# QUALSTAR®

# RLS-8350/85XX Series Tape Library

Installation and Operation Manual

# Important Manual/Firmware Revision Information

This manual and the operating firmware for the RLS family of tape library systems are revised periodically as the product is improved. This manual was revised to correspond with the firmware version indicated below. Check with Qualstar Technical Support about use of this manual with older or newer firmware.

| Manual | Corresponding Firmware |
|---|---|
| RLS-8350/85XX Series Tape Library Installation and Operation Manual 511000 Rev. K, Revised 30 Jan 2018 | RLS Firmware 700191 Version 147 |

## Copyright Notice

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# Notices

Qualstar products are covered by one or more of the following U.S. patents: 6,163,139 and 6,560,061. Other patents pending.

Qualstar equipment is manufactured from new parts, or new and used parts. In some cases, Qualstar equipment may not be new and may have been previously installed. Regardless, Qualstar's warranty terms apply unless the equipment is specifically identified by Qualstar as "used" or "refurbished".

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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Shielded cables are required for this device to comply with FCC Rules. Use shielded cables when connecting this device to others.

## European Union Directive 89/336/EEC and Standard EN55022 (Electromagnetic Compatibility)

> **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.

## European Directive on Waste Electrical and Electronic Equipment (WEEE)

Qualstar encourages its customers to use current recycling practices in order to reduce the burden that waste electronic products place on the environment.

If you are retiring a fully functional tape library, you are encouraged to transfer the functional unit to a new user, thereby extending the useful life of the tape library. The manufacture of all products requires the consumption of energy. By extending the life of the tape library, energy is conserved.

In accordance with environmental directives that are being implemented in many countries (refer to the European Directive on Waste Electrical and Electronic Equipment - WEEE) Qualstar provides customers with "End of Life Instructions" that identify the process for recycling the materials and components that make up a Qualstar tape library.

# End of Life Instructions

## Tools required

- P1 and P2 Phillips head screwdrivers
- Hex head (Allen) wrench/driver set
- 1/4-inch hex nut driver

## Items recyclable using conventional methods

- **Aluminum:** Vertical bars on robot, chassis
- **Stainless steel:** Robot guide rods
- **Steel:** Fasteners
- **Plastic:** Window, front panels, cartridge slots
- **Copper:** Internal wiring, motors, shield around display
- **Paper:** Manuals

## Items requiring special disposal due to lead-based solder

- **Printed Circuit Boards:** Controller, numerous miscellaneous small printed circuit boards

## Items that may have salvage or resale value

- Tape drives

# Reduction of Hazardous Substances (RoHS)

Qualstar is committed to the implementation of RoHS (Restriction of the use of certain hazardous substances in electrical and electronic equipment) in accordance with the European Directive. The effectivity date for compliance is July 1, 2006, at which time Qualstar will certify that its Tape Library products are compliant with the RoHS standard. With the exception of Lead Based Solder, Qualstar will certify that its products are free of all other substances listed in the Directive.

Qualstar Tape Libraries fall under the category of "Information Technology Storage Array Systems" for which the RoHS Directive provides for a lead solder exemption. Insofar as lead free solders are new to the electronics industry and no quality or

reliability data is available, Qualstar will invoke the lead based solder exemption until such time as industry data verifies that lead free solders are capable of meeting or exceeding the documented reliability and quality standards achieved with lead based solders.

Until such time as Qualstar replaces lead based solder with lead free solder, effected subassemblies must be disposed of appropriately.

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# Table of Contents

# 1.                                              Introduction

## 1.1    Who Should Read This Manual

This manual covers the Qualstar RLS-8350/85XX Series tape library systems. The common product reference is RLS or library. Where model differences require separate treatment exceptions are noted specifically. For clarity and compliance with the SCSI specification, the library control interface of the RLS is defined as a "Medium-changer" and alternately referred to throughout this manual as the "changer".

This Installation and Operation Manual is written for the RLS installer, the system administrator and the user/operator. This manual includes instructions on unpacking, installation, configuration and operation. Also included are preventive maintenance procedures and repacking instructions, in case it ever becomes necessary to transport the unit.

For information about the SCSI interface, or other information outside the scope of this manual, please refer to the appropriate documents listed below.

| Subject | Document | Qualstar Document Number |
|---|---|---|
| Specifications | RLS-8500 Tape Library Product Spec | 511001 |
| Specifications | RLS-8350 Tape Library Product Spec | 511002 |
| Service | RLS-8350/85XX Series Tape Library Technical Service Manual | 501510 |
| Approved Data Cartridges | Product Information Note | PIN-038 |
| Barcode Label Specifications | Product Information Note | PIN-040 |
| SCSI Medium-changer Information | RLS SCSI-2 Interface Reference | 501551 |
| SCSI-2 Specification | ANSI X3.131-1994 | N/A |
| SCSI SPI-3 Specification | NCITS T10 Project 1302D | N/A |
| SCSI-1 | ANSI X3.131-1986 | N/A |
| SCSI-2 | ANSI X3.131-1994 | N/A |
| SCSI Parallel Interface-2 Specification (SPI-2) | ANSI X3.302-1998 | N/A |
| SCSI Architecture Model-2 (SAM-2) | ANSI INCITS 366-2003 | N/A |
| SCSI-3 Primary Commands (SPC) | ANSI X3.301-1997 | N/A |
| SCSI-3 Primary Commands - 2 (SPC-2) | ANSI INCITS 351-2001 | N/A |
| SCSI-3 Primary Commands - 3 (SPC-3) | ANSI INCITS 408-2005 | N/A |
| SCSI-3 Media Changer Commands (SMC) | ANSI INCITS 314-1998 [R2003] | N/A |

| | | |
|---|---|---|
| Automation/Drive Interface - Transport Protocol (ADI) | ANSI INCITS 406-2005 | N/A |
| Automation/Drive Interface - Commands (ADI) | ANSI INCITS 403-2005 | N/A |

Table 1-1   Applicable Documents

Although Qualstar has made every effort to insure the accuracy of the information contained in this manual, no guarantee is expressed nor implied that the manual is error-free. Qualstar reserves the right to make changes at any time without prior notification.

The Qualstar RLS is a sophisticated, state-of-the-art computer peripheral. It should only be serviced by an authorized service technician who is experienced with the operation and maintenance of tape libraries, and only after reading and understanding this manual and the RLS-8350/85XX Series Tape Library Technical Service Manual.

## 1.2   Important Safety Information

All of the operating instructions and maintenance procedures in Qualstar manuals must be followed to prevent personal injury or damage to the equipment. In the interests of safety, there are two kinds of warnings used in Qualstar documents, as shown below.

### DANGER

PERSONAL INJURY MAY RESULT IF YOU DO NOT FULLY COMPLY WITH THE HANDLING, OPERATING, OR SERVICE INSTRUCTIONS FOUND IN A DANGER PARAGRAPH.

### GEFAHR

UNSACHGEMAESSE BENUTZUNG, BEDLENUNG ODER RAPARATUR AUFGRUND VON NICHTBEACHTUNG DER SICHERHEITSANWEISUNG KANN ZU VERIETZUNGEN FUEHREN.

## CAUTION

EQUIPMENT DAMAGE OR LOSS OF DATA may result if you do not fully comply with the handling, operating, or service instructions found in a CAUTION paragraph.

In addition, useful information and tips may be found throughout the document in the following formats:

## NOTE

SPECIAL ATTENTION to explanatory statements found in a NOTE paragraph will help you avoid mistakes and/or save time.

## NOTICE

A NOTICE box contains additional important information not covered by the other three types of special text: DANGER, CAUTION, or NOTE.

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# 2. Product Description

## 2.1 General Description

The RLS Series is a high density, automated rack-mountable tape library using LTO tape technology. The RLS-85XX libraries are 10 rack-units tall (10U = 17.50-inches) while the RLS-8350 models are 6 rack-units tall (6U = 10.50-inches).

Models are available with native storage capacities of over 285 terabytes. The entire system (drives and library) is under host control via the ADI host interface.

Each library contains a high performance robotics system for handling data cartridges, one to seven (model dependent) LTO 5, LTO 6, LTO7, or LTO8 SAS or Fibre Channel tape drives and storage slots for data cartridges. All units operate on internationally available AC power with active power factor correction.

The RLS Series is designed for maximum reliability. Only the highest quality components are used in a design that is inherently robust and simple. Brushless motors are used exclusively to effect smooth and reliable operations. All digital, closed-loop servo systems using magnetic and optical position sensors assure fast, smooth, trouble-free cartridge handling. The servos automatically calibrate themselves, thus eliminating all electrical adjustments. Preventive maintenance consists of replacing the air filter(s) and cleaning the gripper pads.

## 2.2 Standard Features Found in All Models

- Library interface to the application is established, via ADI, (Automation/Drive Interface) through the tape drive's interface

- Barcode scanning of data cartridge labels

- Rack mount kit

- Simultaneous Random and Multi-Sequential operating modes with two or more tape drives

- Library resources may be partitioned

- Multiple initiators may simultaneously connect to a single partition

- The front panel has a window for visibility into the interior

- Interior illumination

- Color touch screen Control Panel

- Easy-to-use menu system for configuration, operation and maintenance

- Tape drives are in quick-change hot swappable carriers

- Programmable, automated tape drive cleaning

- Maintenance-friendly by design: no adjustments, quick-swap drives, hot-swap power supply modules

- Filtered, forced-air cooling of library and tape drives provided by redundant fans and front replaceable air filter(s)

- Universal input power rating (100- to 240-VAC, 50/60 Hz)

- Power Factor Corrected (PFC) power system is efficient and fully CE compliant

## 2.3    Optional Features Available

- N+1, hot-swappable power supply modules

- FastPass™ elevator expansion option, which allows up to four RLS-85XX libraries to be interconnected or one RLS-8350 may be connected to up to three RLS-85XX libraries.

- Right side Storage Matrix – adds 60 slots, or 54 if the optional I/O port is also added to the RLS-8560 model.

- Additional I/O port in right side Storage Matrix for RLS-85XX models only.

## 2.4 Models



| FEATURE/MODEL | RLS-8350 | RLS-8560 | RLS-85120 |
|---|---|---|---|
| Tape Technology | LTO 5, 6, 7 or 8 | LTO 5, 6, 7 or 8 | LTO 5, 6, 7 or 8 |
| Maximum Number of Drives | 4 | 7 | 7 |
| Standard Number of Slots | 50 | 54 | 114 |
| Maximum Number of Slots | 50 | 114▯ | 114▯ |
| Standard I/O Ports | 1 | 1 | 1 |
| Optional I/O Ports | 0 | 1▯ | 1▯ |
| Cartridges per I/O Port | 4 | 4 | 4 |
| Barcode Reader | Standard | Standard | Standard |
| Hot-swap Tape Drive Carriers | Standard | Standard | Standard |
| N+1, Hot-Swappable Power Supply Modules | Optional | Optional | Optional |
| FastPass Elevator Expansion option | Optional | Optional | Optional |

▯ Includes right side Storage Matrix without I/O port
▯ Includes left side Storage Matrix with I/O port
▯ Subtracts six data slots

Table 2-1   RLS-8350/85XX Models, Features and Options

### NOTE

If the RLS-8350 is expanded, the maximum number of drives is reduced to 3. If the RLS-85XX is expanded, the maximum number of drives in each cabinet is reduced to 6 if the cabinet is on the top or bottom, and 5 if the cabinet is in the middle.

## 2.5　Major Features

### 2.5.1　Cabinet

The cabinet provides easy access for upgrades and field service while the library is installed in a standard 19" equipment rack. Tape drives and Power Supply Modules (PSMs) all plug into the rear of the library, providing all power and data connections. The User Interface Control Panel and the Robotics can be removed and replaced without removing the cabinet from the 19" rack.

### 2.5.2　Front Panel Components

The library's functions can be controlled through the Control Panel. I/O Ports are unlatched by the robot using the Control Panel, remote management or host interface. Bulk loading can be accomplished by removing the right or left storage matrix. Figure 2-1 shows the various features of the front panel. The library may be configured to continue operation while either of the I/O Port(s) is extended.
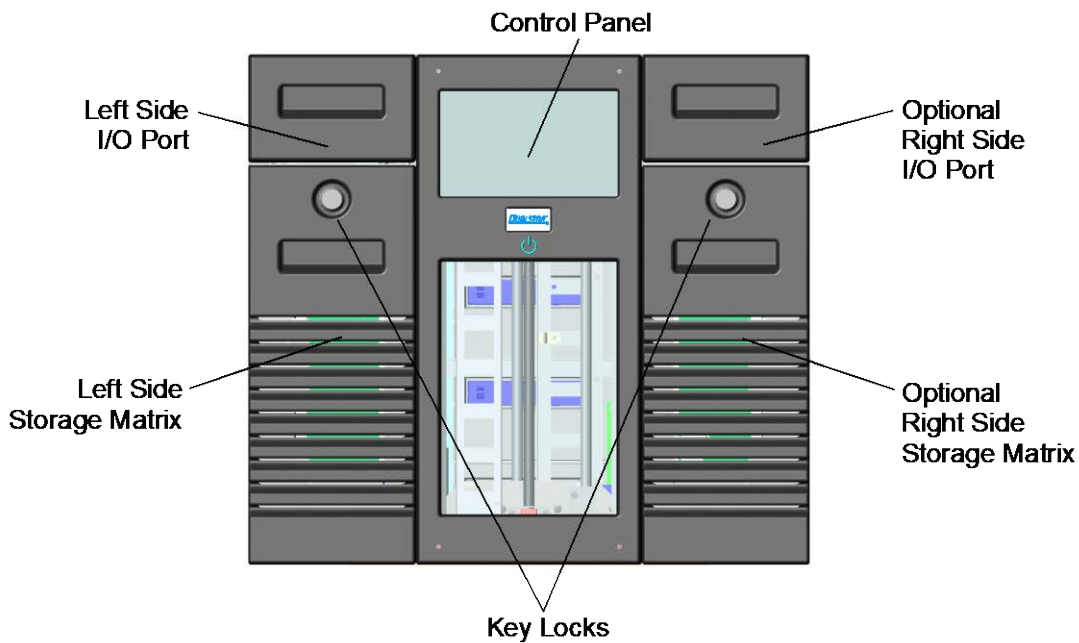


Figure 2-1　RLS-85XX Front Panel Details

#### 2.5.2.1　Control Panel

The Control Panel is a color LCD with LED backlight and touch screen. The operator may use the Control Panel menus to configure and operate the RLS and monitor its status. The following information is an example of what can be displayed:

- Model information and firmware revisions

- Extensive menu system for configuration, maintenance and operation

- Operational status (indicates all active cartridge movements)

- History log which stores the most recent commands and status

- Error conditions

- Library partition information

- Inventory information

### 2.5.2.2    I/O Port

The operator gains access to the media by unlatching the I/O Port through the Control Panel and then manually extending the I/O Port. When closed, the I/O Port is locked electronically. Once extended, four cartridges may be removed or inserted. The library status may be configured to be "not ready" when the I/O Port is extended. Under this configuration, while the I/O Port is open, the RLS can respond to a host interface command with a busy status, a not ready status or it can accept the command and wait for door closure to complete the command.



Figure 2-2    I/O Port Extended

### 2.5.2.3    Security

The storage matrix must be secured with a key operated lock for the library to operate.

### 2.5.2.4    Power Switch and Indicator

The library's power status is indicated by a blue LED Power Indicator button on the front of the library that illuminates when the power is applied. Standby/Soft-power is controlled by a switch located inside the LED Power Indicator button. During standby mode the center of the button flashes blue at the rate of one blink approximately every two seconds. During power on mode the button is fully illuminated.

The primary power for the library is controlled by a rocker switch located on the rear panel.

## 2.5.3    Rear Panel Components



Control Electronics

Expansion Card Slots

Power Supply Modules

Tape Drives

Power Inlet, Line Fuse and Rocker Switch
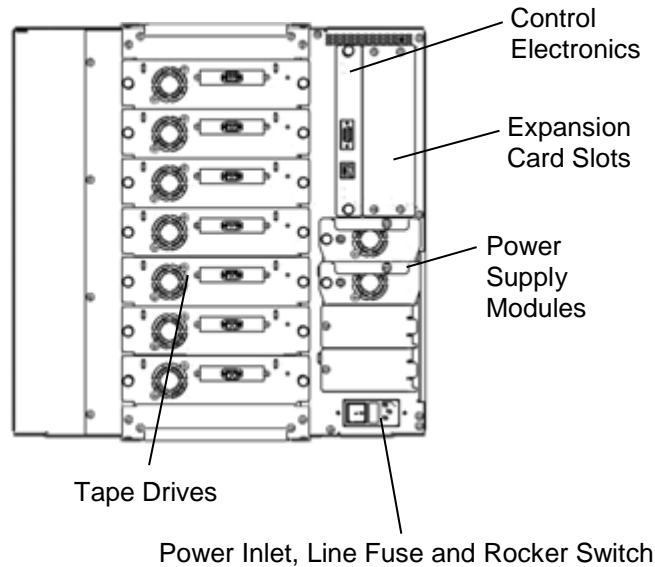
Figure 2-3   RLS-85XX Rear Panel Details

### 2.5.3.1  N+1 Power Option

The RLS libraries have a distributed power system. The RLS-85XX models can have up to four power supply modules (PSM), which accommodate a range of power requirements. The RLS-8350 models can accommodate a maximum of two PSM's. The N+1 Option adds an extra module, ensuring system redundancy.

The PSMs operate in parallel, sharing the load. This reduces the stress on the individual power supplies and greatly extends their service life. When the N+1 Option is installed, the library will continue to operate if one module fails. The remaining power supply module or modules will power the RLS indefinitely. The library and tape drives will continue to function, uninterrupted by the failure and subsequent replacement of the failed PSM. A green "Power Good" LED indicates that a PSM is operating properly.

All PSMs supply regulated 24-volts DC to the RLS-8350/85XX. The unit is powered from AC mains of 100- to 240-volts, 50 or 60 Hertz.
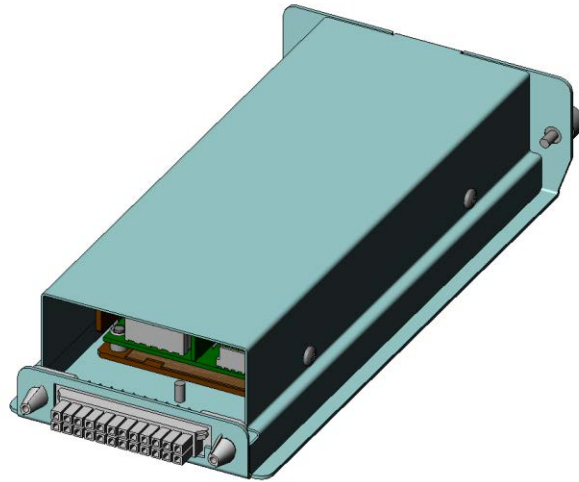
Figure 2-4   Power Supply Module (PSM)

## 2.5.4    Medium-changer Components



I/O Port

Tape Drives

Storage Slots

Robotics
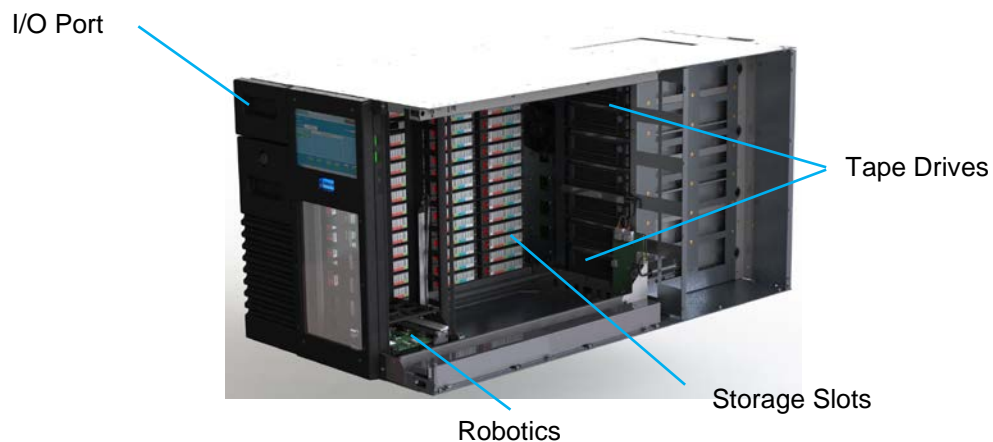
Figure 2-5   RLS Components (RLS-85XX shown)

### 2.5.4.1    Storage Slots

Each RLS model utilizes a left and right fixed matrix of storage slots. The RLS-85XX models contains up to 60 cartridges on the right side and 54 on the left. The RLS-8350 contains up to 28 cartridges on the right side and 22 on the left. The storage matrices may be removed from the unit for bulk loading or removal of cartridges.

Figure 2-6   Left Storage Matrix Extended (RLS-85XX shown)

### 2.5.4.2    Tape Drives

The RLS-85XX Series library accommodates up to seven tape drives while the RLS-8350 contains a maximum of four tape drives. The drives are housed in plug-in drive carriers that may be installed or removed while the other drives within the unit are operating. A microprocessor in the drive carrier communicates with the tape drive via its supervisory port to ascertain its model, serial number and operational status. This information is immediately uploaded to the executive processor and is available to the host computer whenever a new drive is plugged-in. The drive's world-wide name is set to the RLS menu values as soon as power is applied. Any tape drive may be inserted or removed while the others are running. A drive can be changed within a minute and no tools are required. Blank filler panels must be installed at each vacant tape drive location.
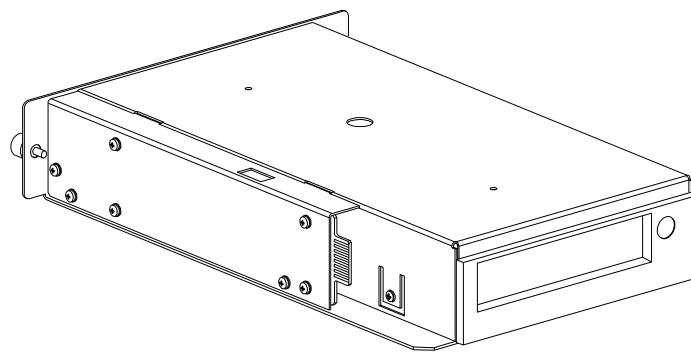


RLS-8350/85XX Series Tape Drive Assembly

Figure 2-7   Tape Drive Assembly

### 2.5.4.3    Robotics

The RLS utilizes a four-axis robotic cartridge handling system that moves cartridges between the storage slots and the tape drives. All axes are driven by brushless DC motors. The motors move the linear axes with precision lead screws driven by long-life timing belts. Feedback is provided by hall effect sensors with optical end-of-travel sensing. Cartridge gripping is accomplished using a solenoid for simplicity and dependability. The linear axes are riding on linear ball bearings, and the rotating axis is supported on ball bearings. This results in high reliability, long life, and nearly zero maintenance for the robotics. The entire robotic handler is a removable as a single unit through the front panel, without removing the library from the equipment rack.

Figure 2-8    The Robotics (RLS–85XX shown)

### 2.5.4.4    FastPass Elevator Expansion Option

RLS-8350 and 85XX libraries easily expand capacity and data delivery performance with the FastPass elevator expansion option. Each model can be equipped to pass tapes vertically from one unit to the next when installed in an industry standard 19-inch EIA equipment rack.

The FastPass elevator expansion option passes tapes from unit to unit.  The FastPass consists of a pair of mechanisms that replace the top-most and bottom-most tape drive position in each pair of cabinets. The mechanism installs from the rear of the rack and is completely self-calibrating. Tapes are passed internally from one library to the next without impacting ongoing read and write operations.

Up to four RLS-8560 and RLS-85120 libraries, one RLS-8350 plus three RLS-85120 libraries can be interconnected in a single 40U high, 19-inch rack enabling the total configuration to include up to 22 tape drives and a maximum of 474 tape cartridges.

Each RLS-8350 library can be expanded by adding up to three RLS-85120 libraries below it, enabling the total configuration to support up to 19 tape drives and up to 410 tape cartridges.

When a library is expanded, the drive capacity is reduced by one for each elevator that is installed in the cabinet.
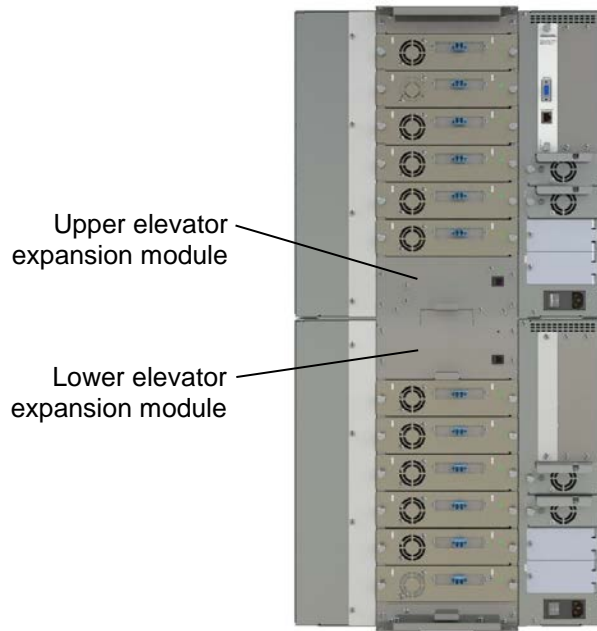


Figure 2-9   Rear view of two RLS-85XX libraries with the FastPass Elevator Expansion Option

### 2.5.4.5    Cooling System

The library is cooled by fresh air that is drawn into the cabinet through a filter(s) in the front of the storage matrices. The air is exhausted out the rear of the library. Each tape drive and power supply module has a fan.

### 2.5.4.6    Barcode Reader

A barcode reader is included on all RLS models. The barcode reader can scan all cartridges in the RLS (except those within tape drives), as well as cartridges introduced into the I/O Port(s).

## 2.5.5    Barcode Labels

Pre-printed barcode labels, which are both human and machine-readable, are available from a number of sources including Qualstar.

Barcode labels must conform to ANSI/AIM BCI-1995, Uniform Symbology Specification Code 39. Please refer to PIN-040 at www.qualstar.com for more information.

*NOTE*

> *Do not apply more than one barcode label at a time in the recess provided on the front side of a tape cartridge (same side as the write-enable/protect switch). If a new label is to be applied, completely remove the old one first.*

By default, the RLS expects no modulus 43 check characters at the end of each label. All of the labels within the RLS must match the check character configuration. If the RLS is configured to expect a check character and the labels do not have a check character, then most barcodes will not read, and if they do read, then they will show an extra character. If the RLS is configured for no check character, and labels with check characters are used, then all of the labels will show an extra character.

