward compatibility The ability of a product to work with previous versions of a product. All DLT tape drives are backward compatible: they can read data written on previous generations of DLT drives. See *scalability.*

Bar code label The identification label on DLT tape cartridges.

Bar code scanner A laser or LED device that is mounted inside the library that reads the cartridge bar code labels.

F

FCC Class A Standard established by the U.S. Federal Communications Commission governing electromagnetic emissions in a commercial environment.

FSE Field Service Engineer.

H

Host *or* host computer The computer that issues SCSI commands to control the library robotics.

M

MTBF Mean Time Between Failures.

MTTR Mean Time To Repair.

N

Native mode The uncompressed storage capacity of a tape subsystem. A DLT7000 tape drive can store 35 GB in native mode and 70 GB with 2:1 compression.

NVRAM Nonvolatile random access memory.

O

Off-line Ready for communication with a diagnostic computer.

On-line Ready for communications with a host.

P

Password A sequence of characters used to gain access to the protected portions of the computer system.

Pick The act of removing a cartridge from one location in preparation for placing it in another location.

Place The act of placing a cartridge in a location after it has been picked from another location.

PROM Programmable Read-Only Memory.

R

RAM Random Access Memory.

RS-232 A serial communications cabling and protocol standard for 9-pin connectors.

RS-422 A serial communications cabling and protocol standard designed to replace the older RS-232 standard that supports higher

data rates and greater immunity to electrical interference. RS-422 supports multipoint connections.

S

Scalability The capability provided by the DLT tape drive family to read tapes from previous generations of drives. Allows users to upgrade to a faster, higher capacity DLT drive, yet still be able to read tape recorded on an older system. Often referred to as *backward compatibility*.

SCSI Small Computer System Interface, a communications standard for attaching peripheral equipment to computers.

Self-cleaning head All DLT tape drive have self-cleaning heads that continuously wipe the tape clean as it passes over the head.

T

Tape drive The mechanism that reads and writes data from and to a tape cartridge.

U

UL Underwriters Laboratories.

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