## 2.6 ADI (Automation/Drive Interface)

This RLS Series library the ADI (Automation/Drive Interface) interface provided by the LTO tape drives, which eliminates the separate SCSI or Fibre Channel interface to the robotic Medium Changer. By default, it utilizes the interface on the first tape drive for the robotics interface or the first tape drive in each partition if the library is partitioned. The RLS can be configured to use any tape drive in a partition to host the ADI interface.

You need only connect to the SAS or Fibre Channel drives.

## 2.7 RLS Operating Features

### 2.7.1 Medium-changer Control System

There are several microprocessors utilized throughout the RLS to form an efficient distributed control system. All of the microprocessors utilize FLASH memory for storing their operating firmware. The Executive Processor firmware contains the firmware images for all of the other microprocessors in the RLS. All of the RLS operating firmware gets updated with a single code load to the Executive Processor. The code load is accomplished over the Ethernet interface using an Internet browser.

### 2.7.2 Inventory Database

The medium changer maintains an Inventory Database that contains data associated with each storage location. The database contains such information as cartridge presence, barcode label data and cartridge source element address. In addition, the library collects the Memory-In-Cartridge data from each tape cartridge that is inserted into a tape drive. This information is available using the Control Panel or the Q-Link remote management facility. A subset of this is available to the host using the SCSI command set.

### 2.7.3    Library and Multi-Sequential (Multiple Stacker) Operation

Each tape drive and cartridge storage location in the RLS may be configured through the menu system for Library or Sequential operation. If a tape drive is configured for the Library mode, it becomes a resource controlled by the application operating the library. If a drive is configured for Sequential mode operation, it is referred to as a sequential drive and is not included in the list of resources reported.

For Sequential or Recycle operation, a set of cartridge locations is assigned to each sequential drive for its exclusive use. In these modes, each tape cartridge is returned to its original storage location after it is ejected from the tape drive.

For Dual Bin operation, two separate sets of cartridge locations are assigned to each sequential drive for its exclusive use. The input set of locations is where the changer gets cartridges to be placed in the sequential drive. The output set is where those cartridges are returned after the drive has ejected them.

Cartridge storage locations assigned to sequential operations are not included in the list of resources reported to host computers. Empty slots in a Sequential, Recycle or Dual Bin drive's storage location set will not adversely affect operation.

When a Sequential or Recycle operation is initiated the changer places the first cartridge, found at (or after) the initial specified storage location into the drive. When the drive ejects the cartridge, the changer automatically returns the cartridge to its original location. The changer then places the next cartridge found in sequence within the drive's storage set into the drive. This process is repeated until the last specified cartridge in the sequence is ejected and returned to storage. This sequence may be initiated at any location within a Sequential drive's storage set but will always end at the last storage location in the sequence. In Recycle operations, the handler will return to the starting position and repeat the cartridge movement cycle indefinitely.

When a Dual Bin operation is interactively started, the changer moves the cartridge found at (or after) its first input set location into the drive. When the drive ejects the cartridge, the changer automatically places it in the first empty cartridge location in the drive's output set. This process is repeated, until the last specified cartridge in the input set has been ejected from the drive and placed into the output set.

The computer communicating with the sequential drive only communicates with the drive and not the changer. This allows the use of applications lacking library-specific, cartridge-movement, operating software.

Multiple tape drives can be configured for concurrent Sequential, Recycle or Dual Bin operation. All Library drives, and all cartridge locations not assigned to sequential drives, are still available for simultaneous random mode operations.

This flexible design allows the user to partition the library's resources to best meet overall system needs.

## 2.7.4    Manual Operation

The menu system provides a means of manually moving cartridges to or from all available locations (drives, magazine slots and I/O Ports). The menu system is accessed using the Control Panel on the front panel. If the host makes a request to the RLS during a manual operation, the RLS indicates it is busy until the manual operation is completed (usually within a few seconds).

## 2.7.5    Library Partitions

When shipped from the factory, all RLS units are configured as a single library with all tape drives and storage slots dedicated to random operation. This is generally the correct configuration for a single system running a library-aware backup application.

However, when multiple hosts are present and each needs to run a library specific backup application, then the RLS can be sub-divided into smaller *library partitions*. Each partition requires at least one dedicated tape drive. Note that when tape drives are dedicated to sequential operation (sequential, recycle or dual bin) only one tape drive is allowed to be assigned to each library partition.

The RLS can have multiple physical partitions, which allows separate hosts and thus separate host applications to have fully separate sub-libraries under their exclusive control. A partition must have one or more drive slots, and one or more cartridge slots assigned. Thus, the maximum number of partitions is a function of the resources assigned to the various partitions, up to the total number of drive slots and the number of cartridge slots in the Library. Note that a drive slot can be assigned but is not active unless a drive is installed. Drives, drive slots, and cartridge slots cannot be shared between partitions.

An individual I/O port slot can only be assigned to one partition. A unit with two (2) I/O ports doubles the number of I/O port slots that can be assigned to partitions. As with drives, drive slots, and cartridge slots, I/O port slots that are assigned to one partition may not be shared with a different partition.

Multiple hosts can communicate with the same partition, via the same physical port and LUN. Should a host need a separate physical connection to the partition, an additional drive can be configured for each physical host interface needed.

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# 3.                                    Specifications

Note that all specifications are subject to change without notice.

## 3.1    Dimensions
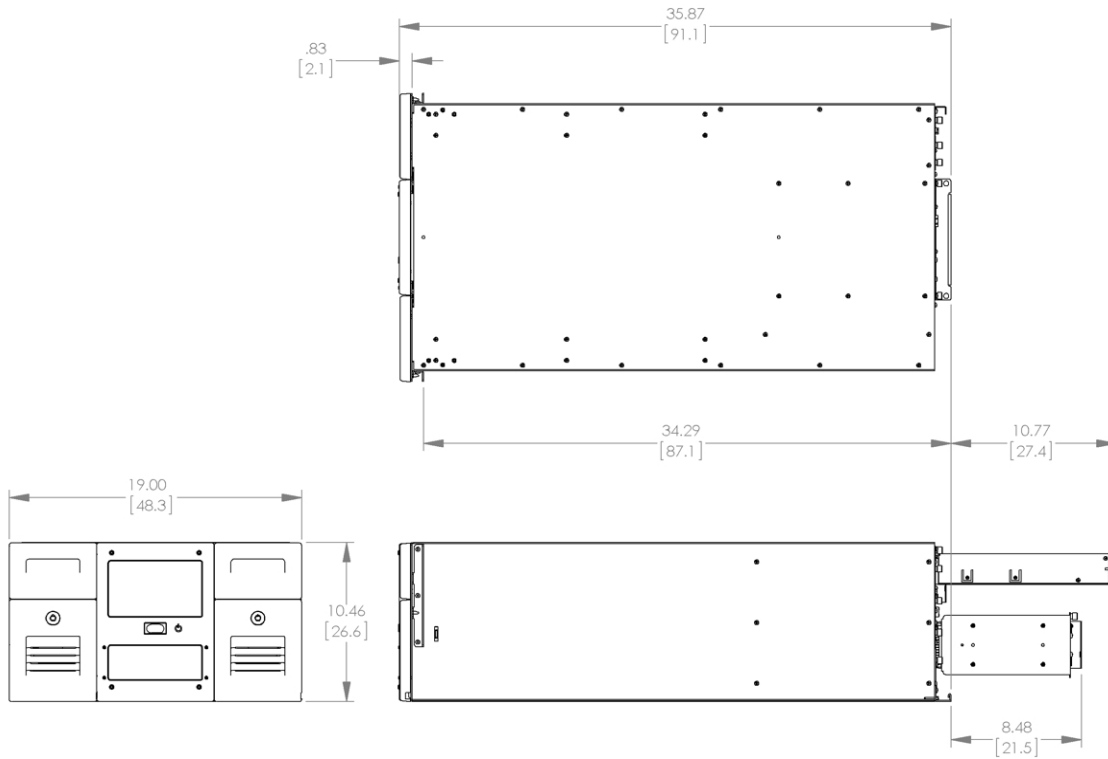


Figure 3-1   RLS-8350 External Dimensions
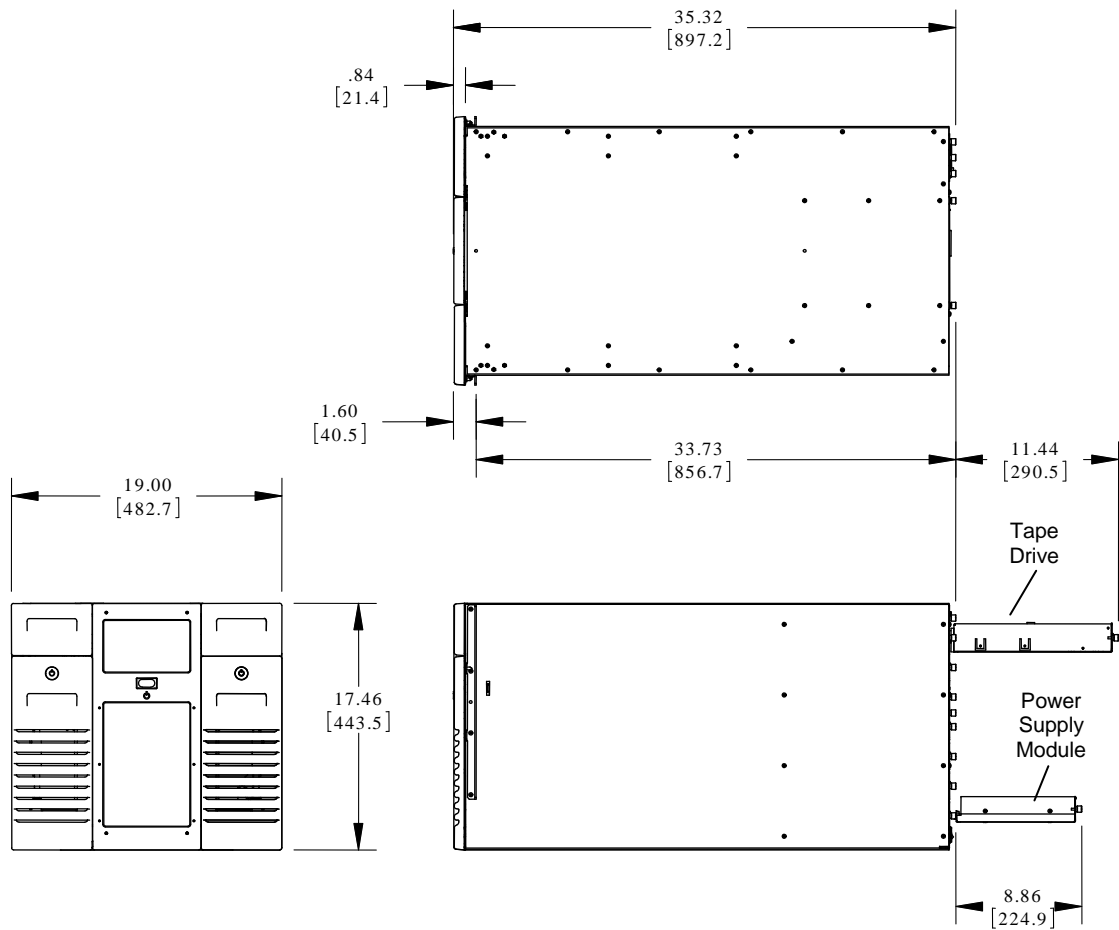
Figure 3-2   RLS-85XX External Dimensions

NOTE

12 additional inches (30.5 cm) of depth are required to hot-swap the optional redundant power supply modules and tape drives.

## 3.2    Weight

| MODEL | WEIGHT FULLY LOADED[1] (LBS / KG) | EMPTY WEIGHT[2] (LBS / KG) |
|---|---|---|
| RLS-8350 | 138 LBS / 63 KG | 50 LBS / 23 KG |
| RLS-8560 | 159 LBS / 72 KG | 54 LBS / 25 KG |
| RLS-85120 | 203 LBS / 92 KG | 54 LBS / 25 KG |

[1] Includes rack mount kit and a full complement of tape drives and tape cartridges
[2] Not including rack mount kit, storage matrices, tape cartridges and drives

Table 3-1   RLS Weights

## 3.3    Standard AC Power Requirements and Consumption

The RLS operates with the following alternating current power sources (Mains):

| Rated Line Voltage | Rated Line Current | Maximum Operating Line Voltage | Minimum Operating Line Voltage | Line Frequency Range |
|---|---|---|---|---|
| 100–240 VAC | 5 AMPS | 254 VAC | 100 VAC | 50–60 Hz |

Table 3-2   RLS Mains Requirements

Power consumption varies with the number of tape drives installed and the particular operation being performed. All AC power supply modules utilize Power Factor Corrected (PFC) power supplies and thus the RLS' power factor is greater than 0.95 and complies with CE requirement EN61000-3-2.

| MODEL | TWO DRIVES INSTALLED | | FOUR DRIVES INSTALLED | |
|---|---|---|---|---|
| | IDLE | PEAK | IDLE | PEAK |
| RLS-8350 | 44 watts 150 BTUs/hr | 126 watts 430 BTUs/hr | 68 watts 232 BTUs/hr | 180 watts 614 BTUs/hr |

Table 3-3   RLS-8350 Power Consumption

| MODEL | TWO DRIVES INSTALLED | | SEVEN DRIVES INSTALLED | |
|---|---|---|---|---|
| | IDLE | PEAK | IDLE | PEAK |
| RLS-85XX | 44 watts 150 BTUs/hr | 126 watts 430 BTUs/hr | 104 watts 355 BTUs/hr | 261 watts 890 BTUs/hr |

Table 3-4   RLS-85XX Power Consumption

Power consumption varies with the number of tape drives installed and the particular operation being performed. Table 3-3 and Table 3-4 are based on a full complement of tape drives installed in each model specified. The idle power figures indicate the power consumed when the changer and tape drives are idle. The peak power figures indicate the peak power consumed when the carriage accelerates and the tape drives are active. The peak power levels are not expected to last for more than two seconds at a time.

## 3.3.1   Power Source Disturbances

The RLS will continue to operate uninterrupted and without damage over a one-cycle line dropout. It is recommended that the RLS be powered from an Uninterruptible Power Source (UPS).

## 3.3.2   Power Entry

All RLS libraries have a line fuse and I.E.C. power receptacle mounted on the rear panel. An internal AC line filter reduces EMI conducted emissions and protects the RLS from any noise present on the power lines. A six-foot, seven-inch (2-meter) power cord is supplied for 120 VAC use in North America. A Harmonized HO5VV-F power cord is supplied for other destinations.

### 3.3.2.1   Replacing the Fuse

If you need to replace a fuse due to an equipment failure, first determine the cause of the failure and solve the problem before replacing the fuse.

*DANGER*

---

TO AVOID THE POSSIBILITY OF PERSONAL INJURY, BE SURE TO TURN OFF THE RLS' POWER AND DISCONNECT THE POWER CORD BEFORE REPLACING A FUSE.

---

The AC power receptacle on the rear of the library contains the fuse. When you pull the fuse holder out it folds to the right so that the fuse can be easily replaced. (Be careful not to pull the fuse holder with excessive force.) See Figure 3-3.

Fuse

Fuse Holder flush with AC power receptacle
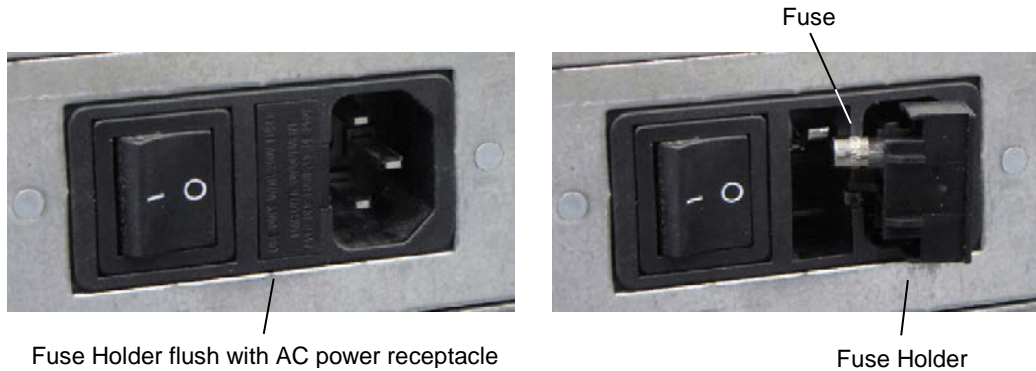
Fuse Holder

Figure 3-3   Fuse Holder on rear of Library

Whenever you pull out the fuse holder and push it back in order to replace or check the fuse, be sure to push it to the point where the AC power receptacle and the fuse holder are flush with each other.

### 3.3.3    Power Cord

The supplied detachable power cord complies with the following specifications:

- **100-120 volt applications**    UL listed and CSA certified three-conductor 18 AWG SJT vinyl-jacketed cord. One end is terminated with an IEC 320 C13 style connector. The other end is terminated with a NEMA 5-15P type plug.

- **200-240 volt applications**    Harmonized three-conductor HO5VV F3G 1.0mm vinyl-jacketed cord. One end is terminated with an IEC 320 C13 style connector. The other end is terminated with the European CEE7 Standard VII type plug.

## 3.4     Temperature, Humidity and Altitude

| PARAMETER | OPERATING | NON-OPERATING |
|---|---|---|
| Ambient temperature | +5°C to +32°C (+41°F to +90°F) | -20°C to +60°C (-4°F to +140°F) |
| Temperature gradient (maximum) | 1°C°/minute, 10°C/hour (2°F/minute, 18°F/hour) | 1°C/minute, 20°C/hour (2°F/minute, +36°F/hour) |
| Relative humidity (non-condensing) | 20% to 80% | 10% to 90% |
| Wet bulb temperature | 26°C (79°F) maximum | 29°C (84°F) maximum |
| Altitude | -1000 to +10,000 feet | -1000 to + 40,000 feet |

| | -304.8 to +3,048 meters | -304.8 to +12,192 meters |
|---|---|---|

 Includes tape drives

Table 3-5   Environmental Specifications

*NOTE*

*Rapid changes in temperature that produce condensation must never be allowed since the condensed liquid may damage tape drives and tape cartridges.*

## 3.5    Acoustical Noise

Overall noise level at one meter from the front of the RLS, shall not exceed:

- With all tape drives operating:                              ≤ 54 dBA
- All tape drives plus robotic handler operating:       ≤ 59 dBA

# 4.                                           Unpacking

This chapter contains unpacking instructions for the RLS.
(Refer to Chapter 13 for instructions on repacking the RLS for shipping.)

*DANGER*

> DEPENDING UPON THE MODEL, THE RLS WEIGHS UP TO 103 POUNDS (47 Kg) AS SHIPPED. IMPROPER LIFTING TECHNIQUES CAN RESULT IN BACK INJURY AND/OR EQUIPMENT DAMAGE. GET HELP WHEN LIFTING OR MOVING THE RLS.

The units are shipped in specially designed packaging. The following standard items are included:

- RLS Tape Library
- Storage Matrices packaged separately
- One Power Cord
- Accessory kit with keys and Quick Start Guides
- For the RLS-8560 only, a Storage Matrix Assembly Blank

Tape drives are ordered separately and may be installed

## NOTE

*Before unpacking the unit, check the shipping container for damage, and report all shipping damage to the carrier before opening the carton.*

**Refer to Figure 4-1**

With the help of an assistant, follow the instructions below.

1. Cut the pallet straps and remove the two Matrix boxes from the top of the large chassis box.

2. Open the top of the large chassis box and remove the material (Rack Mount Kit & accessories) from inside the foam on top of the library.

3. Remove the foam inserts to expose the top of the library chassis.

4. With the help on an assistant lift the library out of the box using the hand holds on the front right and left sides along with the hand hold on the rear.

5. Open the Rack Mount Kit.

6. Place <u>all</u> shipping materials back into the shipping carton for future use.

## NOTE

*Be sure to retain the carton and all packing materials for possible reshipment. All items are needed to properly repack the RLS.*

*Failure to reship an RLS in the original packing materials will most assuredly result in damage to the RLS and will void of the shipper's insurance and the factory warranty.*
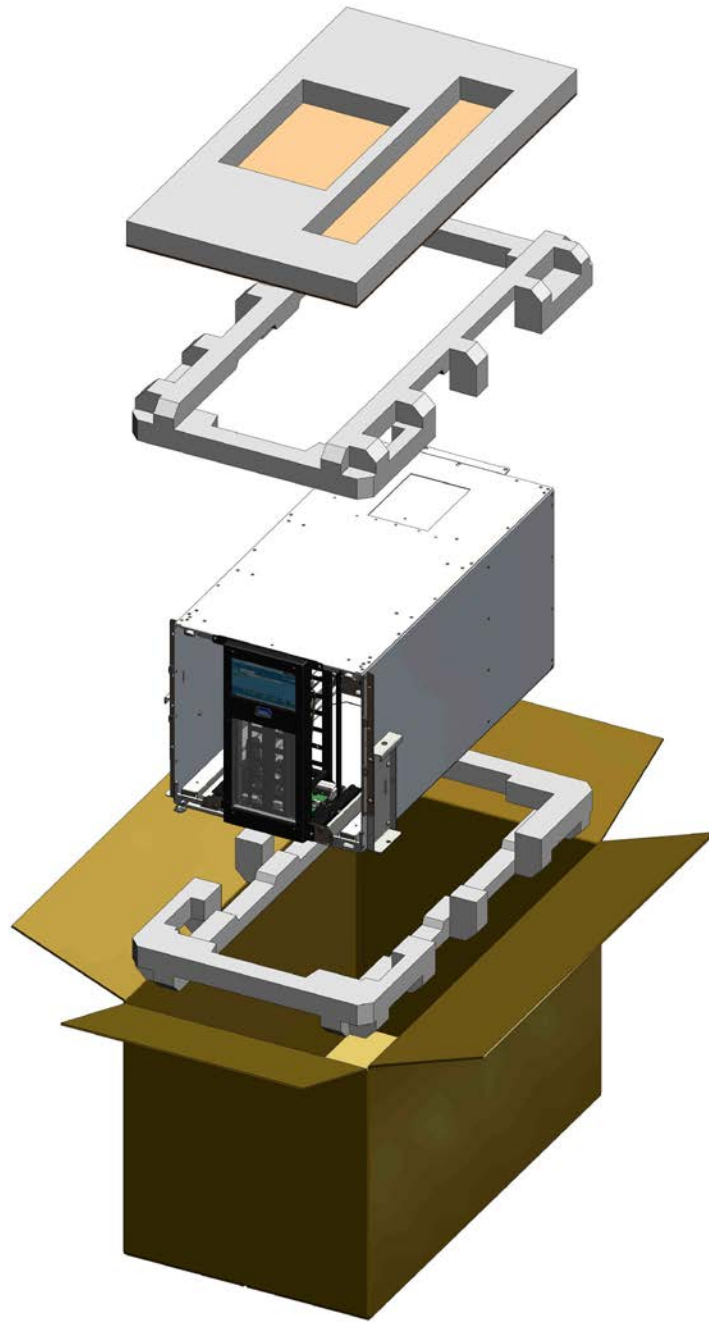
Figure 4-1   Unpacking the RLS (RLS-85120 shown)

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# 5.                                    Installation

## 5.1      Installation Considerations

When selecting a location for the RLS, be sure to consider the unit weight and provide a stable operating location. These tape libraries are not intended for use in mobile applications. They were designed for use in an office environment. Also remember to provide sufficient free space around the unit to allow for loading/unloading media/drives, establishing cable connections, and airflow considerations.

### 5.1.1     Operating Environment

The RLS is designed to operate in an ambient environment from 41°F to 90°F (5°C to 32°C), 20% to 80% relative humidity, and at altitudes from -1000 to +10,000 feet. Moisture must not be allowed to condense inside the system. The RLS should only be operated in a dust-free environment.

### 5.1.2     Ventilation

The RLS draws fresh cooling air in from the front of each storage matrix through a filter and exhausts warm air out the rear. See Figure 3-2 for the outline drawing and dimensions. See Table 3-1 for the heat contribution (BTU/hour) of your model.

### 5.1.3     AC Power Requirements

RLS models have peak power consumptions of between 150- and 300-watts. All AC powered models utilize Power Factor Corrected (PFC) power supplies to the primary VA requirements are the same as the peak watts. See Table 3-4 for the power requirements of your model.

## 5.2      Rack Mounting

The RLS is designed to mount in an industry-standard 19-inch wide rack.

*DANGER*

THE RLS WEIGHS UP TO 103 LBS (47 KG ), INCLUDING STORAGE MATRICES AND TAPE DRIVES AND A MINIMUM OF TWO PEOPLE ARE NEEDED TO LIFT

IT. HANDLING THE RLS ALONE COULD RESULT IN BACK INJURY OR OTHER
ACCIDENTS.

## 5.2.1    Cautions

Check the following points before rack mounting the RLS.

- When installing the library, keep cables and other obstructions away from the area around the fans on the rear of the library and the ventilation slots on the front of the library.

- When the library is mounted in a rack, the balance of the rack could be affected and the rack could tip over. To prevent this from happening, we recommend securing the rack with brackets that are designed to keep it from tipping over.

- Confirm that the correct AC power is supplied within the rack and its outlet is properly grounded.

## 5.2.2    Preparing the Library for Rack Mount Installation

There are three pieces to each rack rail and these will first be attached to the rack before the RLS is installed in the rack.

## 5.2.3    Rack Mounting the Library

### 5.2.3.1    Required Tools

- Tape Measure

- No. 2 Philips screwdriver

- 11/32-inch Open End Wrench or Nut Driver

### 5.2.3.2    Preparing the Rack

Each rack rail assembly has both a long and short mounting bracket that needs to be adjusted to match the distance between the front and rear rack posts.

### 5.2.3.3    Mounting the Rack Rail Assemblies on the Rack

1.  Decide where the rack rails are to be mounted. We recommend marking the position where each rack rail assembly bracket is to be mounted. To optimize the spacing in the rack, it is recommended to select a "1U" increment on the racks hole pattern as the starting point. Some racks will have the increments marked, otherwise the start and stop location of a single rack unit can be determined by locating the .50" (12.7mm) spaces between mounting holes as seen in Figure 5-1.

**1U**

.50" (12.7mm)
.62" (15.9mm)
.62" (15.9mm)
.50" (12.7mm)
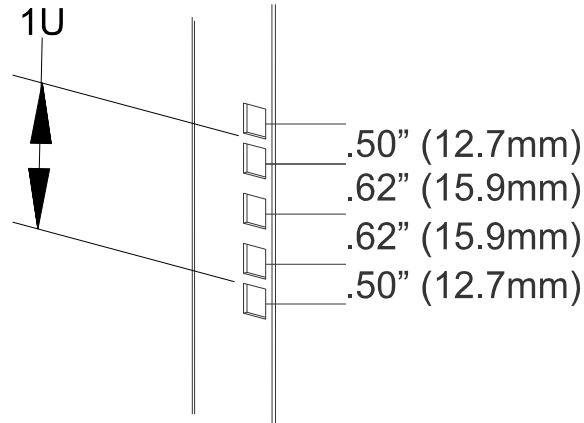
Figure 5-1  1 U Division on a Rack Post

2. Position a rack rail assembly between the front and rear rack posts and use a tape measure to determine how far the brackets need to be moved so that the mounting holes of the brackets will be in contact with the inside edge of the rack posts. Note that the long bracket must be mounted at the rear of the rack. Refer to Figure 5-2.



Rear Rack Post

Front Rack Post

Potential Cage Nut Locations

Rack Rails

Long Mounting Brackets

13.38
9.38
6.38
2.38

Washer and Rack Rail Mounting Screw

Short Mounting Brackets
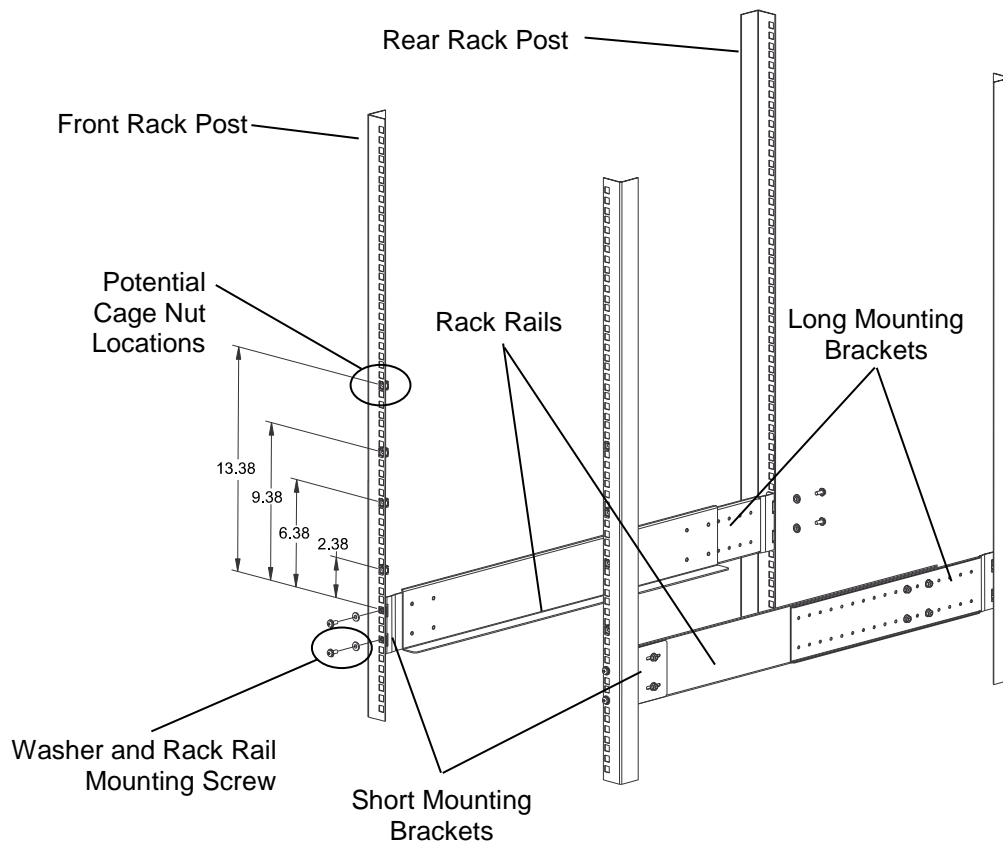
**Figure 5-2   Rack Rail Assembly between the Front and Rear Rack Posts**

3.  Each rack rail assembly bracket has four hex head nuts that are used to position the brackets. To move a long bracket, use a 11/32" wrench to remove all four nuts, reposition the bracket along the four threaded studs of the rack rail and then re-attach the four nuts. The short bracket is used to "fine tune" the length of the assembly by loosening the four nuts with the 11/32" wrench, sliding the bracket and then re-tightening the nuts. See Figure 5-3.

Remove the nuts using a 11/32" wrench.
Move the bracket.
Reattach the nuts.

Loosen the nuts using a 11/32" wrench.
Slide the bracket.
Re-tighten the nuts.
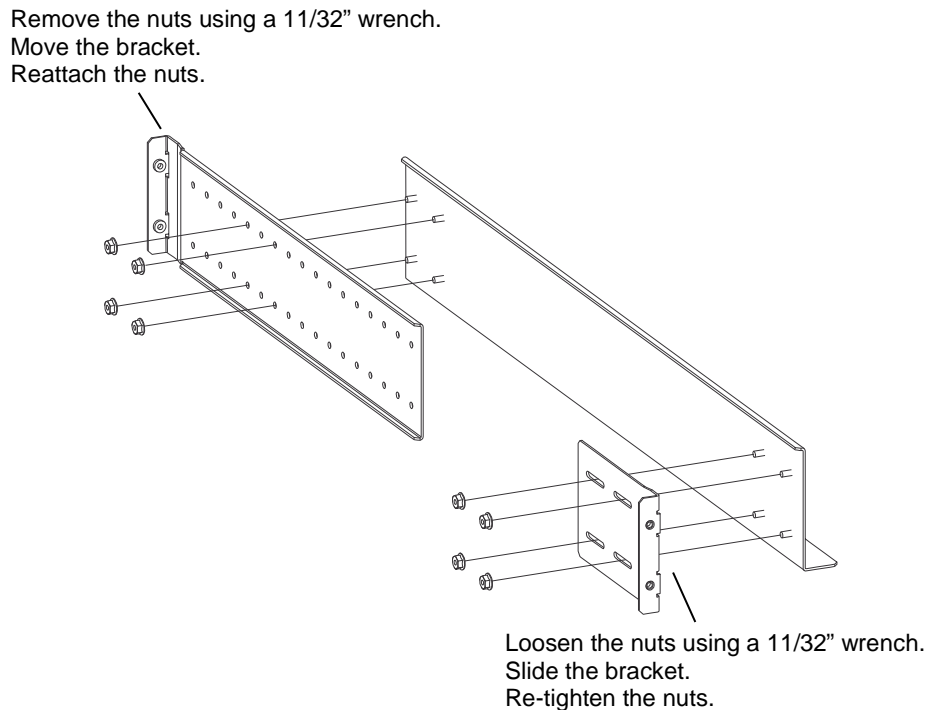
**Figure 5-3   Adjusting the Location of the Rack Rail Assembly Brackets**

4.  When one rack rail assembly has had its brackets moved so that they are in contact with the inside edge of the rack posts, reposition the brackets on the other rack rail assembly to match.

5.  Position a rack rail assembly between the front and rear posts so that the brackets are touching the inside of the posts and the holes in its brackets align with the mounting positions chosen in Step 1. Make sure that the mounting bracket tabs are facing towards the outside of the rack and that the long bracket is at the rear of the rack. Refer to Figure 5-2.

6.  Using the screws and washers that were supplied with the rack rail assembly, attach the assembly to the rack using all four mounting bracket holes on each slide assembly. Tighten the hardware securely with a Number 2 Phillips screwdriver making sure that the washers are in place as shown in Figure 5-4.

Note that the washers have a specially designed shoulder and can only be acquired from Qualstar. If new washers are required please contact technical support and request P/N 510703-01-0.

*CAUTION*

*Do not attempt to replace the washers with any other washer that has not been provided by Qualstar.*

Rear view of Qualstar washer (P/N 510703-01-0) showing the shoulder.
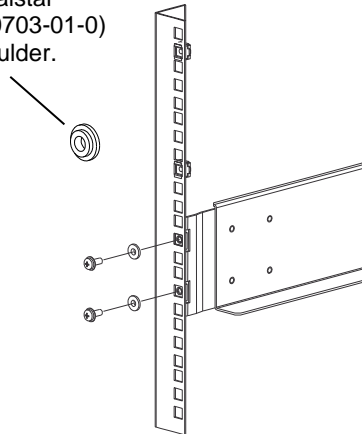
Figure 5-4   Screws and Washers securing a Rack Rail Assembly to the Rack Posts

7.   Using a 11/32" wrench, tighten all of the nuts that were loosened in step 3 when the brackets were moved on the rack rail assembly.

8.   Repeat Steps 5 through 7 to attach the remaining rack rail assembly to the rack.

9.   The library will be secured to the front rack posts using one screw on each side. Cage nuts need to be installed in the rack posts that correspond with a mounting hole in the library.

10.   Using either a tape measure or by counting holes in the rack posts insert one of the supplied cage nuts into the left front rack post as shown in Figure 5-5.
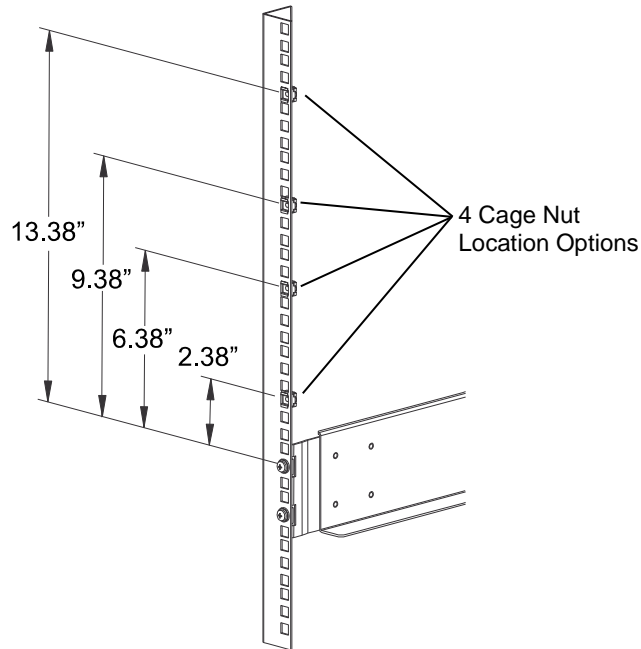
**Figure 5-5   Cage Nuts location options in a Rack Post**

> **11.** Repeat the same procedure for the right front rack post making sure that the cage nut is at the same height as the left side.

## 5.2.3.4   Mounting the Library in the Rack

<div align="center">

*DANGER*

</div>

> THE RLS WEIGHS UP TO 103 LBS (47 KG) ), INCLUDING STORAGE MATRICES AND TAPE DRIVES AND A MINIMUM OF TWO PEOPLE ARE NEEDED TO LIFT IT. HANDLING THE RLS ALONE COULD RESULT IN BACK INJURY OR OTHER ACCIDENTS.

> **1.** If powered, remove power from the RLS by first pressing the power switch off and then removing the power cord.

> **2.** If the storage matrices have not already been removed from the library, follow the procedure described in Section 5.7.5 to remove them.

> **3.** If any tape drives are in the library, follow the procedure described in Section 5.5.2 to remove them.

> **4.** Have two or more people lift the library by grabbing the front and rear hand holds as seen in Figure 5-6. Place it between the rack posts and slide it back on

the rack rails until about 8 inches remains sticking out the front of the rack posts.
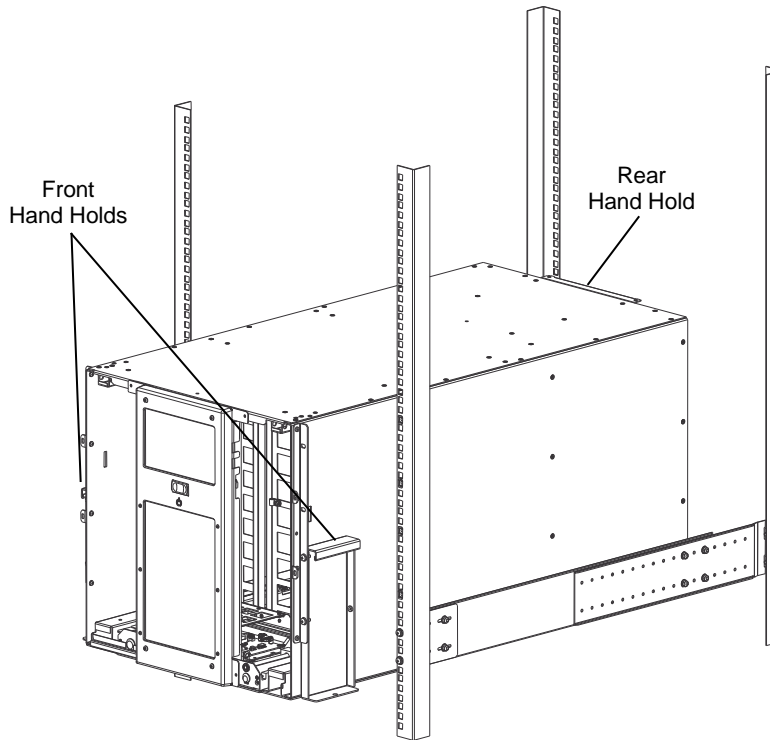


Figure 5-6   Library being inserted into the Rack (RLS-85XX shown)

5.   The front hand holds must be removed from the library before it can be slid all the way back into the rack. Use a Number 2 Phillips screwdriver to remove the two screws that secure the hand holds to the left and right sides of the RLS.
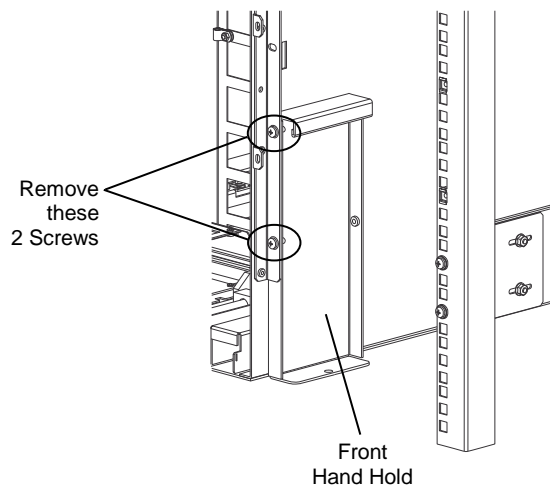


Figure 5-7   Removing the Front Hand Holds from the Library

6. Store the front hand holds and their mounting screws in a safe location so they may be re-used if the library is removed from the rack.

7. With the hand holds removed, slide the library all the way back into the rack until the flanges on the sides touch the front rack posts.



Flange

Install one screw in each rack post
to secure the library to the rack.
(there are 8 potential locations)
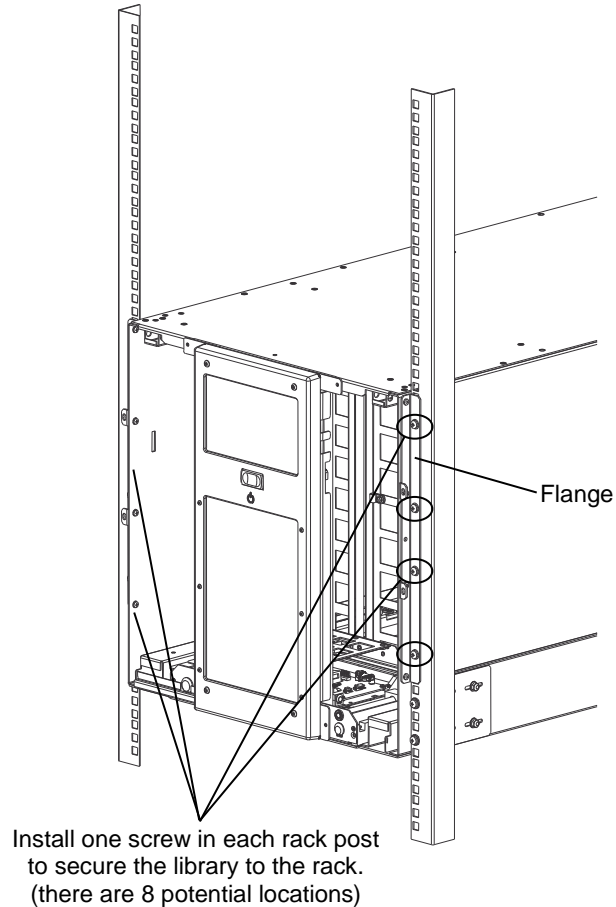
Figure 5-8   The Library fully inserted into the Rack (RLS-85XX shown)

8. Confirm that the library is housed properly in the rack. The two holes in each of the flanges should line up with the cage nuts that were installed earlier in the front rack posts.

9. Use a Number 2 Phillips screwdriver to install the two screws (one on each side) that secure the library to the front rack posts.

10. The Robot Restraining Screw is located on the right side of the front of the library and **MUST** be removed before operating the library.

Figure 5-9   Removing the Robot Restraining Screw

**11.** Use a No. 2 Phillips screwdriver to remove the screw and keep the screw and tag with the packaging materials.

**12.** For RLS-8350 and 85120 libraries follow the procedure described in Section 5.7.5 to reinstall the storage matrices and connect all necessary cables.

**13.** For RLS-8560 libraries ONLY follow steps 11 through 23 to install the storage matrix assembly blank.

**14.** The blank is secured to the RLS with two captive screws, which can be reached by inserting a hand through the opening created with the left side storage matrix removed. This is the preferred and simpler option, however if the screws cannot be accessed through this opening the face of the user interface panel assembly can also be removed (step 15).

**15.** Align the guide pin on the right side of the Storage Matrix Assembly Blank with the corresponding hole on the right side of the library, then position it against the front of the RLS. See Figure 5-10.

User Interface Panel Assembly

Storage Matrix
Assembly Blank
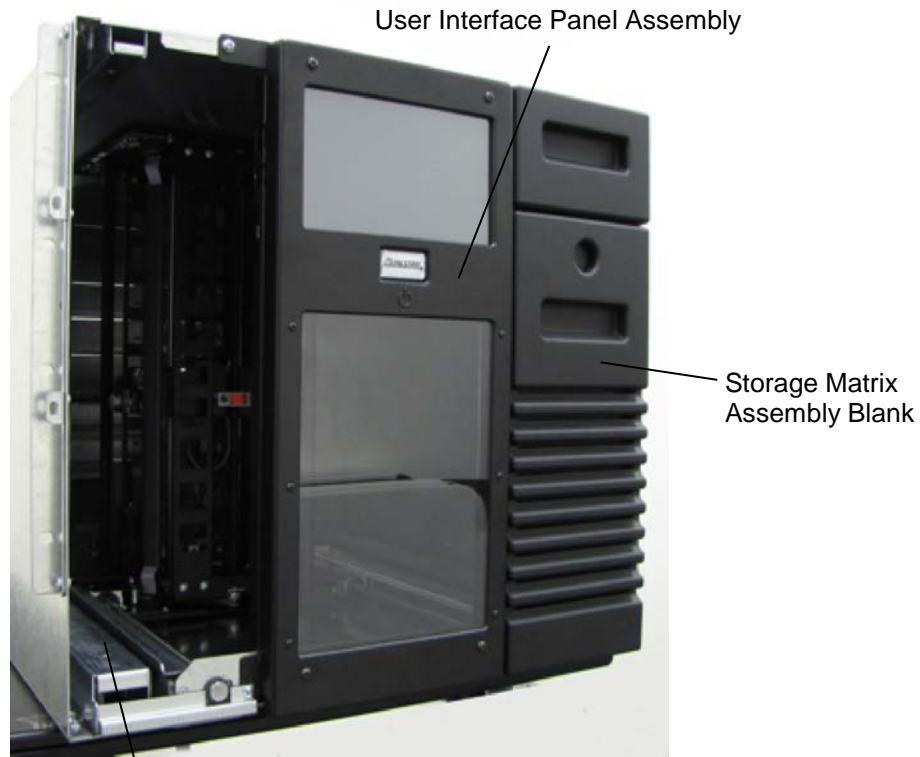
Left Side Storage Matrix Removed

Figure 5-10   Storage Matrix Assembly Blank on front of RLS with Left Side Storage Matrix Removed

16.     The two large tabs at the top and bottom of the blank have a single captive screw in each of them to secure it to the RLS. A flashlight and/or a small mirror may be helpful to see the exact location of where the two screws are located.

Captive screw used to secure the top and bottom tabs.



Storage Matrix
Assembly Blank
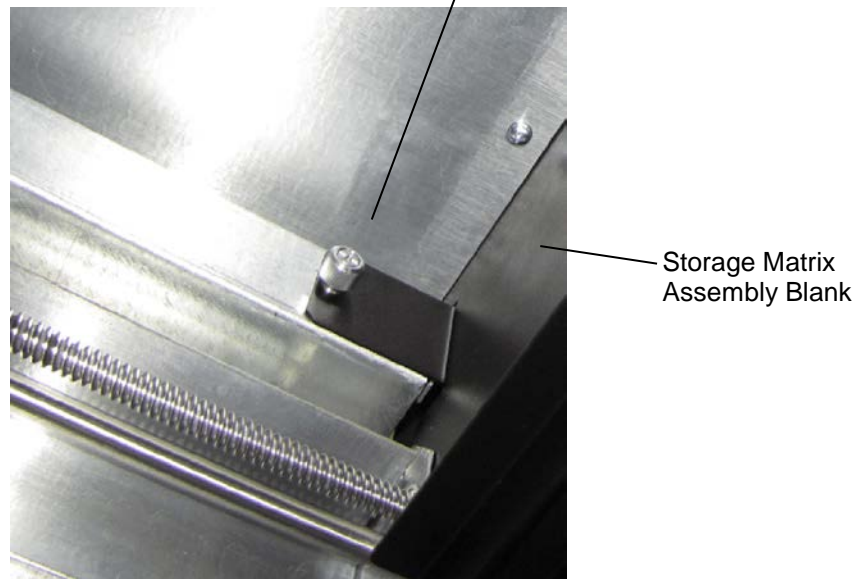
Figure 5-11   Captive screw shown securing the bottom tab of the Storage Matrix Assembly Blank

17.  Reaching into the RLS through the left side storage matrix opening, engage the two captive screw fasteners and turn them clockwise until they are fully tightened to hold the blank to the RLS.

18.  If the screws can be reached, skip to step 19, otherwise follow the next step to remove the face of the user interface panel assembly.

19.  **IF** the screws could not be reached through the left side opening, there are four screws securing the face of the user interface panel assembly to the RLS. Removing the assembly will allow for easier access to the screws.

20.  Using the supplied 3/32 Allen wrench remove the four screws shown in Figure 5-12 that secure the user interface panel assembly. Use caution to avoid damaging the touch screen while using the wrench.

User Interface
Panel Assembly

Remove these 4 Screws
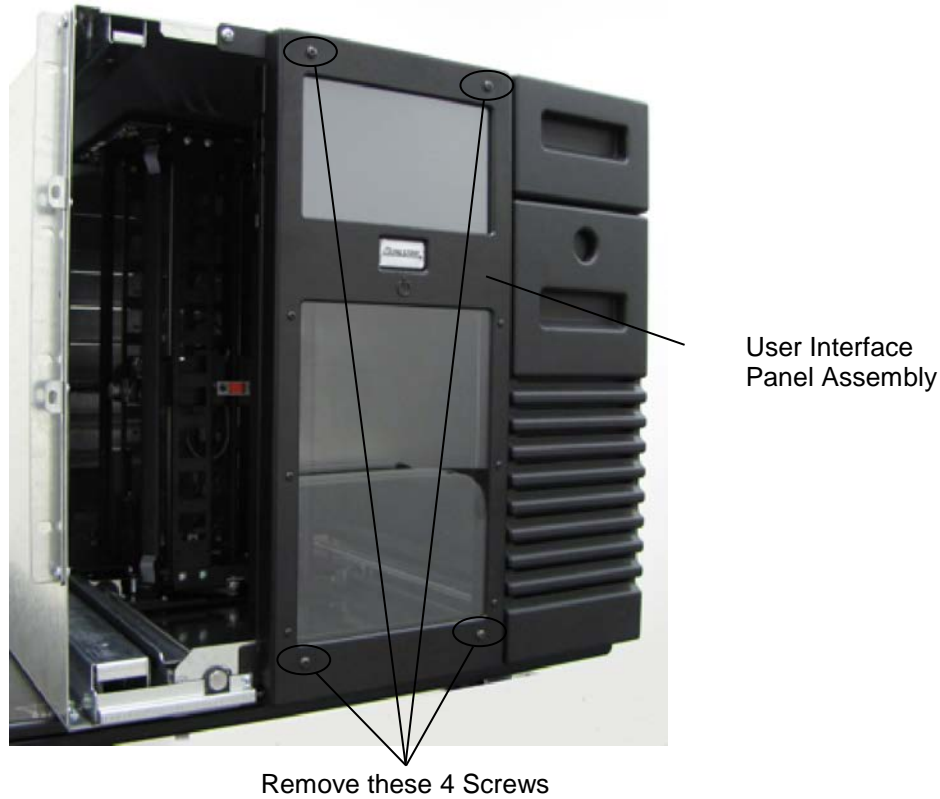
Figure 5-12   Screws shown securing the face of the User Interface Panel Assembly

21.    Once all four screws are removed carefully pull the panel off from the user interface assembly and set aside.

22.    Now reach into the RLS through the opening below the touch screen and engage the two captive screw fasteners turning them clockwise until they are fully tightened to hold the blank to the RLS.

23.    **IF** only the left side storage matrix was removed to access the screws, simply replace the left side storage matrix as described in Section 5.7.5.

24.    **IF** the face of the user interface panel assembly was removed to access the screws, follow the steps below to replace the panel.

25.    Position the panel against the front of the RLS, aligning its four mounting holes with the corresponding holes in the user interface assembly. Be careful to not pinch the cable close to the bottom left mounting hole.

26.    Using the 3/32 Allen wrench replace the four screws removed earlier that secure the panel to the user interface assembly. See Figure 5-12. Use caution to avoid damaging the touch screen while using the wrench and do not over-tighten the screws.

27.     Once the user interface panel assembly is replaced, follow the procedure
        described in Section 5.7.5 to reinstall the left side storage matrix.

28.     Connect all necessary cables.

## 5.2.4     Installing the Optional FastPass Elevator Expansion Module

Up to four RLS-8560 and RLS-85120 libraries can be interconnected and an RLS-8350
library can be expanded by adding up to three RLS-85120 units below it. The
following instructions will describe installing a FastPass elevator expansion module
with a RLS-85120 and a RLS-8560 however additional libraries can be interconnected
by repeating the procedure.



Upper elevator
expansion module

Lower elevator
expansion module

Elevator module cable
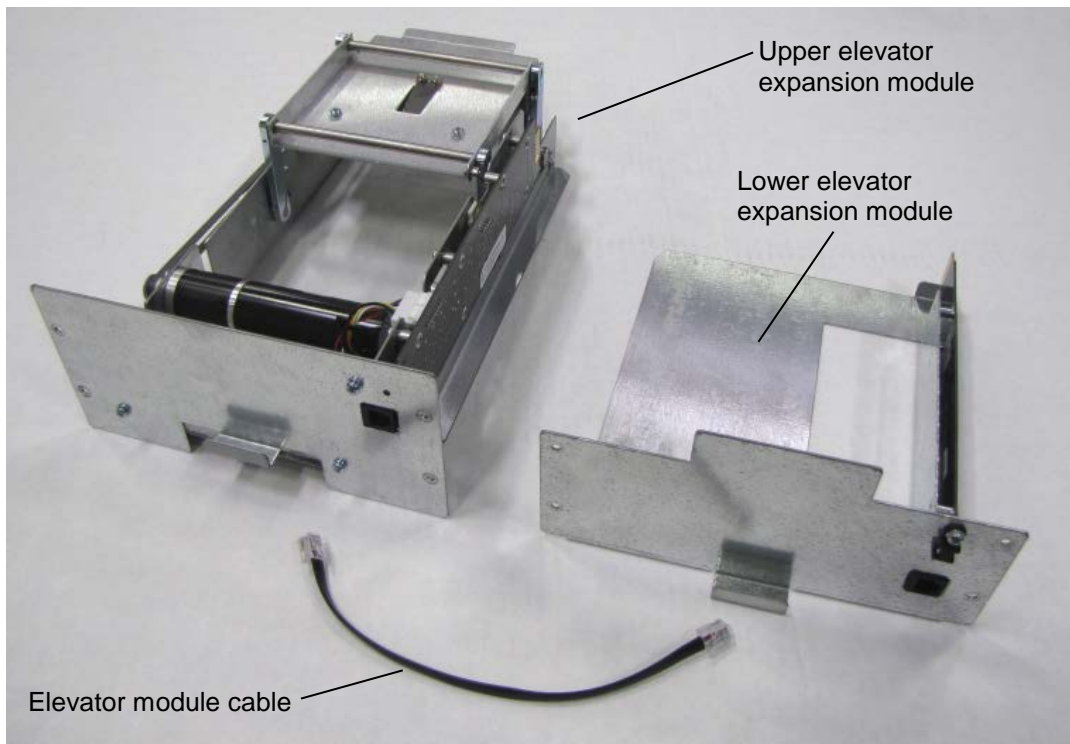
Figure 5-13   FastPass Elevator Expansion Module parts

1.      If the libraries are powered up, press the Park Rear button on the Park Handler
        section of the libraries Home Page to move the handler to the rear of the library.

Figure 5-14   Park Rear Button on the Home Page

2.  Remove power from both of the libraries by first pressing the power switch off and then removing the power cord. FastPass elevator expansion modules are **NOT** hot-swappable.

3.  The libraries need to be slightly loosened in the mounting racks for the FastPass elevator expansion modules to align themselves.

4.  If the storage matrices have not already been removed from both of the libraries, follow the procedure described in Section 5.7.5 to remove them.

5.  For RLS-8560 libraries ONLY follow steps 5 through 13 to remove the storage matrix assembly blank.

6.  The blank is secured to the RLS with two captive screw fasteners, which can be reached by inserting a hand through the opening created when the left side storage matrix is removed. This is the preferred and simpler option, however if the screws cannot be accessed through this opening the face of the user interface panel assembly can also be removed (step 8).

User Interface Panel Assembly

Storage Matrix
Assembly Blank
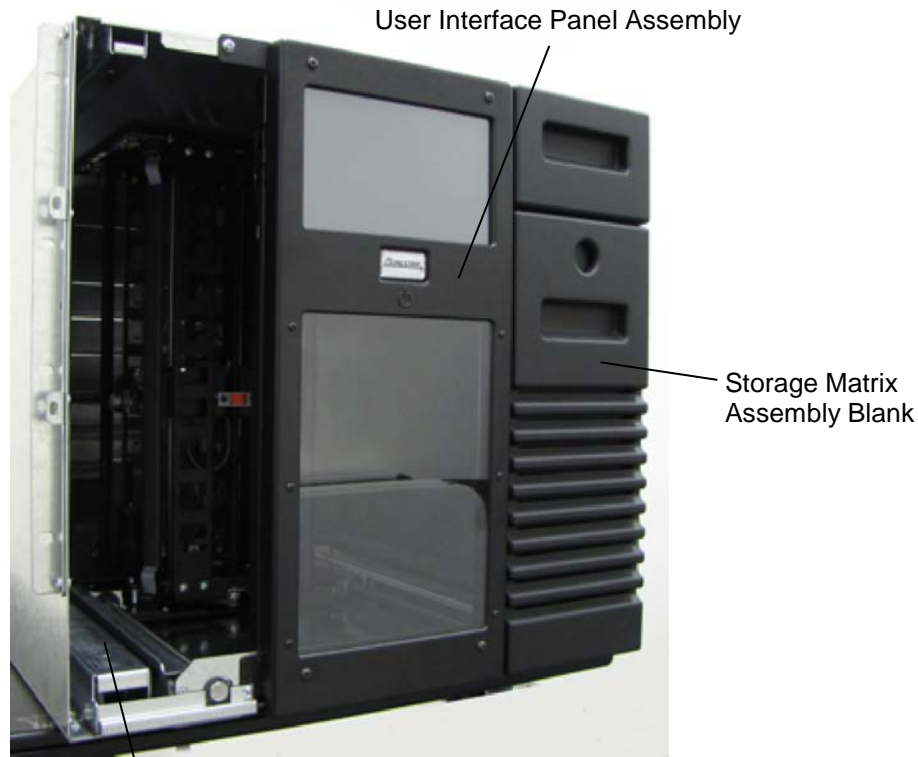
Left Side Storage Matrix Removed

Figure 5-15   Storage Matrix Assembly Blank on front of RLS with Left Side Storage Matrix
Removed

7. Two large tabs at the top and bottom of the Storage Matrix Assembly Blank have
   a single captive screw in each of them that secures it to the RLS. A flashlight
   and/or a small mirror may be helpful to see the exact location of the two screws.

8. Reaching into the RLS through the left side storage matrix opening, engage the
   two captive screw fasteners and turn them counter clockwise until they are fully
   loosened. If the screws can be reached, skip to step 13, otherwise follow the next
   step to remove the face of the user interface panel assembly.

9. **IF** the screws could not be reached through the left side opening, there are four
   screws securing the face of the user interface panel assembly to the RLS.
   Removing the assembly will allow for easier access to the screws.

10. Using a 3/32 Allen wrench remove the four screws shown in Figure 5-12 that
    secure the user interface panel assembly. Use caution to avoid damaging the
    touch screen while using the wrench.

User Interface
Panel Assembly

Remove these 4 Screws
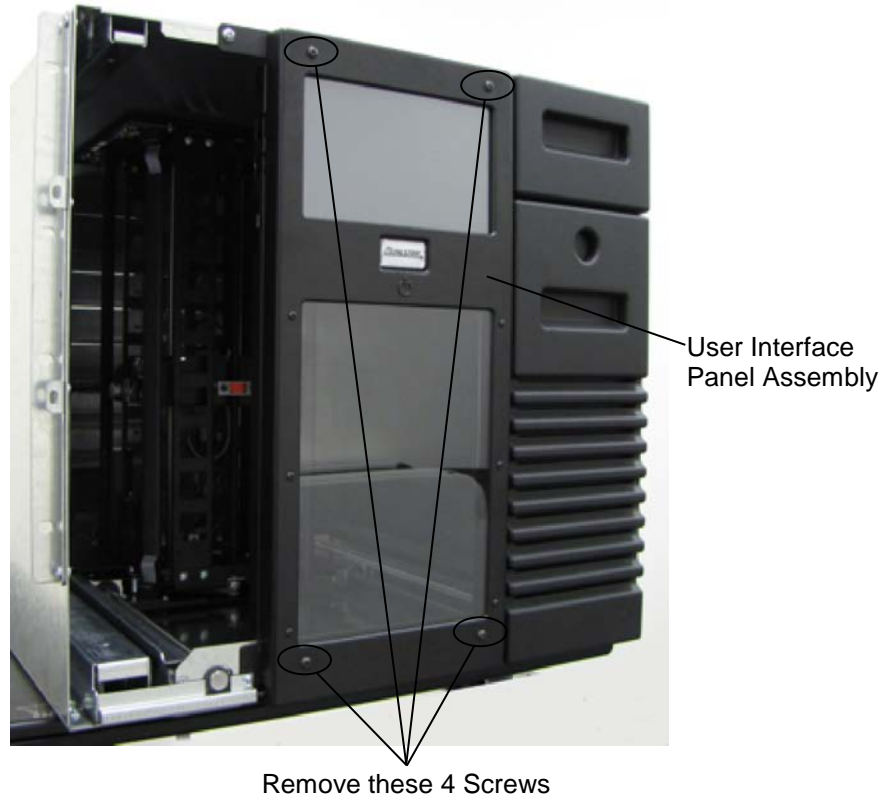
Figure 5-16   Screws shown securing the face of the User Interface Panel Assembly

11.   Once all four screws are removed carefully pull the panel off from the user interface assembly and set aside.

12.   Now reaching into the RLS through the opening below the touch screen, engage the two captive screw fasteners and turn them counter clockwise until they are fully loosened.

13.   Once both screws from the Storage Matrix Assembly Blank are loosened, carefully pull it off the RLS and set it aside.

14.   Using a Number 2 Phillips screwdriver loosen the two screws (one on each side) that secure each library to the front rack posts.

15.   On the rear of the two libraries two panels need to be removed so the FastPass elevator expansion modules can be installed.

16.   As shown in Figure 5-17 use a Number 2 Phillips screwdriver to remove the four screws securing the panel to the lower library. Next use a T15 Torx driver to remove the four screws securing the panel to the upper library. If the upper library contains Phillips screws, simple remove them with the Number 2 Phillips screwdriver.
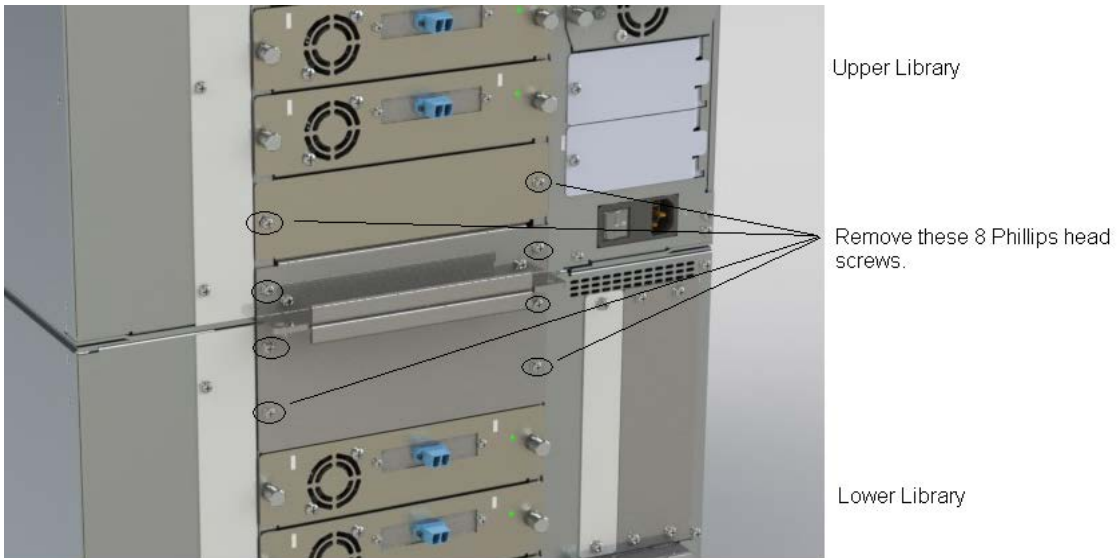
Figure 5-17   Screws shown securing the panels to the Upper and Lower Libraries

**17.**   When both panels have been removed, carefully slide the upper FastPass elevator expansion module into the upper library as shown in Figure 5-19. Make sure that the elevator mechanism is in its upward position so that it does not interfere with anything inside the library as it is slid in. See Figure 5-18.
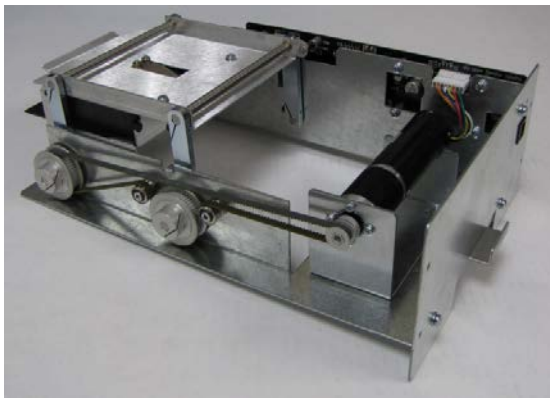


Elevator Mechanism shown in It's upward position.
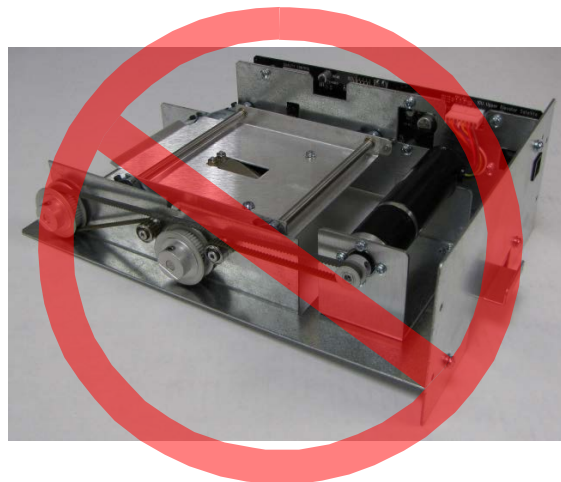
Do not attempt to install or remove an Elevator Mechanism in this position.

Figure 5-18   Upper Elevator Mechanism

Elevator Mechanism in
It's upward position.

Upper Elevator Expansion Module
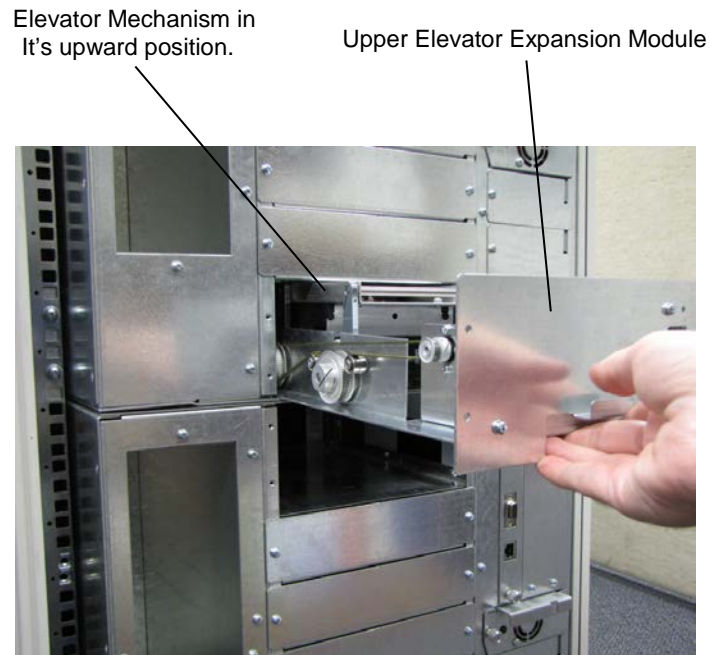


Figure 5-19   Sliding the Upper Elevator Expansion Module into the Upper Library

18. Carefully slide the lower elevator expansion module into the lower library as shown in Figure 5-20.

Lower elevator expansion module
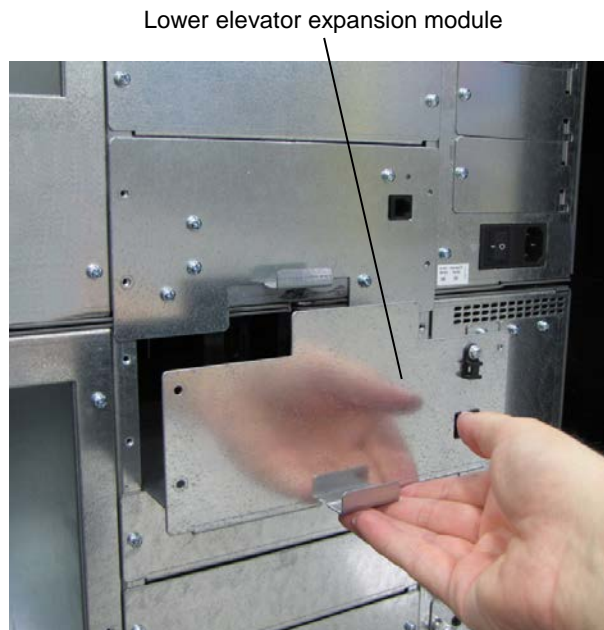


Figure 5-20   Sliding the Lower Elevator Expansion Module into the Upper Library
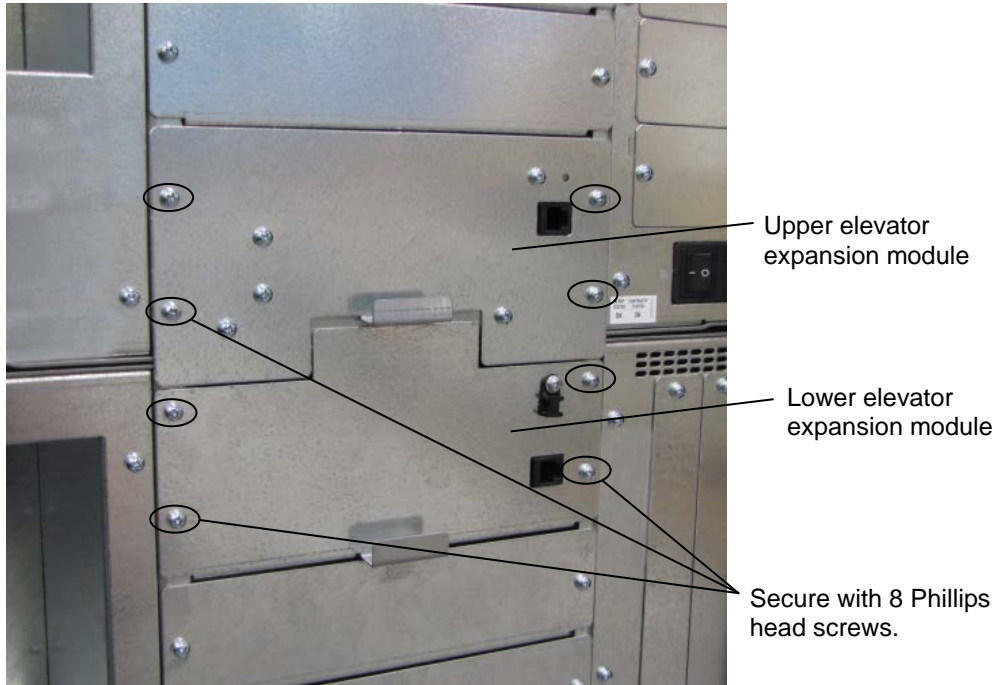
Figure 5-21   Securing the Upper and Lower Elevator Expansion Modules into the Library

19. Using the four Phillips head screws removed earlier and the four additional ones included with the FastPass elevator expansion modules, secure both the upper and lower modules to the rear of the libraries with a Number 2 Phillips screwdriver.

20. Take the black elevator module cable and plug it into the connectors on the upper and lower elevator modules as shown in Figure 5-22. Note that the cable provides both power and data transfer and can only be acquired from Qualstar. If a new cable is required please contact technical support and request P/N 673-0011-3.

*CAUTION*

*Do not attempt to replace the black elevator module cable with a phone cable or any other cable that has not been provided by Qualstar.*

LED on upper elevator expansion module

Secure Elevator module cable with cable tie.

Elevator module cable
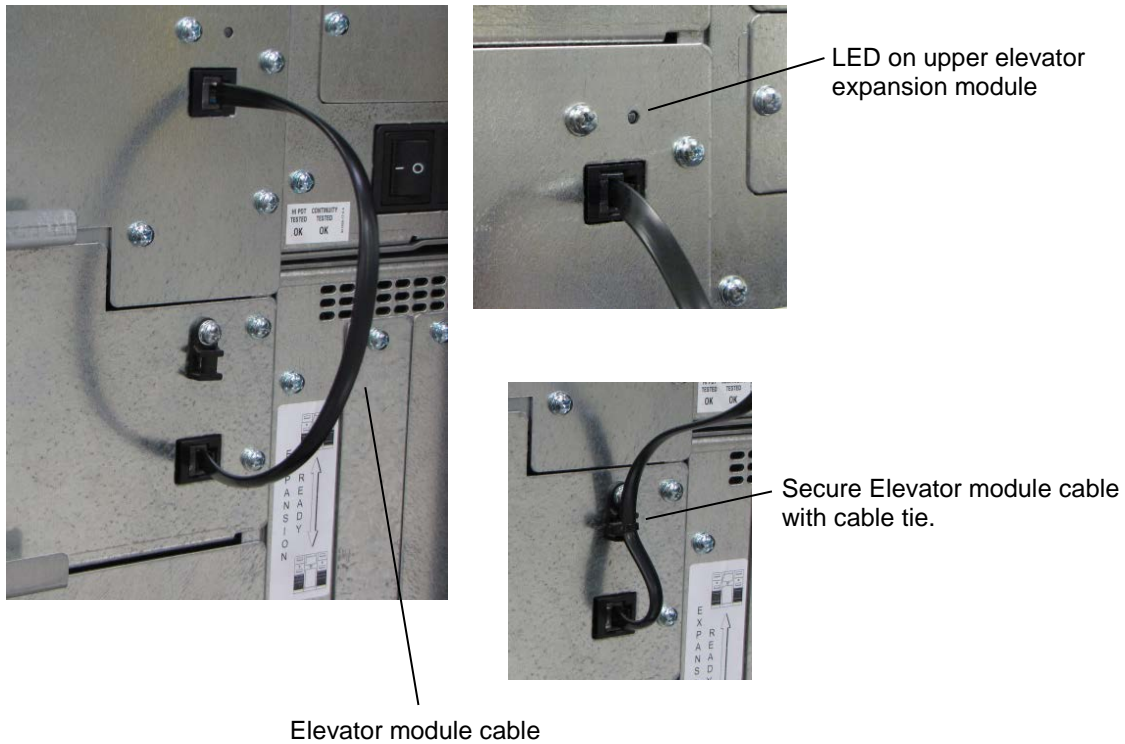
Figure 5-22   The Elevator Module Cable and LED on Upper Module

21.  There is a small LED light on the upper elevator expansion module where green indicates that power and data connectivity are good between the upper and lower modules. A red LED is an indication that one end of the cable is not attached correctly or one of the libraries is not powered up.

22.  Once the black elevator module cable is attached between the libraries, attach the power cords to the libraries and turn the main power switch on the rear of the libraries to on. The standby power switch on the front of the libraries will begin flashing. Press and release the standby power switch to fully power up the libraries.

23.  Once both machines are powered up a message will appear on the Home Page screen stating that a calibration needs to be performed. See Figure 5-23.
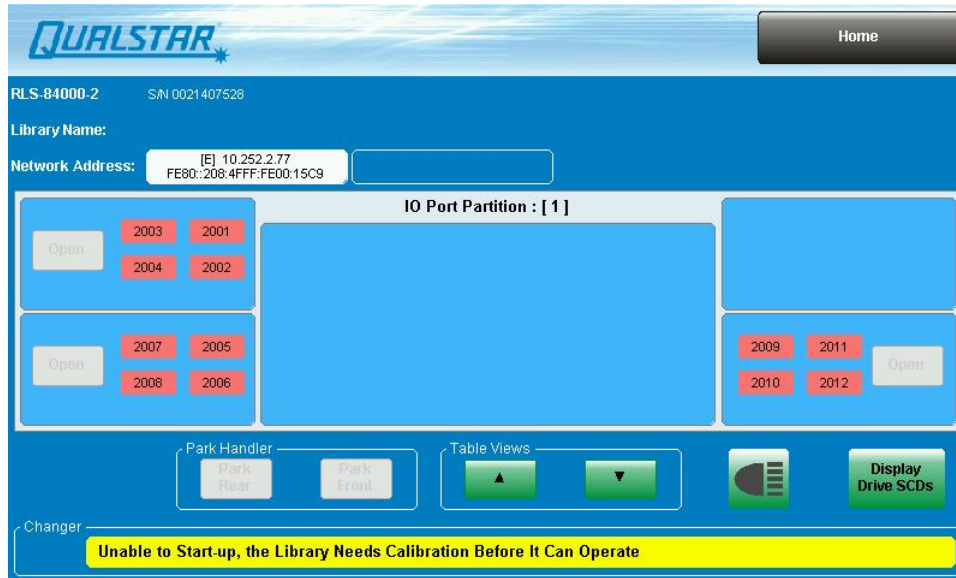
Figure 5-23  Calibration Needed Message on Bottom of Home Page Screen

**24.** To perform the calibration procedure the Maintenance/Operations page must be accessed. Press the Home button to access the Menu Navigation Screen.

**25.** The Menu Navigation screen provides direct access to all the control panel views. See Figure 5-24. Locate and press the Maintenance/Operations button. This will bring up a screen that provides access to the calibration control screen, shown in Figure 5-25
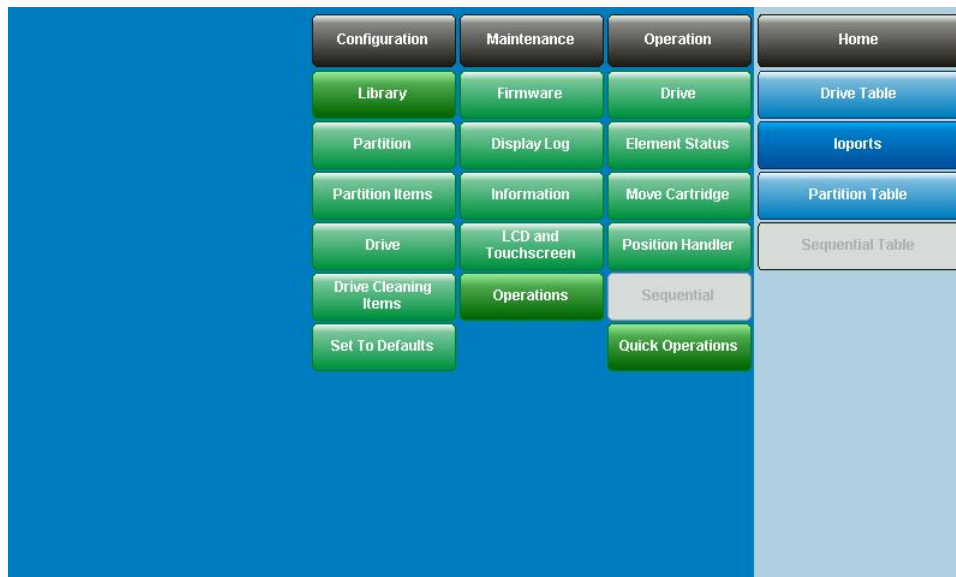


Figure 5-24  Control Panel Menu Navigation Screen

**26.** The Maintenance/Operations/Calibration page should now be visible and the Calibration page is the first sub-page as shown in Figure 5-25.
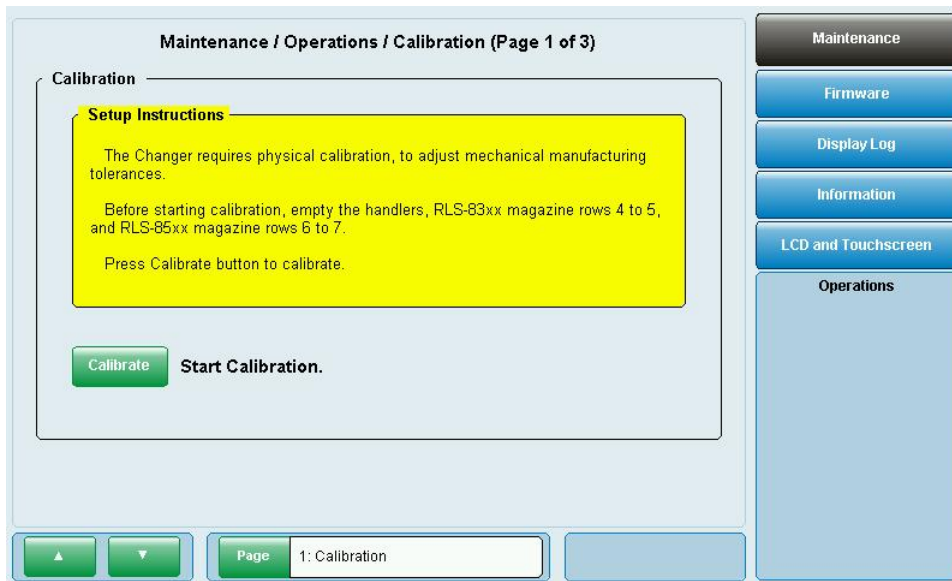


Figure 5-25   Maintenance/Operations/Calibration Screen

**27.** Before starting calibration the handler and storage array magazine, review the Setup Instruction highlighted in yellow, for the specific magazine rows that must be emptied of any tape cartridges in each library cabinet.

**28.** Press the Calibrate button to begin the calibration process, which may take several minutes to complete.

## 5.2.5 Removing the Optional FastPass Elevator Expansion Module

The following instructions will describe removing a FastPass elevator expansion module between two libraries, however additional libraries can be disconnected by repeating the procedure.

1. If the libraries are powered up, press the Park Rear button on the Park Handler section of the libraries Home Page to move the handler to the rear of the library. See Figure 5-14.

2. Remove power from both of the libraries by first pressing the power switch off and then removing the power cord (two power cords if dual-redundant power supply modules are installed).

3. Remove the black elevator module cable that is attached between the libraries.

4. Use a Number 2 Phillips screwdriver to remove the eight screws that secure both the upper and lower elevator expansion units.

5. Carefully slide the **lower** elevator expansion unit out from the lower library.

### CAUTION

*It is important to visually confirm that the elevator mechanism is in its upper position before attempting to remove the upper elevator module from the library. Damage to the module can occur if the elevator is in its lower position when it is being removed.*

6. Look through the opening where the lower elevator expansion unit was removed and confirm that the elevator mechanism is in its upper position as shown in Figure 5-26. If it is not in this position, reach into the library and push it upwards until it is completely in the upper position.

Elevator Mechanism in
It's upward position.

Figure 5-26   Elevator Mechanism in its Upper Position

7.   Carefully slide the upper elevator expansion unit out from the lower library.

8.   At this point new upper and lower elevator modules may be installed, or the panels originally on the libraries may be installed.

9.   If the panels are to be installed, use a Number 2 Phillips screwdriver and the eight screws from removing the modules to secure the panels as shown in Figure 5-27.
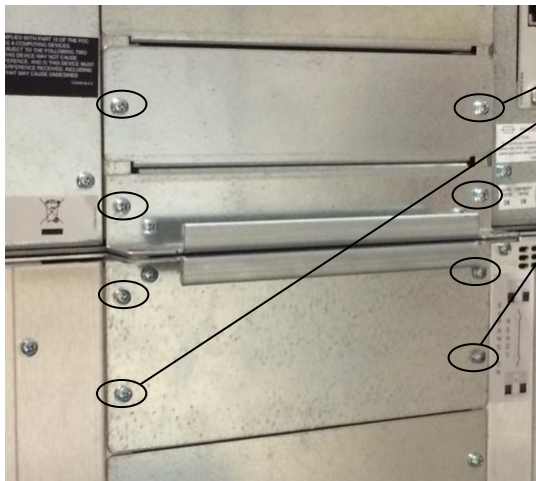


Secure with 8 Phillips head screws.

Figure 5-27   Screws shown securing the panels to the Upper and Lower Libraries

## 5.2.6     Removing the Library from the Rack

<div align="center">

*DANGER*

</div>

> THE RLS WEIGHS UP TO 103 LBS (47 KG) ), INCLUDING STORAGE MATRICES
> AND TAPE DRIVES AND A MINIMUM OF TWO PEOPLE ARE NEEDED TO LIFT
> IT. HANDLING THE RLS ALONE COULD RESULT IN BACK INJURY OR OTHER
> ACCIDENTS.

1.  Remove power from the RLS by first pressing the power switch off and then removing the power cord.

2.  Disconnect any other cables from the RLS.

3.  If the storage matrices have not already been removed from the library, follow the procedure described in Section 5.7.5 to remove them.

4.  For RLS-8560 libraries ONLY follow steps 5 through 12 to remove the storage matrix assembly blank.

5.  The blank is secured to the RLS with two captive screw fasteners, which can be reached by inserting a hand through the opening created when the left side storage matrix is removed. This is the preferred and simpler option, however if the screws cannot be accessed through this opening the face of the user interface panel assembly can also be removed (step 8).

User Interface Panel Assembly

Storage Matrix Assembly Blank
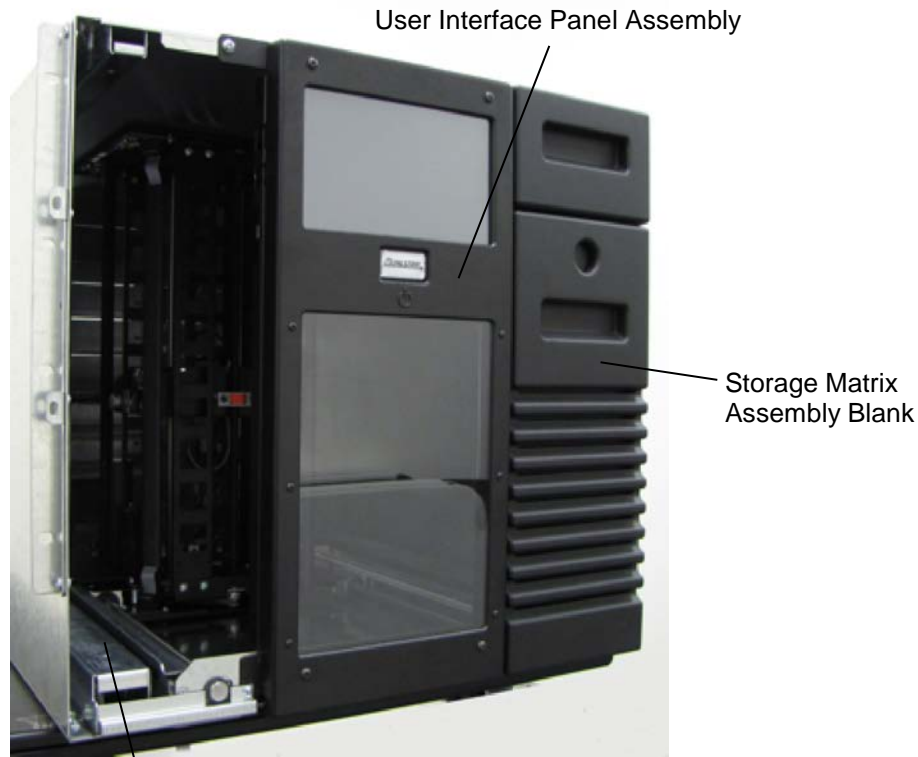
Left Side Storage Matrix Removed

Figure 5-28   Storage Matrix Assembly Blank on front of RLS with Left Side Storage Matrix Removed

6.   Two large tabs at the top and bottom of the Storage Matrix Assembly Blank have a single captive screw in each of them that secures it to the RLS. A flashlight and/or a small mirror may be helpful to see the exact location of the two screws.

7.   Reaching into the RLS through the left side storage matrix opening, engage the two captive screw fasteners and turn them counter clockwise until they are fully loosened. If the screws can be reached, skip to step 13, otherwise follow the next step to remove the face of the user interface panel assembly.

8.   If the screws could not be reached through the left side opening, there are four screws securing the face of the user interface panel assembly to the RLS. Removing the assembly will allow for easier access to the screws.

9.   Using a 3/32 Allen wrench remove the four screws shown in Figure 5-29 that secure the user interface panel assembly. Use caution to avoid damaging the touch screen while using the wrench.

User Interface
Panel Assembly

Remove these 4 Screws
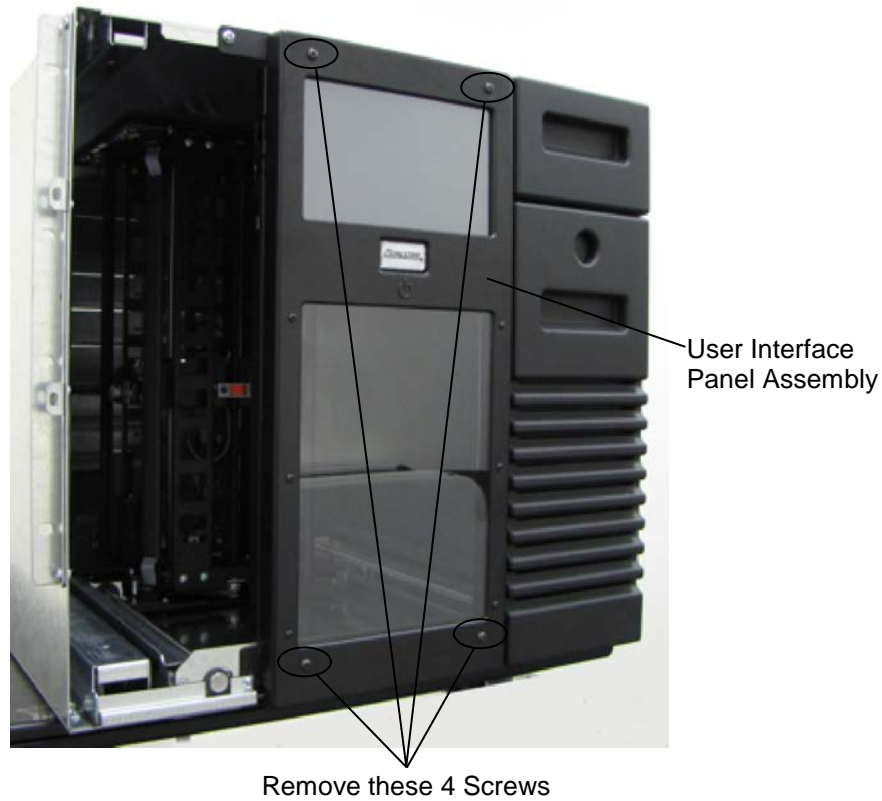
Figure 5-29   Screws shown securing the face of the User Interface Panel Assembly

10.   Once all four screws are removed carefully pull the panel off from the user
interface assembly and set aside.

11.   Now reaching into the RLS through the opening below the touch screen, engage
the two captive screw fasteners and turn them counter clockwise until they are
fully loosened.

12.   Once both screws from the Storage Matrix Assembly Blank are loosened,
carefully pull it off the RLS and set it aside.

13.   Use a Number 2 Phillips screwdriver to remove the two screws (one on each side)
that secure the library to the front rack posts.

Flange

Remove both screws to release
the library from the rack
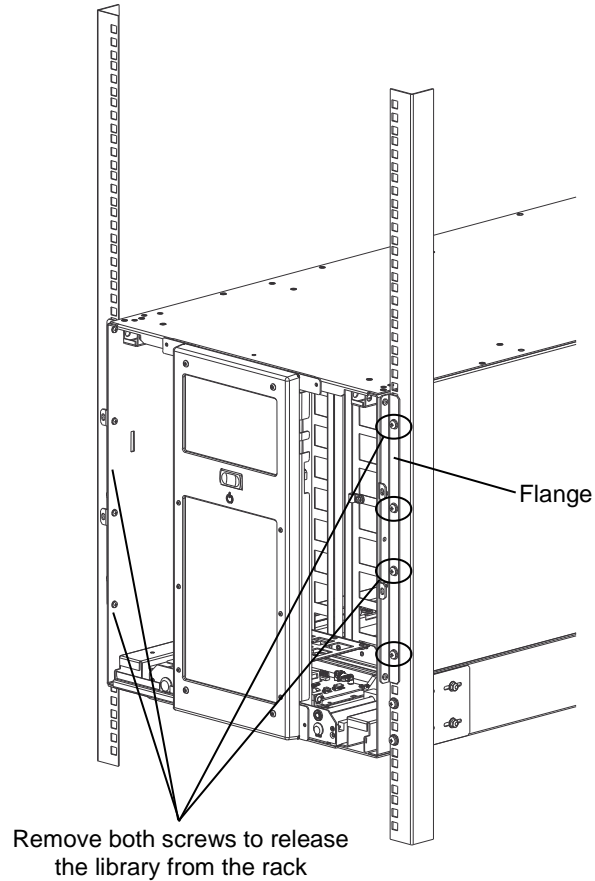
Figure 5-30   Removing the screws that secure the Library to the Rack (RLS-85XX shown)

**14.**    Slide the library out on the rack rails until about 8 inches is sticking out the
front of the rack posts.

**15.**    The front hand holds must be installed on the library before it can be slid all the
way out of the rack. Please contact Qualstar Technical Support for a replacement
set if the front hand holds that originally shipped with the RLS cannot be
located. Use a Number 2 Phillips screwdriver to install the two screws that
secure the hand holds to the left and right sides of the RLS.

Install these 2 Screws to
secure a Hand Hold
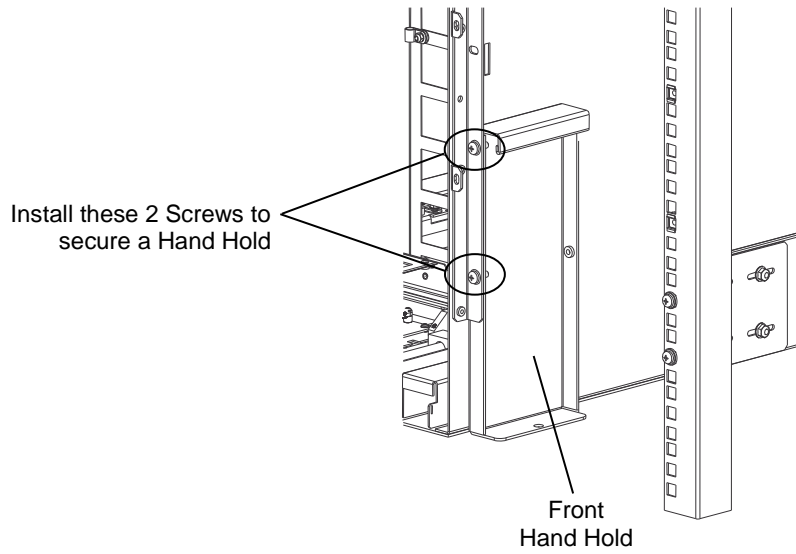
Front
Hand Hold

Figure 5-31  Installing the Front Hand Holds on the Library

16.  With the front hand holds installed, have two or more people slide the library out of the rack and lift the library by grabbing the front and rear hand holds as seen in Figure 5-32.



Front
Hand Holds

Rear
Hand Hold
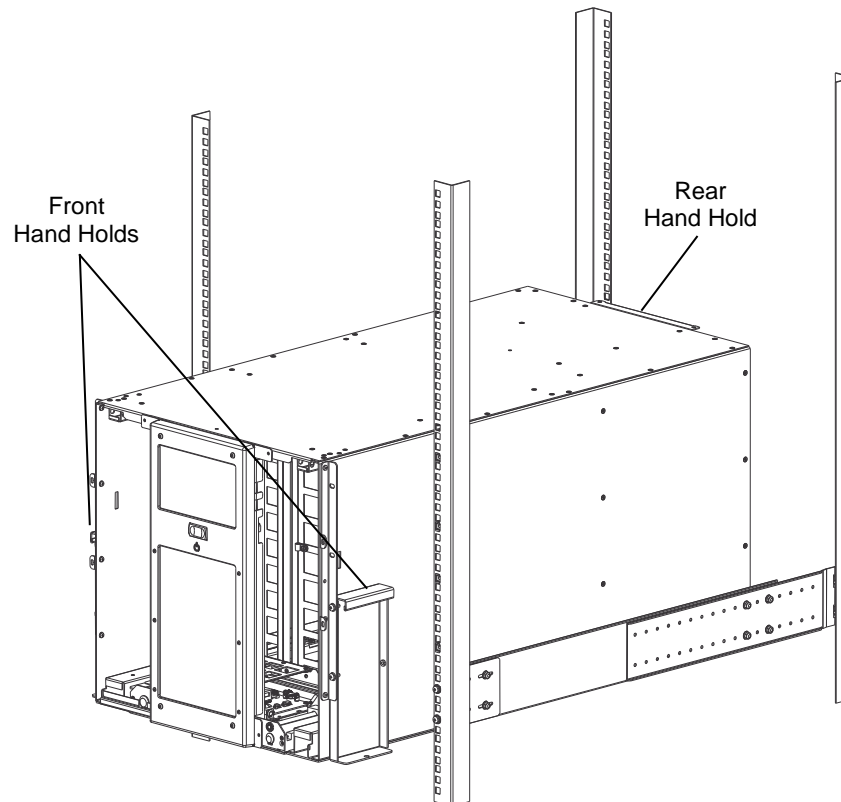
**Figure 5-32** Library ready to be removed from the Rack (RLS-85XX shown)

     **17.** Carefully place the library down on a sturdy surface.

## 5.3 Quick Check

We recommend powering up the RLS after it has been mounted in the rack to verify that it is functional.

**1.** Attach the power cord to the RLS and the mains supply.

**2.** Turn the main power switch on the rear of the RLS to on. The standby power switch on the front of the library will begin flashing. Press and release the standby power switch to fully power up the library and the control panel will display the Home page. Note that both storage matrices must be locked for the library to become ready. Any changer status or fault messages indicate a problem that must be resolved.

**3.** To completely power off the RLS turn the main power switch on the rear of the library to off. Then remove the power cord.

## 5.4 Cable Connections

This RLS Series library has the simplified ADI (Automation Drive Interface) interface, which eliminates the separate SCSI or Fibre Channel interface to the robotic Medium Changer. It utilizes unused bandwidth on the first tape drive (T1) for the robotics interface or the first drive in each partition if the library is partitioned.

You need only connect to the SAS or Fibre Channel drives.

### 5.4.1 External Cable Requirements

For SAS, Qualstar and the drive manufacturer, IBM, recommend a 6Gb HBA with external SFF-8088 SAS connection(s). Each external connector can fan out to up to four (4) drives. Port expanders are not recommended. The maximum length for SAS cables is eight meters. Please refer to Product Information Note # 46 for Cable considerations. Also, make sure the BIOS, firmware and driver are current for the SAS HBA.

For Fibre Channel, connect an FC cable from your FC switch to each drive. For small configurations, the drives may be direct-connected to a Fibre Channel HBA, with one port on the HBA for each drive. In the direct-connect scenario, if the drive fails to negotiate with the HBA, please unplug one end of the FC cable and re-connect. Note that LTO drives have an 8Gb FC interface, which will negotiate 2Gb, 4Gb, and 8Gb but not 1Gb.

## 5.4.2 Cable Connection Examples

Figure 5-33 shows some of the possible connection schemes.
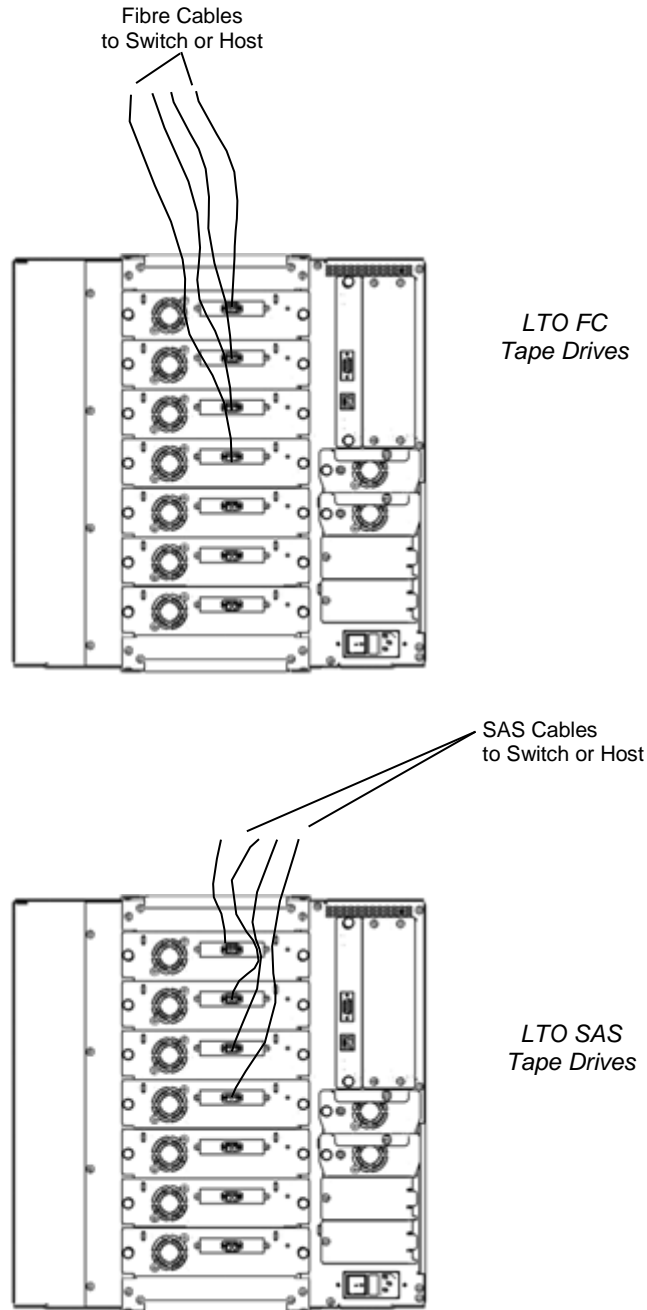


Figure 5-33   Connection Examples (RLS-85XX shown)

## 5.5    Tape Drive Installation

All tape drives used in the RLS are factory installed in a plug-in drive carrier assembly. This assembly is pre-tested and ready to plug into the RLS drive bay. RLS units are normally shipped with the drive carrier assemblies installed and ready to run. However, if you are installing your own drives, this section will lead you through the process. This procedure is also used when replacing a tape drive. Drives may be installed and removed while RLS power is on. If an RLS does not have all of its tape drives installed, drive fillers must be installed in the empty drive bays. See Section 5.5.3.

### 5.5.1    Installing a Tape Drive

*NOTE*

*Any tape drive may be inserted or removed while the others are running.*

To install a tape drive, simply slide the assembly into an open drive bay and secure it with the two thumbscrew fasteners.
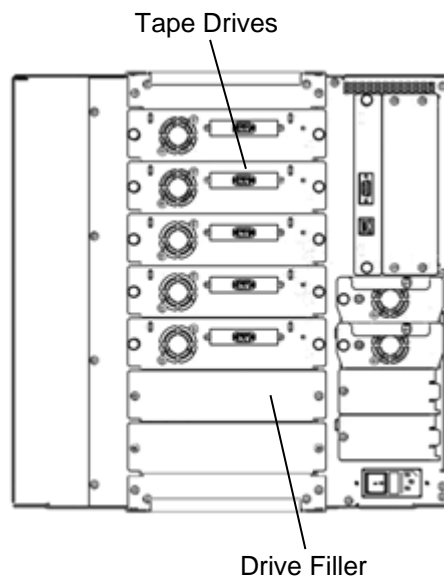


Figure 5-34   Drive Carriers and Drive Fillers on Rear Panel (RLS-85XX shown)

### 5.5.2    Removing a Tape Drive

Loosen the two thumbscrew fasteners on the drive assembly and slide it out from the drive bay.

### 5.5.3    Drive Fillers

If an RLS does not have all of its tape drives installed, drive fillers must be installed in the empty drive bays. The appropriate amount of drive fillers for empty drive bays were included with the RLS if it was ordered without a full compliment of tape drives. Please contact Qualstar Technical Support if additional drive fillers are required.

To install a drive filler in an empty drive bay, simply slide it into the drive bay and secure it with the two thumbscrew fasteners.

## 5.6    Media Handling Precautions

### 5.6.1    General Precautions

Note that tape cartridges are fragile and can be damaged if mishandled. Observing the following guidelines will help to prevent damage to tape drives and/or tapes cartridges.

- When outside of a library, always keep tape cartridges in either their protective plastic case or a covered magazine.

- When carrying more than one LTO cartridge, always orient the cartridges the same way and stack them together. Their cases are designed to interlock to each other to prevent them from slipping apart.

- Never stack the tape cartridges more than five high.

- Before a cartridge is inserted into a tape drive, it should be allowed to acclimate to the operating environment for at least 24 hours. This may be done in the same room as the library or inside the library. Inserting a very hot or cold cartridge into a tape drive could damage both the cartridge and the drive.

- The ideal archival environment for storing tape cartridges is at a temperature range of 64°-79° Fahrenheit and a relative humidity of 40 to 60 percent.

- Make sure to stand each cartridge vertically, when placing them in archival (long term) storage. This means that magazines with cartridges should be stored in a horizontal orientation.

- Avoid placing tape cartridges near any source of high intensity magnetic fields, such as monitors or electric motors.

- Never apply adhesive labels to the tape cartridge anywhere except in the recess provided on the front side (same side as the write-enable/protect switch). Labels applied elsewhere could cause the cartridge to become jammed inside a tape drive or magazine.

- Do not apply more than one label at a time in the recess provided on the front side. If a new label is to be applied, completely remove the old one first.

- Only use ink when writing on labels. Lead pencils, grease pencils, etc. can produce debris that can cause data errors.

- Do not carry cartridges loosely in a container. Allowing them to bang together creates undesirable physical shock.

- Do not touch or allow direct contact with the tape or tape leader. Dust or natural skin oils can contaminate the tape and impact performance.

- Do not expose the tape cartridge to moisture or direct sunlight.

- If a cartridge has been dropped, do not load it into a tape drive as the drive could be damaged.

## 5.7    Installing Media

### 5.7.1    Static Precautions

Before handling tape cartridges, it is a good idea to eliminate any static charge that may exist. To protect the data stored on the tape cartridges, just follow this simple procedure before loading, moving, or removing any tape cartridges: touch the rack the RLS is mounted in, or if it's not rack mounted, touch one of the bright screws on the cabinet sides just prior to handling the media.

### 5.7.2    Media Selection

The choice of media for use in the RLS is important. Only media approved by the tape drive manufacturer and Qualstar should be used in the RLS. Non-approved media can cause numerous hidden problems that aren't readily apparent. Media sold by Qualstar is certainly approved for use in the RLS. Please refer to Product Information Note #038 for the current list of approved media sources.

### 5.7.3    Write Enable Tabs

All of the tape formats supported by the RLS utilize Write Enable Tabs that determine if the tape can be written upon. When disabled or protected, tapes can only be read – not written or appended.

The following figure depicts the Write Enable Tabs for LTO media. Brand new media must be write enabled for obvious reasons.

IBM
Tape Cartridge



Write Enable/Protect
Tab Window
(shown unlocked)

HP
Tape Cartridge
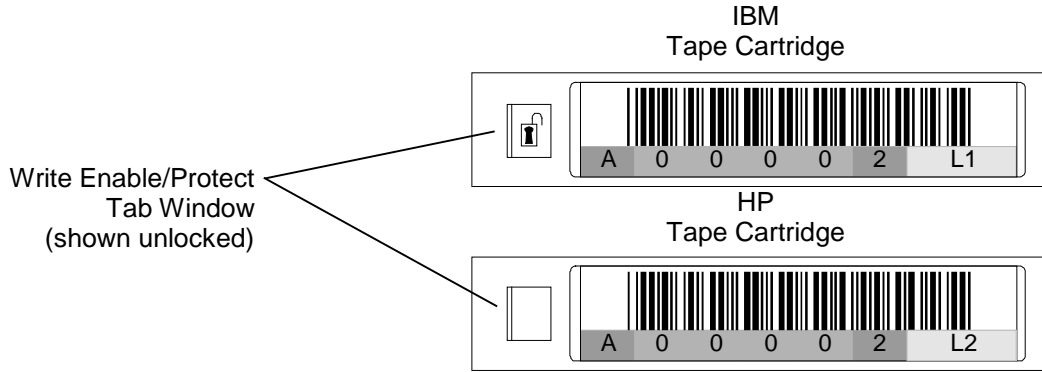
LTO cartridges are write protected when the Enable/Protect tab is moved to the right. Cartridges will show a "locked" symbol on the face of the tab.

Figure 5-35   LTO Media Write Protect Tab

## 5.7.4     Loading a Storage Matrix with Tape Cartridges

Storage matrices may be loaded prior to or after installation in the RLS. For the initial load, it's faster and easier to load the matrices with tape cartridges prior to installing them into the RLS. Make certain that cartridges are properly oriented, and for new media, be certain to set the Write Enable tab to its enabled position before installing. Refer to Figure 5-36.



Record-Protect Tab

Shown in the recordable position.
(Read-Only is when the tab is closed)
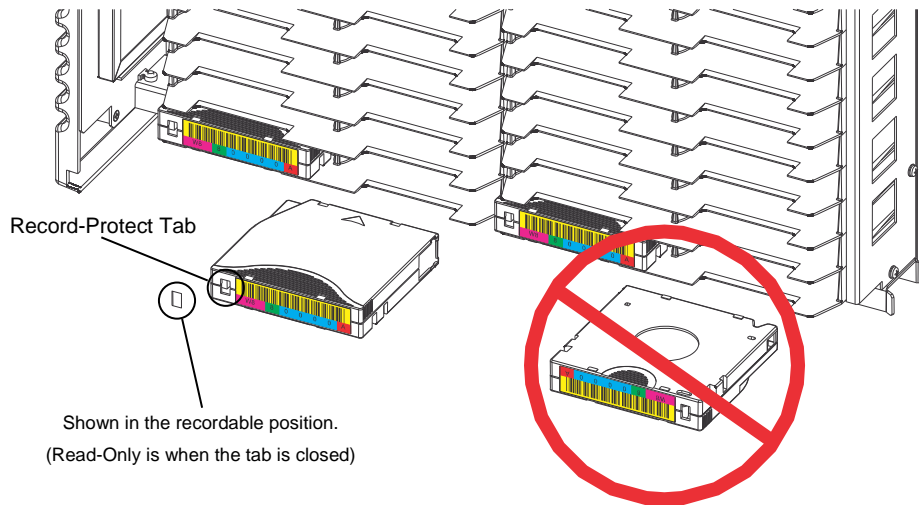
Figure 5-36   Loading LTO Media into a Storage Matrix

*Improperly installed tape cartridges will not fully seat in the slots and may prevent installation of the storage matrix in the library.*

## 5.7.5 Bulk Loading Media in Storage Matrices

Cartridges are easily installed and removed without the use of tools. Note that matrices are key locked only and the library cannot prevent a user with a key from opening them.

1. Unlock the left or right storage matrix with the key. See Section 6.2 for details.

2. Grasp the matrix at the indentation on its front cover below the key lock.



Figure 5-37   Storage Matrix Indentation

3. Carefully slide the matrix out from the front of the RLS until it stops.

4. There is a handle built into the top of the storage matrix that must be turned 90 degrees so it is pointing up. When this handle is in the up position the matrix is ready to be completely removed from the library.
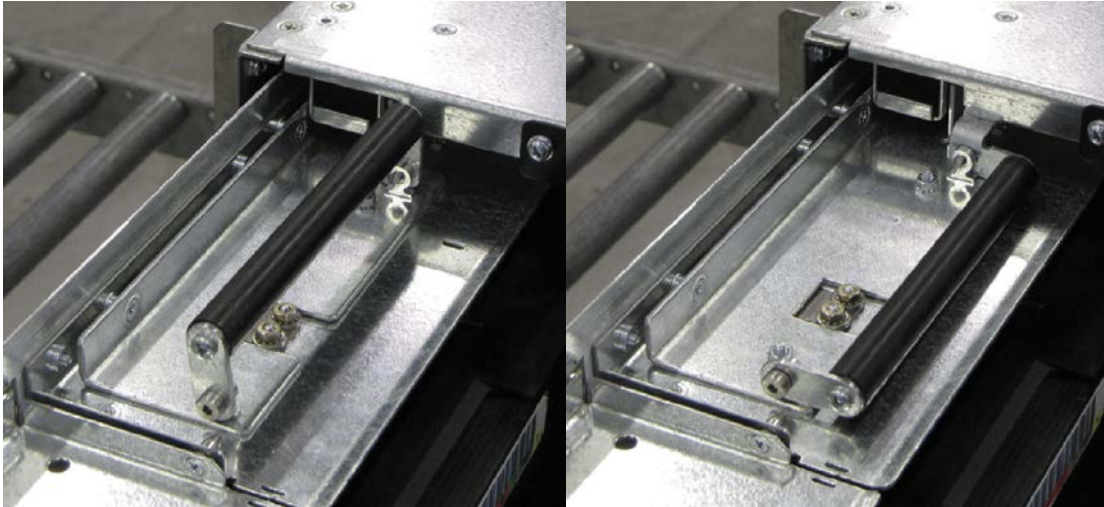
Folded up for removal.               Folded down for replacement.

Figure 5-38   Storage Matrix Top Handle

*CAUTION*

*A storage matrix may be heavy when loaded with tapes and caution should be taken to securely grasp the top handle when removing it or inserting it into the library. Tilting the storage matrix when it is outside the library may cause tapes to fall from the storage slots and become damaged.*

5.  While securely grasping the top handle of the storage matrix and using your other hand to guide it, slide the matrix out of the library.

6.  Place the storage matrix on a stable surface. It may be set upright or on its back.

7.  Cartridges may now be loaded into the matrix. Make certain that cartridges are properly oriented, and for new media, be certain to set the Write Enable tab to its enabled position before installing.

8.  When all the cartridges have been loaded into the matrix it is ready to be placed into the library.

9.  While securely grasping the top handle of the storage matrix and using your other hand to guide it, align the matrix with its slots in the library.

10.  Carefully slide it in until the handle on top of the matrix makes contact with the library.

11.  Fold the handle down 90 degrees so it will clear the libraries frame and continue to slide it all the way into the library.

**12.** Lock the storage matrix with the key. See Section 6.2 for details.

## 5.7.6    Checking the RLS Configuration

At this point, the tape drives, magazines and cartridges have been installed, and the cables have been connected. Also, the RLS power has been turned on where needed and the Medium-changer has proven to be basically functional (successful completion of the power-up sequence). The Medium-changer is now configured to the default values for use with the drives and with the host computers.

## 5.7.7    Testing Basic SCSI Operation

The MC, can now be tested to verify that it responds correctly to commands from the host. The simplest way of doing this is to issue a Test Unit Ready command to the MC. If the changer returns a GOOD status, then it is certain that the SCSI communications protocol and the cables are operational. Once the Media-changer returns a GOOD status, the system is ready for a more thorough checkout.

For the factory-default settings the host must be attached to the top most drive.

SAS and fibre channel are both point-to-point connection schemes that use the WWN to identify each device. To identifying which drive is in which library position in Windows systems, please use the following commands, which are part of the QuickConf package, available from Qualstar Technical Support.

1. `scanscsi *,*,*`        (to determine [id],[lun],[host])

2. `readelem [id],[lun],[host] e:4 voltag`   (to Library result of  scanscsi)

3. `inquiry [id],[lun],[host] v:128`        (each Drive result of scanscsi)

4. match s/n in `readelem` to s/n from `inquiry` to each drive.

The factory-default settings are sufficient for 90% of the SCSI applications in the field. This means that in nine out of ten installations, the system will transfer data and function normally. Some systems, however, may not function optimally using the factory-default settings. For example, the application may require a particular SCSI Inquiry string, which differs from the default inquiry string. Refer to Chapter 9 for additional information on configuring the RLS. The default inquiry strings are:

- "RLS-8350"
- "RLS-8560"
- "RLS-85120"

# 6.                    The Operator Interface

The library's functions can be controlled through the control panel. Manually operated I/O ports slide out from the front panel, and can be electronically locked. Bulk loading can be accomplished by removing the right or left storage matrix. Figure 6-1 shows the various features of the front panel. The library may be configured to continue operation while either of the I/O port(s) is extended.
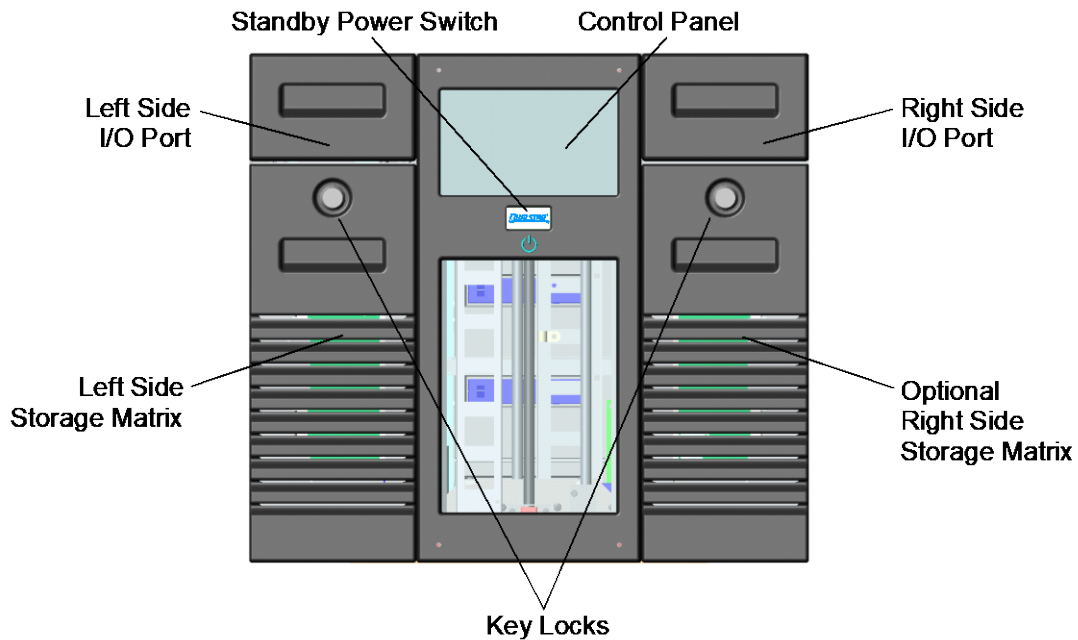


Figure 6-1   RLS Front Panel (RLS-85XX shown)

## 6.1     The Standby Power Switch

The standby power switch allows control of the library's power from the front panel.

## 6.2     The Key Locks

The storage matrices are secured with a key operated lock. The library will not become active unless the key lock(s) is in the locked position. See Figure 6-2.
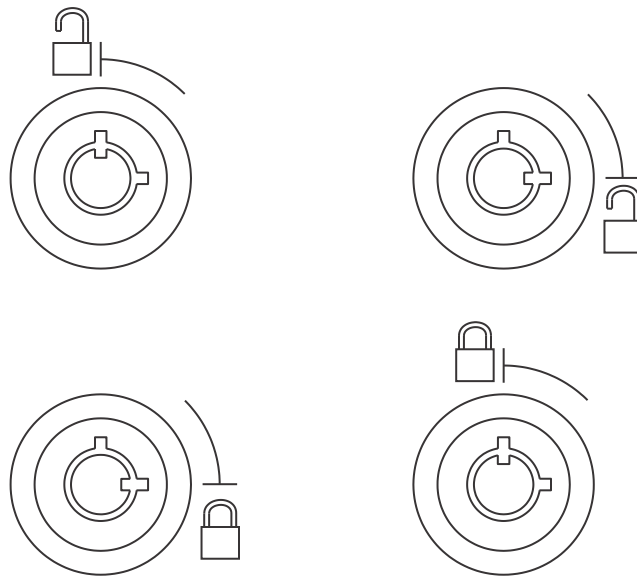
Left Side Storage Matrix          Right Side Storage Matrix

Figure 6-2   Key Lock Positions

## 6.3     Control Panel

The control panel is a color LCD with a touch screen overlay. The operator may use the control panel menus to configure and operate the RLS and monitor its status. It can also be used to add or remove cartridges.

*NOTE*

*You can perform library functions locally, using the touch screen, or remotely, using a PC with an Ethernet connection to the RLS. Although the instructions in this manual are written for someone using the touch screen, they can be adapted easily for use with a remote WEB browser. The interface page menus are very similar to the Control Panel menus.*

### 6.3.1    The Touch Screen

When the library is powered on the Home page will display as the first of five main pages that the library contains. The touch screen is designed to be used with just a finger tip, although a stylus may be used if desired.
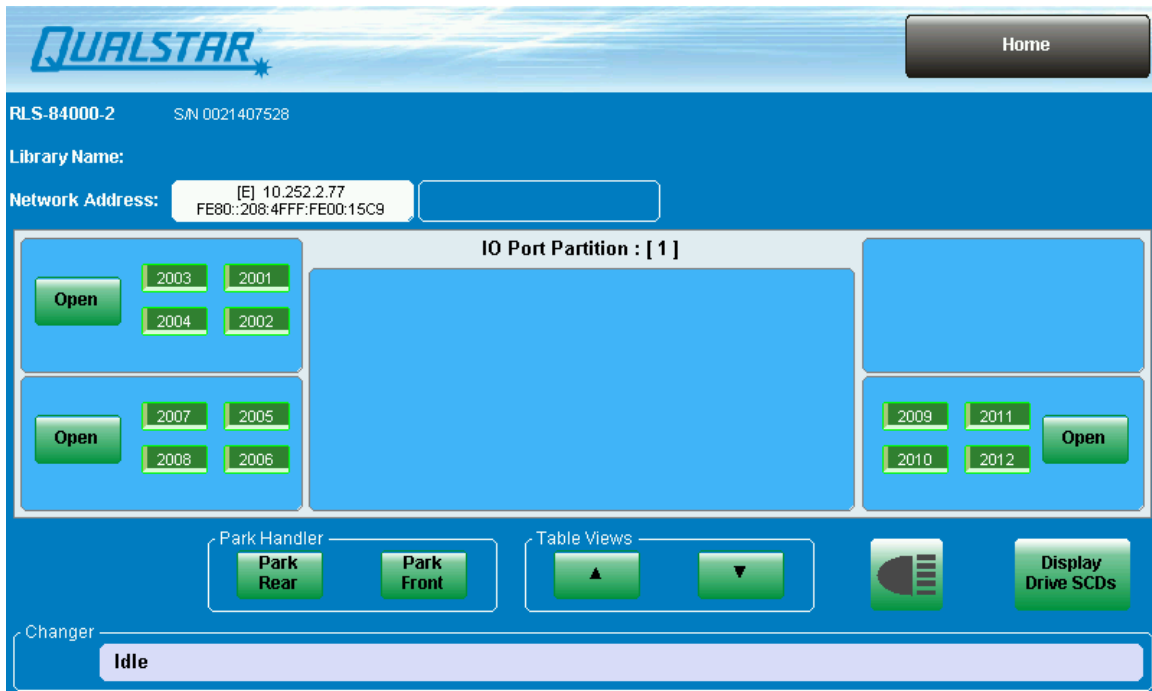
Figure 6-3   The Home Page

The five main pages (Home, Operation, Maintenance, Configuration and Private) are accessed by pressing dark gray page title button box the top right of each page column. See Figure 6-4. Note that the Private page is password-protected for the protected service pages and will not appear unless the appropriate Qualstar password has been entered. It is intended only for use by field service personnel.
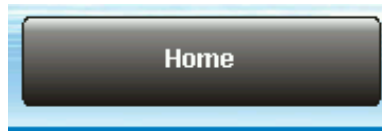


Figure 6-4   Page Title Box

Pressing the page title box, the dark gray button at the top right of the screen, alternates between the main page screen and the menu navigation screen shown in Figure 6-5.
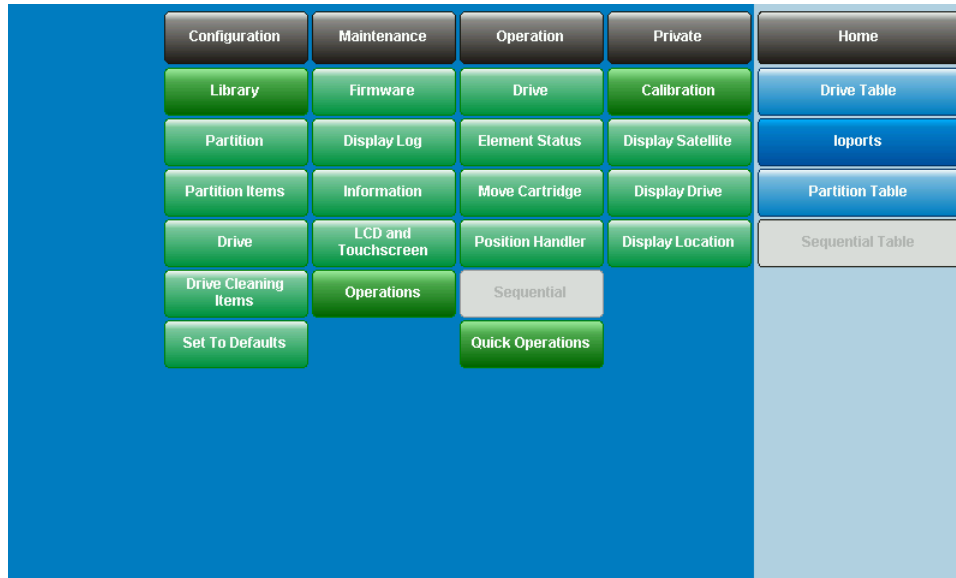
Figure 6-5   Menu Navigation Screen

The top row of the Menu Navigation screen provides direct access to the main page of the Operation, Maintenance, Configuration and Private menus. Each main page contains sub-pages that allow additional information to be displayed or commands to be performed. Press the dark gray Operation button, to select the Operation menu page, as seen in Figure 6-6.



Figure 6-6   Main Operation

These sub-pages are accessed by pressing the boxes on the right side of the screen underneath the page title box. As seen in Figure 6-7, the Operation page contains Drive, Element Status, Move Cartridge, Position Handler and Quick Operation sub-pages.



Figure 6-7   Operation Page Sub-pages

When there are additional tables or pages to be displayed in the main field of a page a set of up and down arrow buttons will be shown. See Figure 6-8. Pressing either of these arrows will allow for scrolling through the pages.



Figure 6-8   Up and Down Arrow Buttons

When libraries are interconnected by the FastPass elevator expansion option, some of the menus will change slightly to represent the individual libraries and/or the additional quantities and capabilities of the interconnected models. As shown in Figure 6 9   Menu

examples from Libraries with the FastPass Elevator Expansion Option, the graphics on the left show that the inventory view of two attached libraries can easily be toggled by pressing the 1 or 2 button on the left side of the touch screen. On the right side of Figure 6-9 it shows that two attached RLS-85XX libraries having up to 10 partitions while a single RLS-85XX having 5 partitions. The maximum number of partitions is equal to the maximum number of tape drive locations.
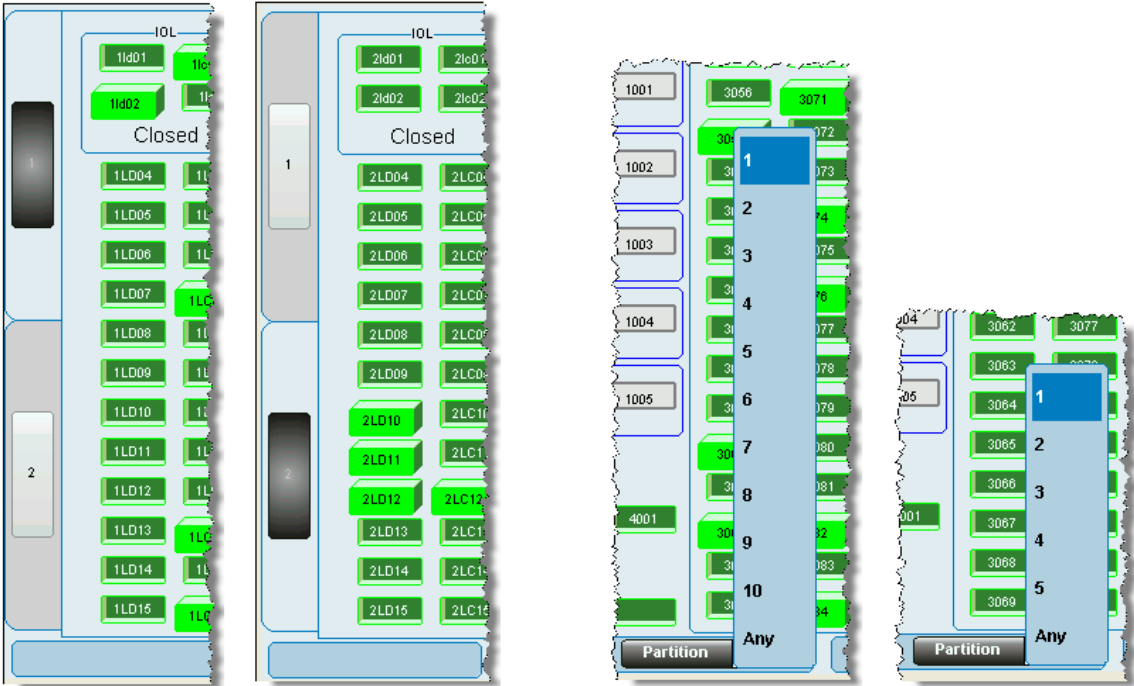


Figure 6-9   Menu examples from Libraries with the FastPass Elevator Expansion Option

As shown in Figure 6-10 the graphics on the left show the inventory view of the first of two attached library cabinets. The middle graphic shows the inventory from the second library cabinet and by double tapping on either the 1 or 2 (when highlighted) on the left side of the touch screen a global view will appear, which shows the inventory of both libraries on the same screen.
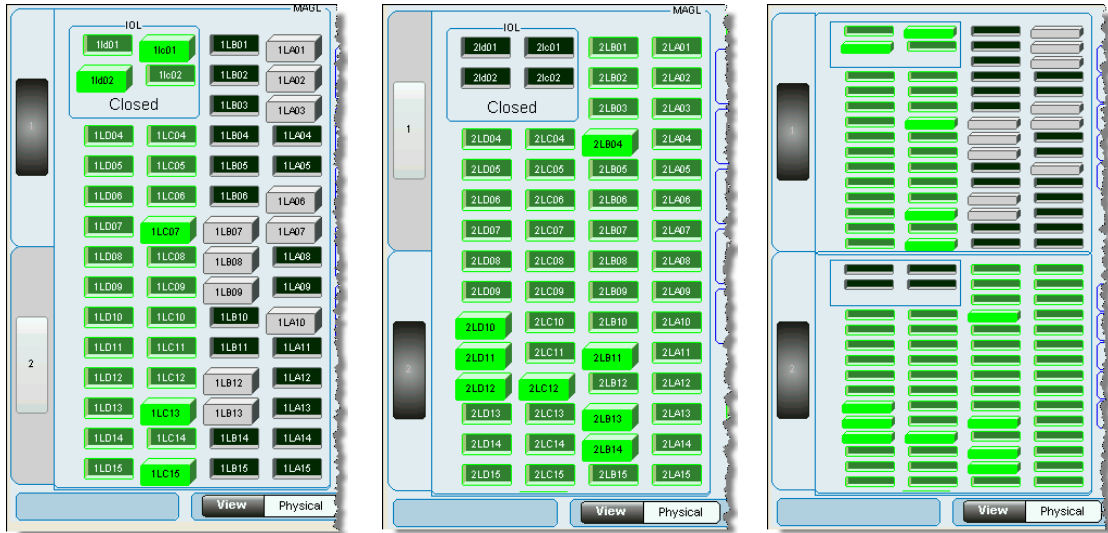
Library Cabinet 1 view  Library Cabinet 2 view  Global View combining Library Cabinet 1 & Library Cabinet 2

Figure 6-10 Additional menu examples from Libraries with the FastPass Elevator Expansion Option

This page left blank intentionally.

# 7. Home Page

## 7.1 Introduction

The Home page is the first screen that appears after the library is powered on.
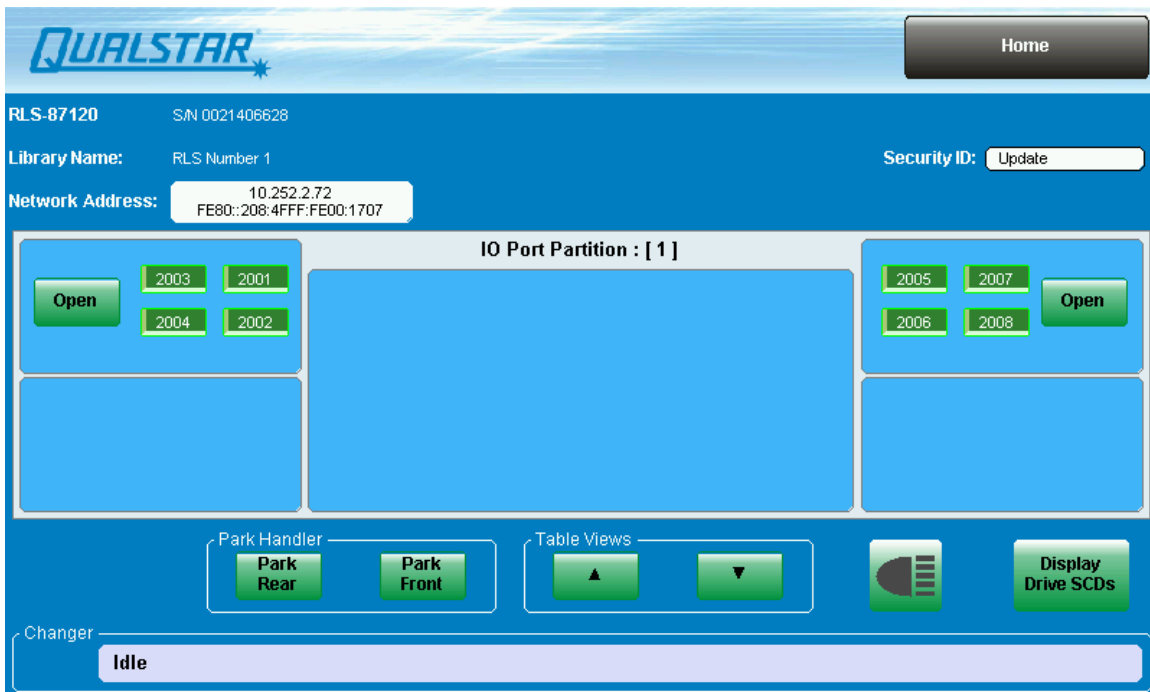


Figure 7-1 The Home Page – IO Ports

The following information is displayed at the top of the Home page:

- A unique descriptor for the library, including the model (for example, RLS-xx120, followed by the serial number of the library), the physical library name (for example, RLS Number 1) and the address (the IP address of the library). Note that multiple network addresses can be displayed for each library connected with the FastPass elevator expansion option.

- The current Security Id level (indicates which Qualstar password controlled level has been entered into the library). Under normal operation, this is not present, to indicate that no password has been entered.

## 7.1.1    Partition View

The table in the middle of the Home page displays information on the amount of partitions the library contains as well as information on the tape drives, which can be alternately viewed by pressing the up or down buttons in the Table Views area.



Figure 7-2   The Partition Screen

When shipped from the factory, all RLS-8350/85XX libraries have a single partition with all of its tape drives and storage slots dedicated to the random operation of partition number 1. However, when multiple hosts are present the library can be sub-divided into smaller logical libraries, which are referred to as partitions. Depending on how the resources are allocated a single RLS-85XX can have up to seven partitions while a RLS-8350 can have up to four. When the FastPass elevator expansion option is used, up to four RLS-85XX libraries can be interconnected for a total of up to 22 potential partitions. Table 7-1 describes the partition screen information displayed.

| Section | Field | Description |
|---|---|---|
| Partitions | Partition/Type | The number of partitions in the library and their type. |
|  | Encrypt | Does the tape drive(s) assigned to this partition allow the encryption of the data written on tape cartridges in the partition? Yes or No |
|  | Tapes | The number of cartridges assigned to each partition. |
| Slots | Present | Total amount of slots assigned to the partition. |
|  | Tapes | Number of cartridges currently in the partition. |
| IO Ports | Slots | The number of I/O port slots, if any, assigned to the partition. |
|  | Access. | I/O port slot can be accessed by the library. |
|  | Tapes | The number of I/O port slots that contain a cartridge. |
| Drives | # | The physical location of the tape drive (T1, T2, T3, T4, T5, T6 or T7 for a single library) When the FastPass elevator expansion option is used, the additional library locations will read: 2T1, 2T2… 3T1, 3T2, etc all the way up to 4T6 when four RLS-85XX libraries are interconnected. |
|  | Drive Status | Blank means a tape drive is not present. When a tape drive is installed the potential values are No Tape, Tape Loaded and Tape Unloaded. |
|  | Cleaning | Represents the cleaning status of the tape drive. |
|  | Tape Label | The value read from a barcode label attached to the tape cartridge. |

Table 7-1   Partition Screen Information

During typical day-to-day library operation, no human intervention is required to operate the tape drives in the RLS. Instead, the tape drives are controlled by the software applications.

Although the tape drives are typically controlled by the software, you may occasionally want to view information about their status using the tape drives screen.

| Tape Drives | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Drive | Partition / Type | Host Intf. | Model | Serial No. | FW Rev. | Clean | Primary WWPN | Secondary WWPN |
| T1 | 1 / LIBRARY | FC(nc) | IBM LTO5 | 1068021731 | B171 | None | 50:05:07:63:12:49:6F:4D | |
| T2 | 1 / LIBRARY | | | | | | | |
| T3 | 1 / LIBRARY | | | | | | | |
| T4 | 1 / LIBRARY | | | | | | | |
| T5 | 1 / LIBRARY | | | | | | | |
| T6 | 1 / LIBRARY | | | | | | | |

Figure 7-3   The Tape Drives Screen

Table 7-2 describes the tape drive screen information displayed.

| Field | Description |
|---|---|
| Drive | The physical location of the tape drive (T1, T2, T3, T4, T5, T6 or T7 for a single library) When the FastPass elevator expansion option is used, the additional library locations will read: 2T1, 2T2… 3T1, 3T2, etc all the way up to 4T6 when four RLS-85XX libraries are interconnected. |
| Partition/Type | The partition that the tape drive is assigned to / What mode the tape drive has been assigned (Disabled, Dual Bin, Library, Recycle or Sequential) |
| Host Intf. | The interface type of the drive will be listed: FC (Fibre channel) or SAS (Serial Attached SCSI) followed by the connection speed listed in parenthesis. For example: FC (3) represents a fibre channel drive with a connection speed of 3 Gigabits. If the tape drive has dual ports and both ports are connected that would look like the following example FC (3, 4). The possible speeds displayed range from NC (no connection) up to 10. |
| Model | The model of the tape drive (Manufacturer and tape format) |
| Serial No. | The serial number of the individual tape drive |
| FW Rev. | The revision of the firmware installed on the tape drive |
| Clean | Represents the cleaning status of the tape drive.. |
| Primary WWPN | The World Wide Port Name assigned to tape drives with a single fibre channel port and this will be the first connection for dual port tape drives. |
| Secondary WWPN | Some tape drives have two fibre channel ports and if the second port is connected its assigned WWPN will be shown here. |

Table 7-2   Tape Drive Screen Information

## 7.1.2    The I/O Ports Screen

Partition 1 incorporates this I/O Port

**IO Port Partition : [ 1 ]**
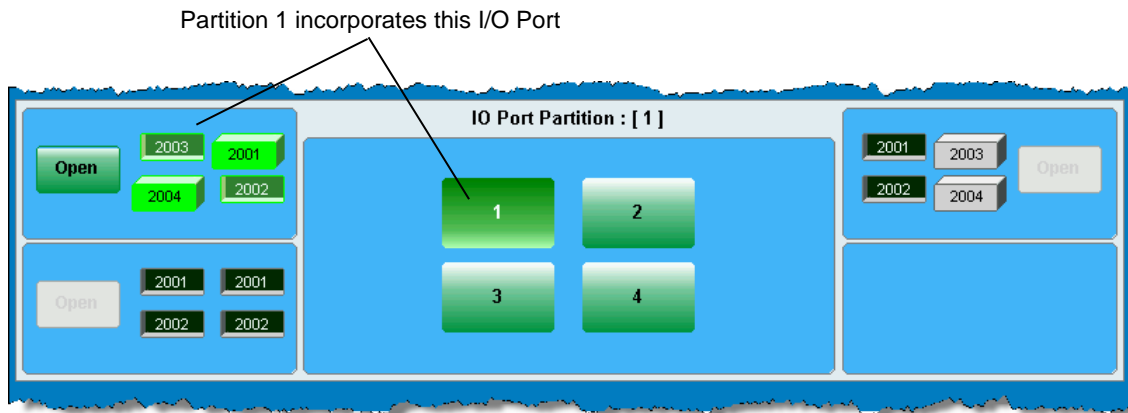


Figure 7-4   An I/O Ports Screen from Libraries using the FastPass Elevator Expansion Option

The I/O Ports screen shows a graphic representation of every I/O port in the library. A single library would have a maximum of two ports (one of the left and one on the right). When the FastPass elevator expansion option is incorporated, a total of four RLS-85xx models could be interconnected for a maximum of eight ports. If more than one partition has I/O Ports incorporated, the partitions will be represented by numbered buttons in the center of the screen. A maximum of 22 partitions are possible if four RLS-85xx models are interconnected.

Touching the Open buttons command the individual I/O ports to open. The I/O ports are closed by hand.

## 7.1.3    Quick Commands

The row of buttons directly below the table view screens allow for the handler to be parked and the interior lighting to be activated.



Parks the Handler

Turn the Interior Lighting On or Off

Display Drive SCDs
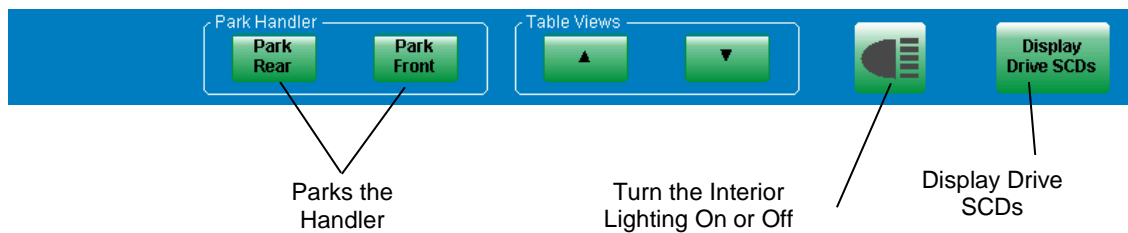
Figure 7-5   Quick Command Buttons

- Touching the Park Rear or Park Front buttons commands the handler (the robotics that handle the tape cartridges) to park itself at either the front or rear of the library

- Touching the interior lighting button turns the lights that illuminate the inside of the library on or off

- Touching the Display Drive SCD button, displays a table of library tape drives, and any SCD (Single Character Display) condition for the tape drive. See Figure 7-6.



Figure 7-6   Tape Drive SCDs

## 7.1.4    Changer Status

The Changer portion of the Home page is an informational text box that displays a summary of what actions the library is performing as well as alerts and error messages.

This page left blank intentionally.

# 8.    Resource Management

## 8.1    Introduction

The physical resources of a RLS tape library may be sub-divided for multiple purposes by allocating tape drives, I/O ports and storage locations to specific partitions. The Handler (the libraries robotics) is a shared resource that cannot be dedicated to any single task.

Except for cleaning cartridges, resources cannot be shared between two enabled partitions. A logical library partition is enabled when its Mode value is set to Library, Sequential, Recycle or Dual Bin.

A good example of dedicated resources is that of a Sequential tape drive and its allocated storage locations. A sequential tape drive looks to the host computer as a single tape drive with an operator supplying it with tapes. A host backup application that is not aware of tape libraries, can simply write its backup data to the drive until the tape becomes filled. It then causes the tape to be rewound and ejected from the drive. The changer can then automatically insert the next tape needed to continue the backup operation. The host application is completely unaware of how the next tape gets inserted into the drive as well as where the tapes come from and go to.

For this example to succeed in an automated tape library, one or more tape cartridges must be dedicated to the Sequential backup performed by the drive. To the changer (referred to as the Medium-changer in the SCSI specifications), the tape drive and a group of cartridges are reserved for that task. These dedicated resources cannot be used for any other purpose. If this example is all that is required of the changer, then only a single drive is installed and all of the cartridges are dedicated to this single task.

However, the RLS libraries are much more flexible than our example. They can perform three modes of sequential backups on multiple tape drives for multiple host systems while simultaneously running multiple random logical library operations with other tape drives and cartridge locations. Before the library is put to use, you have to decide how it is to be used and then allocate the available resources to meet the requirements. This chapter will deal with this task.

## 8.1.1    Element Addresses

From the SAS (or Fibre Channel) interface, cartridge locations are identified by their Element Address if the partition type is Library. Unlike the permanent and absolute Location designators, each SCSI element address is assigned by the RLS. Element addresses are 16-bit unsigned integers (0–65535). All elements of the same type (e.g. Storage) are numbered consecutively. Element addresses are only assigned to locations within a logical library partition (see Chapter 9).

## 8.1.2    Default Element Addresses

Element Addresses are initially assigned by the RLS in sequential order to each type of location. During address assignments, all locations within a sequence are always considered present, even if they are not physically present, e.g. a tape drive is not installed.

| Element Type | Physical Location (Model Dependent) | Default Element Addresses |
|---|---|---|
| Storage: Storage Matrices | LA01–RD15 | 3001–3108 |
| Data Transfer: | T1–T7 | 1001–1007 |
| Import Export (I/O port) | lc01–rd04 | 2001–2008 |
| Medium Transport | H | 4001 |

Table 8-1   Default SCSI Element Addresses for a single RLS

When libraries are connected with the FastPass elevator expansion option their physical location will be identified with a number in front identifying their order in the interconnected libraries. When using RLS-85XX models a maximum of four libraries can be connected.

| Element Type | Physical Location (Model Dependent) | Default Element Addresses |
|---|---|---|
| For the first library | | |
| Storage: Storage Matrices | 1LA01–1RD15 | 3001–3108 |
| Data Transfer: | 1T1–1T6 | 1001–1006 |
| Import Export (I/O port) | 1lc01–1rd02 | 2001–2008 |
| Medium Transport | 1H | 4001 |
| For the second library | | |
| Storage: Storage Matrices | 2LA01–2RD15 | 3109–3216 |
| Data Transfer: | 2T1–2T5 | 1007–1011 |
| Import Export (I/O port) | 2lc01–2rd02 | 2009–2016 |
| Medium Transport | 2H | 4001 |
| For the third library | | |
| Storage: Storage Matrices | 3LA01–3RD15 | 3217–3324 |
| Data Transfer: | 3T1–3T5 | 1012–1016 |
| Import Export (I/O port) | 3lc01–3rd02 | 2017–2024 |
| Medium Transport | 3H | 4001 |
| For the forth library | | |
| Storage: Storage Matrices | 4LA01–4RD15 | 3325–3432 |
| Data Transfer: | 4T1–4T6 | 1017–1022 |
| Import Export (I/O port) | 4lc01–4rd02 | 2025–2032 |
| Medium Transport | 4H | 4001 |

Table 8-2   Default SCSI Element Addresses for libraries using the FastPass Elevator Expansion
Option

**Physical Addresses**

Left Side I/O Ports · Tape Drives · Right Side I/O Ports

| ld01 | lc01 | | | | T1 | | rc01 | rd01 |
| ld02 | lc02 | | | | | | rc02 | rd02 |

| LD01 | LC01 | LB01 | LA01 | | | RA01 | RB01 | RC01 | RD01 |
| LD02 | LC02 | LB02 | LA02 | T2 | | RA02 | RB02 | RC02 | RD02 |
| LD03 | LC03 | LB03 | LA03 | | | RA03 | RB03 | RC03 | RD03 |
| LD04 | LC04 | LB04 | LA04 | T3 | | RA04 | RB04 | RC04 | RD04 |
| LD05 | LC05 | LB05 | LA05 | | | RA05 | RB05 | RC05 | RD05 |
| LD06 | LC06 | LB06 | LA06 | T4 | | RA06 | RB06 | RC06 | RD06 |
| LD07 | LC07 | LB07 | LA07 | | | RA07 | RB07 | RC07 | RD07 |
| LD08 | LC08 | LB08 | LA08 | T5 | | RA08 | RB08 | RC08 | RD08 |
| LD09 | LC09 | LB09 | LA09 | | | RA09 | RB09 | RC09 | RD09 |
| LD10 | LC10 | LB10 | LA10 | T6 | | RA10 | RB10 | RC10 | RD10 |
| LD11 | LC11 | LB11 | LA11 | | | RA11 | RB11 | RC11 | RD11 |
| LD12 | LC12 | LB12 | LA12 | T7 | | RA12 | RB12 | RC12 | RD12 |
| LD13 | LC13 | LB13 | LA13 | | | RA13 | RB13 | RC13 | RD13 |
| LD14 | LC14 | LB14 | LA14 | | | RA14 | RB14 | RC14 | RD14 |
| LD15 | LC15 | LB15 | LA15 | H | | RA15 | RB15 | RC15 | RD15 |

Handler

**SCSI Element Addresses**

Left Side I/O Ports · Tape Drives · Right Side I/O Ports

| 2003 | 2001 | 3016 | 3001 | | | 3055 | 3070 | 2005 | 2007 |
| 2004 | 2002 | 3017 | 3002 | 1001 | | 3056 | 3071 | 2006 | 2008 |
| 3043 | 3031 | 3018 | 3003 | | | 3057 | 3072 | 3085 | 3097 |
| 3044 | 3032 | 3019 | 3004 | 1002 | | 3058 | 3073 | 3086 | 3098 |
| 3045 | 3033 | 3020 | 3005 | | | 3059 | 3074 | 3087 | 3099 |
| 3046 | 3034 | 3021 | 3006 | 1003 | | 3060 | 3075 | 3088 | 3100 |
| 3047 | 3035 | 3022 | 3007 | | | 3061 | 3076 | 3089 | 3101 |
| 3048 | 3036 | 3023 | 3008 | 1004 | | 3062 | 3077 | 3090 | 3102 |
| 3049 | 3037 | 3024 | 3009 | 1005 | | 3063 | 3078 | 3091 | 3103 |
| 3050 | 3038 | 3025 | 3010 | | | 3064 | 3079 | 3092 | 3104 |
| 3051 | 3039 | 3026 | 3011 | 1006 | | 3065 | 3080 | 3093 | 3105 |
| 3052 | 3040 | 3027 | 3012 | | | 3066 | 3081 | 3094 | 3106 |
| 3053 | 3041 | 3028 | 3013 | 1007 | | 3067 | 3082 | 3095 | 3107 |
| 3054 | 3042 | 3029 | 3014 | | | 3068 | 3083 | 3096 | 3108 |
| | | 3030 | 3015 | H | | 3069 | 3084 | | |

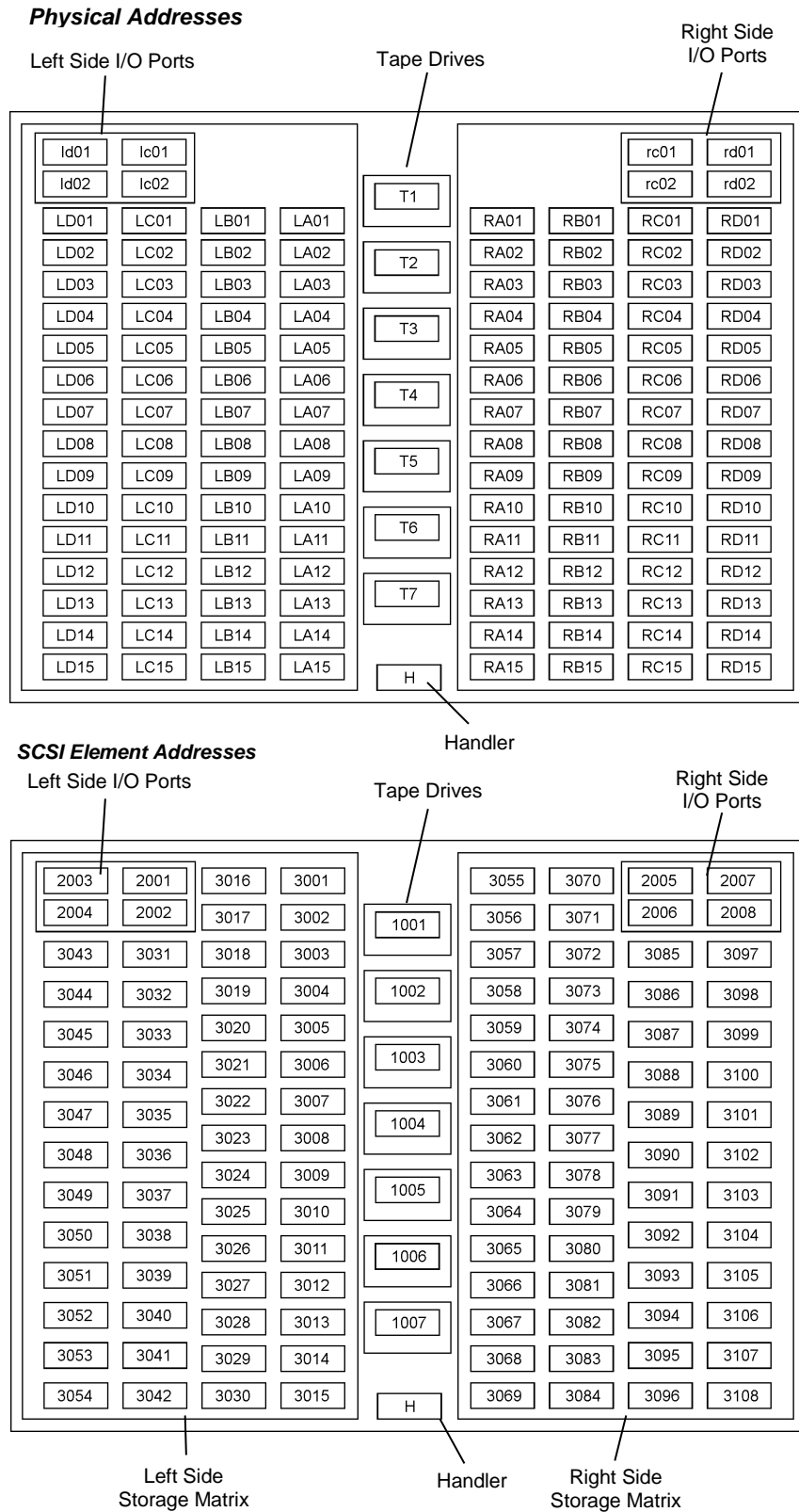Left Side Storage Matrix · Handler · Right Side Storage Matrix

Figure 8-1   Physical Location and Default SCSI Element Addresses for a single RLS-85XX

### 8.1.3    Inventory Validation

When the inventory database is invalidated, the RLS scans all locations before it does anything else, and stores the new cartridge location information in its internal inventory database. The inventory database will be invalidated by:

- Loss of RLS Power

- Opening a storage matrix

After an inventory invalidation:

- The RLS re-scans all locations before it does anything else, to update its internal inventory database.

- Since the host initially has no way of knowing what changes were made to the inventory, the changer sends the host a `CHECK CONDITION` message to notify the host that changes have occurred. The host should then ask for the new information.

If a barcode reader is installed and barcode labels are affixed to the cartridges, barcode information is also stored as part of the inventory information.

### *NOTE*

*If the move a cartridge function is used on the Operation page, the changer's internal inventory database is updated, but the host is not informed about the move. In addition, no* `CHECK CONDITION` *is sent to the host.*

## 8.2    Logical Libraries

When shipped from the factory, all RLS-8350/85XX libraries look like a single library with all of its tape drives and storage slots dedicated to the random operation of partition number 1. This is generally the correct configuration for a single-host system running a library specific backup application.

However, when multiple hosts are present and each host needs to run a library specific backup application, then the RLS can be sub-divided into smaller *logical libraries*. Physically, there is still one cabinet with one SCSI Medium-changer within it. That Medium-changer senses the SCSI ID of the host computer that is selecting it and can therefore indicate to that host that only a pre-determined (via the configuration process) list of physical resources are available to it. Up to seven of these library partitions are available in a single RLS-85XX while an RLS-8350 can have up to four. When the FastPass elevator expansion option is used, up to four RLS-85XX libraries can be interconnected for a total of up to 22 potential partitions.

If more than one logical library is to be defined, then a list of tape drives and cartridge locations for each of logical library must be made. No overlapping of resources (for

either logical libraries or sequential drives) is allowed and the allocations need not be equal.

## 8.3 Sequential Operations

A sequential tape drive looks to the host computer as a stand-alone tape drive with an operator supplying it with tapes. A host backup application that is not aware of tape libraries can simply write its backup data to the drive until the tape becomes filled. It then causes the tape to be rewound and ejected from the drive. The Medium-changer can then insert the next tape needed to complete the backup operation. The host application is completely unaware of how the next tape gets inserted into the drive as well as where the tapes come from and go to. When the Medium-changer does the work of supplying tapes to and removing them from a tape drive, the process is called Sequential operation.

There are three types of Sequential operation: Sequential, Recycle and Dual Bin. For Sequential or Recycle operation, a single contiguous set of cartridge locations (Input) is assigned to each sequential drive for its exclusive use. Sequential operation stops when the last cartridge has been returned to it original storage slot while Recycle operation will restart the cycle after its completion. To put it another way – Sequential operation is a single pass mode while the Recycle mode runs continuously. In both of these modes, each tape cartridge is returned to its original storage location after it is ejected from the tape drive.

For Dual Bin operation, two separate sets of magazine locations are assigned to each sequential drive for its exclusive use. The Input set of locations is where the changer gets cartridges to be placed in the sequential drive. The Output set is where those cartridges are put after the drive has ejected them. The number of output locations must be equal to or larger than the input locations.

There can be many Sequential or Recycle drives and each requires a set of magazine storage locations. Each Dual Bin drive requires two sets magazine storage locations (which do not have to be adjoining).

This flexible design allows the user to partition the library's resources to best meet overall system needs. See Chapter 11 for detailed information on Sequential Operation.

## 8.4 Resource Inventory

The first order of business is to document precisely what is in your RLS. This data will then be used when allocating resources to different partitions. The RLS-85XX library supports up to seven tape drives and 114 cartridges with the right side storage matrix. The standard number of cartridge slots is 54 when the library only has the left side storage matrix. The RLS-8350 library supports up to four tape drives and 50 cartridges with the right side storage matrix. The standard number of cartridge slots is 22 when the library only has the left side storage matrix.

If you are planning to partition the entire RLS physical library into more than one logical library, you may want to create a planning worksheet, such as the example in Table 8-3. By creating a worksheet in advance, you can minimize the time required to create partitions and reduce the chances that you will need to edit the logical library definitions later on.

| Option | Total available for use | Log. Lib. 1 | Log. Lib. 2 | Log. Lib. 3 | Log. Lib. 4 |
|---|---|---|---|---|---|
| Name | | Partition 1 | Partition 2 | Partition 3 | Partition 4 |
| Number of slots | 100 | 20 | 30 | 10 | 40 |
| Number of I/O ports | 8 | 4 | 0 | 0 | 4 |
| Number of tape drives | 4 | 1 | 1 | 1 | 1 |

Table 8-3   Example Worksheet for Planning Logical Libaries

# 9. Configuration Page
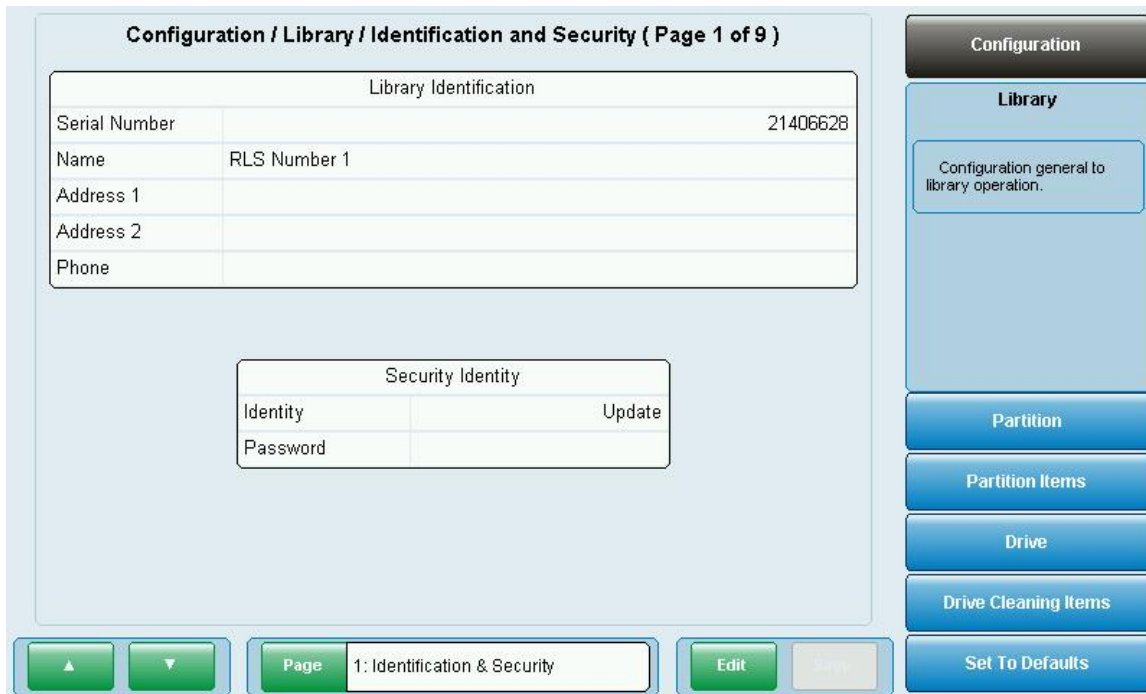


Figure 9-1   Configuration Page

The Configuration page is used to customize the operation of the RLS libraries to meet the system requirements. The Configuration page consists of several sub-pages, some affecting the unit's interaction with the SCSI system, and others affecting the unit's interaction with the user. Once the items in the Configuration page have been customized, the Configuration page should not have to be revisited, unless the configuration of the changer or the SCSI system (e.g. adding or removing tape drives) is changed.

The following sections explain each page in detail. Not all values or menu items appear at all times; some depend upon the model of library in use, other configuration parameters and incomplete prerequisite conditions.

## 9.1    Configuration/Library Page

The Configuration/Library page consists of individual pages that can be viewed by pressing the up or down buttons in the bottom left corner of the page. The Page button pops-up a page selection list, to provide direct access to the desired page. Information on these pages may be edited by pressing the Edit button. Note that changes to these screens will not be saved until the Save button is pressed. Pressing the Cancel button

will remove all of the current editing and revert to the last saved version of the library configuration.

## 9.1.1 Configuration/Library/Log Screen
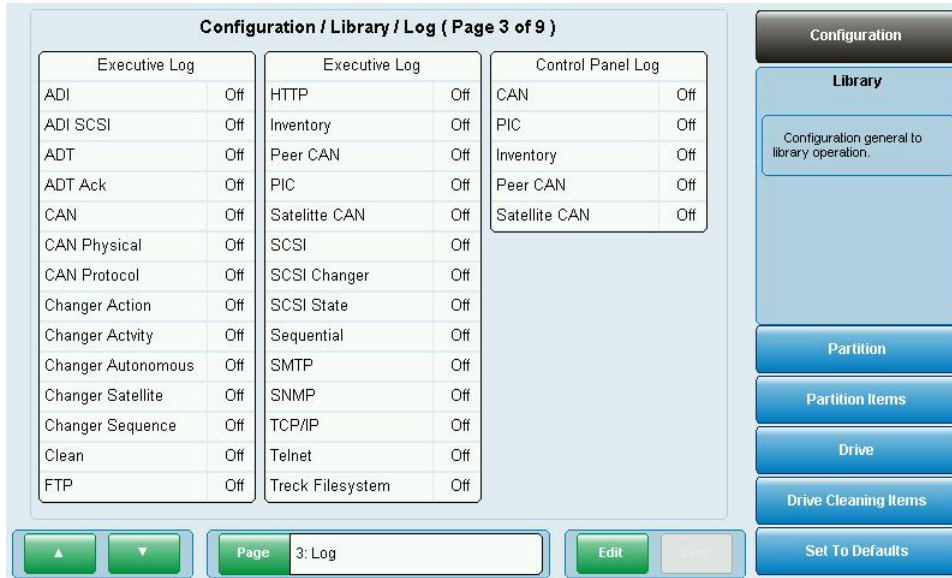


Figure 9-2   Configuration/Library/Log Screen

The library maintains a log that consists of a list of internal events. This screen determines which events are logged. The purpose of the log is to assist in testing and isolating problems with the assistance of Qualstar support personnel.

Each item in the Executive and Control Panel Logs have two choices:

**On**          Logging of the individual menu item enabled.

**Off**          Logging of the individual menu item disabled.

The log is limited to a fixed amount of memory. Log items can be individually disabled by selecting Off to provide more memory for the On log items.

| Section | Field | Description | Option |
|---|---|---|---|
| Executive Log | ADI | ADI (Automation/Drive Interface) communications | On or Off |
| | ADI SCSI | ADI (Automation/Drive Interface) SCSI communications | On or Off |
| | ADT | ADT (Admission Discharge and Transfer) communications | On or Off |
| | ADT Ack | ADT (Admission Discharge and Transfer) | On or Off |

| Section | Field | Description | Option |
|---|---|---|---|
| | | (Acknowledgements) communications | |
| | CAN | Executive CAN (Controller Area Network) communications | On or Off |
| | CAN Physical | CAN physical layer messages. | On or Off |
| | CAN Protocol | CAN protocol layer communications. | On or Off |
| | Changer Action | Actions requested of changer | On or Off |
| | Changer Activity | Actions performed by changer | On or Off |
| | Changer Autonomous | Autonomous changer processes | On or Off |
| | Changer Satellite | Low level steps to perform tasks | On or Off |
| | Changer Sequence | Steps to execute tasks | On or Off |
| | Clean | Tape drive cleaning processes | On or Off |
| | FTP | FTP (File Transfer Protocol) | On or Off |
| | HTTP | HTTP events | On or Off |
| | Inventory | Inventory communications | On or Off |
| | Peer CAN | Executive Peer CAN (Controller Area Network) communications | On or Off |
| | PIC | PIC processor communications | On or Off |
| | Satellite CAN | Robotics communications | On or Off |
| | Scsi | SCSI communications | On or Off |
| | Scsi Changer | SCSI communications | On or Off |
| | Scsi State | SCSI communications | On or Off |
| | Sequential | Sequential operation tape drive communications | On or Off |
| | SMTP | Simple Mail Transfer Protocol | On or Off |
| | SNMP | Simple Network Management Protocol | On or Off |
| | TCP/IP | TCP/IP actions. | On or Off |
| | Telnet | Telnet actions. | On or Off |
| | Treck Filesystem | Treck filesystem actions. | On or Off |
| Control Panel Log | CAN | Control Panel CAN (Controller Area Network) communications | On or Off |
| | PIC | Control Panel PIC processor communications | On or Off |
| | Inventory | Control Panel Inventory communications | On or Off |
| | Peer CAN | Control Panel Peer CAN (Controller Area Network) communications | On or Off |
| | Satellite CAN | Control Panel Robotics communications | On or Off |

Table 9-1   Configuration/Library/Log Screen Information

## 9.1.2    Configuration/Library/Network Screen



Figure 9-3    Configuration/Library/Network Screen

The Configuration/Library/Network screen allows for the configuration of the library to communicate via FTP (File Transfer Protocol), HTTP, the internet and email. Information on these pages may be edited by pressing the Edit button. Information on this screen may be edited by pressing the Edit button. Note that changes to the screen will not be saved until the Save button is pressed. Pressing the Cancel button will remove all of the current editing and revert to the last saved library configuration.

| Section | Field | Description | Option |
|---|---|---|---|
| Network Configuration | Ethernet Mac Addr. | Displays the unique Qualstar Mac (media access control) value when communicating in a network environment. | Variable |
| | FTP | Allows the library to communicate via FTP (File Transfer Protocol). | On or Off |
| | HTTP | Allows the library to communicate via HTTP. | On or Off |
| | SMTP | Allows Simple Mail Transfer Protocol. | On or Off |
| | Telnet | Allows the library to communicate via Telnet. | On or Off |
| Network IP4 Configuration | DHCP Enable | This option enables the network interface to use DHCP to obtain its network address values. | On or Off |
| | Enable | Allows the library to communicate via Ethernet | On or Off |

| Section | Field | Description | Option |
|---|---|---|---|
| | | IPv4. | |
| | Address | This value is the library's current IP address. When the DHCP Enable value is set to On, this value is supplied by a DHCP server. When DHCP Enable is Off, the IP address may be manually edited. | Variable |
| | Gateway | This value is the IP address of the library's network gateway When the DHCP Enable value is set to On, this value is supplied by a DHCP server. When DHCP Enable is Off, the gateway IP address may be manually edited. | Variable |
| | Mask | This value is the library's IP mask. When the DHCP Enable value is set to On, this value is supplied by a DHCP server. When DHCP Enable is Off, the IP mask may be manually edited. | Variable |
| Network IP4 DNS Configuration | Override DHCP | When the Override DHCP value is set to On, the IP address is supplied by a DHCP server. When DHCP Enable is Off, the IP address may be manually edited. | On or Off |
| | Primary Server Address | The address of the primary DNS server that the library is using. | Variable |
| | Secondary Server Address | The alternate or secondary address of the primary DNS server that the library is using. | Variable |
| Network IP6 Configuration | DHCP Enable | This option enables the network interface to use DHCP to obtain its network address values. | On or Off |
| | Enable | Allows the library to communicate via Ethernet IPv6. | On or Off |

Table 9-2   Configuration/Library/Network Screen Information

### 9.1.3 Configuration/Library/Network User Screens



Figure 9-4   Configuration/Library/Network User Screens

The Configuration/Library/Network User screens allow for the setting of pass codes for individual network users. Information on these screens may be edited by pressing the Edit button. Note that changes to the screen will not be saved until the Save button is pressed. Pressing the Cancel button will remove all of the current editing and revert to the last saved library configuration.

### 9.1.4    Configuration/Library/IO Port, Barcode and Power On Policy Screen



Figure 9-5   Configuration/Library/IO Port, Barcode and Power On Policy Screen

The Configuration/Library/IO Port, Barcode and Power On Policy screen allows for the configuration of the I/O ports functionality, whether or not the changer expects a check character on barcode labels and what action the library performs after a power cycle. Information on this screen may be edited by pressing the Edit button. Note that changes to the screen will not be saved until the Save button is pressed. Pressing the Cancel button will remove all of the current editing and revert to the last saved library configuration.

| Section | Field | Description | Option |
|---|---|---|---|
| IO Port | Open Prevention | Ignored – the library's open I/O port command will operate regardless of the prevent state. | Ignored, |
| | | Operator Only – the operator cannot open the I/O port, unless allowed by every initiator. | Operator Only, |
| | | Operator and SCSI – the library will not allow the I/O port to be extended until it receives an Allow command from every initiator that sent a Prevent command. | Operator and SCSI |
| | Ready While Open | The library remains ready while the I/O port is open. | Yes or No |
| | Shared Prevention | An I/O port can be allowed or prevented from being shared by multiple logical library partitions. | Allow, Prevent |

| Section | Field | Description | Option |
|---|---|---|---|
| Barcode | Barcode Check Character | Yes: a barcode label must contain a valid check character in order to be read with valid status. It is possible for some labels without check characters to read correctly, because the last character on the label happens to be the same as a valid check character for the preceding characters (default value).<br><br>No: the RLS will not expect a check character. However, if one is present, it will appear as an extra character in the barcode label data. | Yes or No |
| Power On Policy | Policy | On: If the library is powered on when the power is cycled it will return to the on state.<br><br>Off: If the library is powered off when the power is cycled it will remain powered off.<br><br>Revert: if the power is cycled to the library it will return to the last state it was in. Either on or off. | On, Off or Revert |

Table 9-3   Configuration/Library/IO Port and Barcode Screen Information

## 9.1.5   Configuration/Library/Identification and Security Screen



Figure 9-6   Configuration/Library/Identification and Security Screen

The Configuration/Library/Identification and Security screen contains unique serial numbers specific to the library as well as optional user supplied data fields to identify the library. This screen also contains the area for entering passwords to allow for access to different controlled security levels of the library for maintenance, upgrades and diagnosis.

Information on this screen may be edited by pressing the Edit button. Note that changes to the screen will not be saved until the Save button is pressed. Pressing the Cancel button will remove all of the current editing and revert to the last library configuration.

| Section | Field | Description | Option |
|---------|-------|-------------|--------|
| Library Identification | Serial Number | The serial number of the library, which is found on the product label located on the rear of the RLS. | Factory supplied data |
| | Name | Name of the libraries location and/or contact person. | User supplied data |
| | Address 1 | Physical address of the libraries location. | User supplied data |
| | Address 2 | Second line for additional address information | User supplied data |
| | Phone | Phone number of the libraries location and/or contact person. | User supplied data |
| Security Identity | Identity | Shipped from the factory the library will have None as its security identity. | |
| | Password | Allows for the entering of passwords that provide access to controlled security levels of the library for maintenance, upgrades and diagnosis. | |

Table 9-4   Configuration/Library/Identification and Security Screen Information

# 9.2    Configuration/Partition Page

The Configuration/Partition page for a single RLS consists of three pages for an RLS-8350 and seven pages for an RLS-85XX (one for each of the possible logical library partitions) that can be viewed by pressing the up or down buttons in the bottom left corner of the page. When the FastPass elevator expansion option is used, up to four RLS-85XX libraries can be interconnected for a total of up to 22 potential partitions.

Information on these pages may be edited by pressing the Edit button. Note that changes to these screens will not be saved until the Save button is pressed. Pressing the Cancel button will remove all of the current editing and revert to the last saved library configuration.
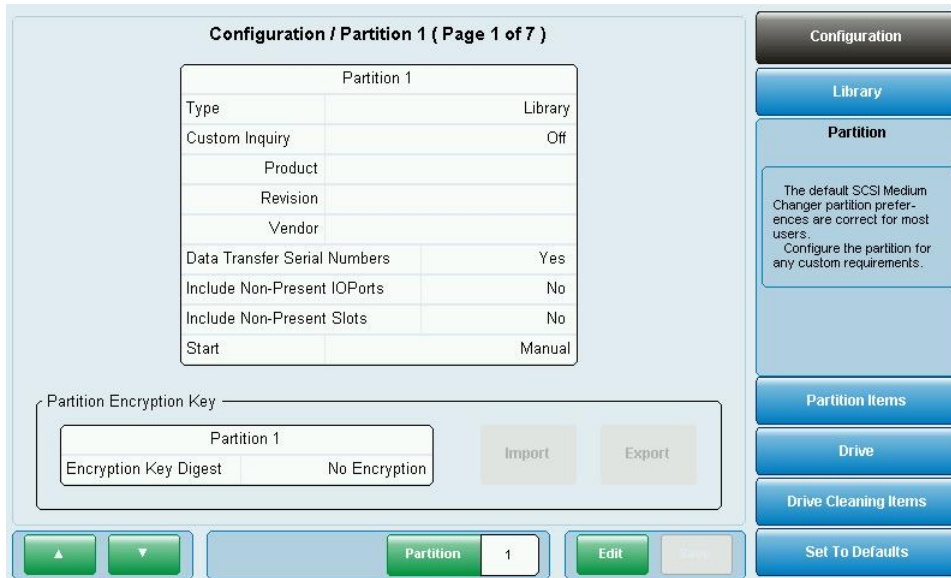
Figure 9-7   Configuration/Partition 1-7 Screen for an RLS-8560

The Configuration/Partition screens allow for a single library to be divided into as many as seven logical library partitions for an RLS-85XX or four for an RLS-8350. Each partitions tape drive(s) can be assigned to function in either Library format or one of the three Sequential formats.

Information on this screen may be edited by pressing the Edit button. Note that changes to the screen will not be saved until the Save button is pressed. Pressing the Cancel button will remove all of the current editing and revert to the last saved library configuration.

| Field | Option | Description |
|---|---|---|
| Type | Disabled | This partition is not active and will not appear as an available option. |
| | Dual Bin | The tape drive is dedicated to receiving cartridges under changer control. The changer will reject host-requested cartridge movements to this device. This mode is similar to Sequential except the source and destination cartridge locations are separate and distinct. |
| | Library | The tape drive is available for normal library cartridge movement operations to and from the drive under host computer control. The drive and cartridges must be within an enabled logical library partition. |
| | Recycle | The Recycle mode shares the attributes of the Sequential mode. It has the additional feature of automatically restarting the cartridge movement cycle after the last cartridge in the drive's location set has been returned. |
| | Sequential | The tape drive is dedicated to receiving cartridges under changer control. The changer will reject host-requested cartridge movements to this device. |
| Custom Inquiry | On or Off | Allows for the creation of a custom SCSI inquiry menu. This allows for the changing of the information that the changer reports but does not change the operation of the library system. |
| Product | Variable | Used to describe the product by name, model, etc. |

| Field | Option | Description |
|---|---|---|
| | Data | |
| Revision | Variable Data | Used to indicate the firmware revision. |
| Vendor | Variable Data | Used for vendor specific data. |
| Data Transfer Serial Numbers | Yes or No | Data Transfer Serial Numbers may be set to Yes or No for compatibility with ISV (Independent software vendor) requirements. |
| Include Non-Present IOPorts | Yes or No | Include Non-Present IOPorts may be set to Yes or No for compatibility with ISV (Independent software vendor) requirements. |
| Include Non-Present Slots | Yes or No | Include Non-Present Slots may be set to Yes or No for compatibility with ISV (Independent software vendor) requirements. |
| Start | Inventory | If a cartridge is in the tape drive at power-on or after an inventory violation, the previous input and output slots are invalidated. If after the library completes an inventory scan and finds the input and output slots are both valid, the library attempts to continue from where it left off. If the input and output slots are both invalid, the library will search at the beginning of the set for the first empty slot. It will then restart using the next tape that was found after the first empty slot in the input set. In any other case the library will stop. |
| | Manual | If a cartridge is in the tape drive at power-on, the library stops and waits for the operator to either manually eject the cartridge or call upon the host system to eject it. After the cartridge is ejected it must be moved back to the location it came from. |
| | | If a cartridge is in the tape drive after a library has stopped because of an inventory violation, the library attempts to continue from where it left off. |
| | PowerOn | This mode behaves like INVENTORY, but it only starts the library at power-on. |
| Encryption Key Digest | No Encryption or alpha-numeric key digest | This option allows tape drives in a partition to encrypt the data written on tape cartridges when an encryption key has been entered. No Encryption means that no encryption key has been entered and an alpha-numeric code represents the digest of the current encryption key. |

Table 9-5   Configuration/Partition 1-7 Screen for an RLS-8560

## 9.2.1    Encryption Key Digest

The RLS supports library managed encryption, which allows tape drives assigned to a particular partition to encrypt the data written on tape cartridges in that partition. Note that when the library is shipped from the factory, the default settings are for a single partition containing all tape drives and tape cartridges with no encryption set.

*CAUTION*

*Once a tape cartridge has been written by a tape drive with a particular encryption key it may only be read by a tape drive that has been given the same encryption key. Trying to read an encrypted tape cartridge with a different encryption key or no key will result in a data protect error in which case the tape will not read or advance.*

*The library does not have the ability to read back an encryption key once it has been entered and there is no way to retrieve it afterwards. It is very important that encryption keys and their associated digests be kept somewhere in a safe location for when they are needed at a later time.*

The following steps are an example of entering an encryption key for the tape drives in a partition.

1.    Begin by pressing the Edit button on the desired partition screen.



Figure 9-8   Configuration/Partition Screen Ready to Edit

2.    Press the Encryption Key Digest text and it will bring up the following screen.

Figure 9-9   Warning Screen for Adding an Encryption Key

**3.** Press the Proceed button to advance to the screen which allows the encryption key to be entered. The data may be entered in either hex characters or Base64 character set. The two screens can we alternated by pressing the Base64 or Hex button on the screen. Figure 9-10 shows both screens. When using hex characters up to 64 digits may be entered. 43 characters are allowed in Base64 and they may include A through Z in both upper and lower case, 0-9, along with the + and / symbols.

## NOTE

*Pressing the Cancel button at any time before Step 9 will simply return the RLS back to the Configuration/Partition screen WITHOUT an encryption key being saved.*
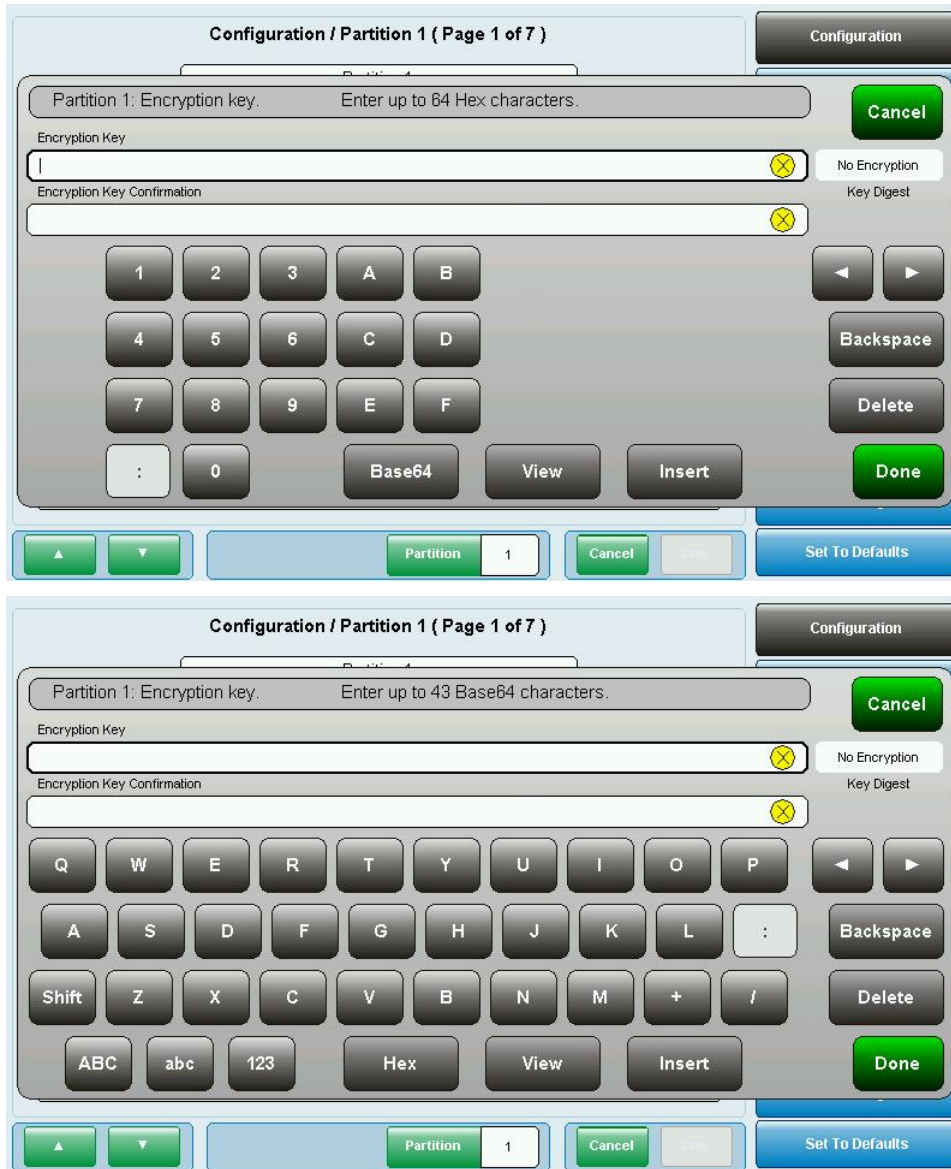
Figure 9-10   The Hex and Base64 Screens

4.   As a default all characters except the current one being entered on the screen will be represented by an *, but all the characters can be shown by pressing the View button. Pressing the Hide button will return to the asterisk view.
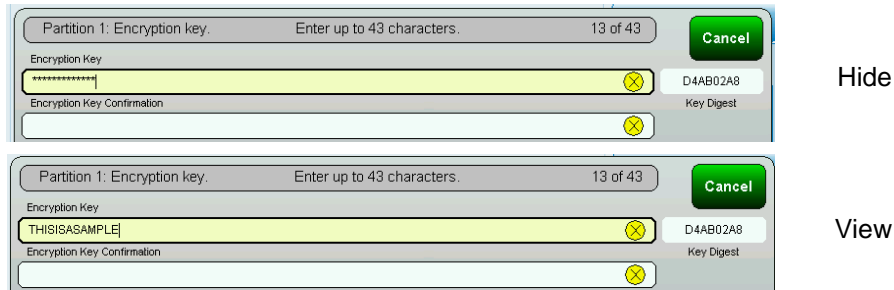
Hide

View

Figure 9-11   The Hide and View Modes

**5.** In this example "THISISASAMPLE" was used as the encryption key and the key digest generated "D4AB02A8". The key digest allows for determination of what encryption key is currently in the library, if it has been changed and will help determine if there was an error in entering the encryption key.
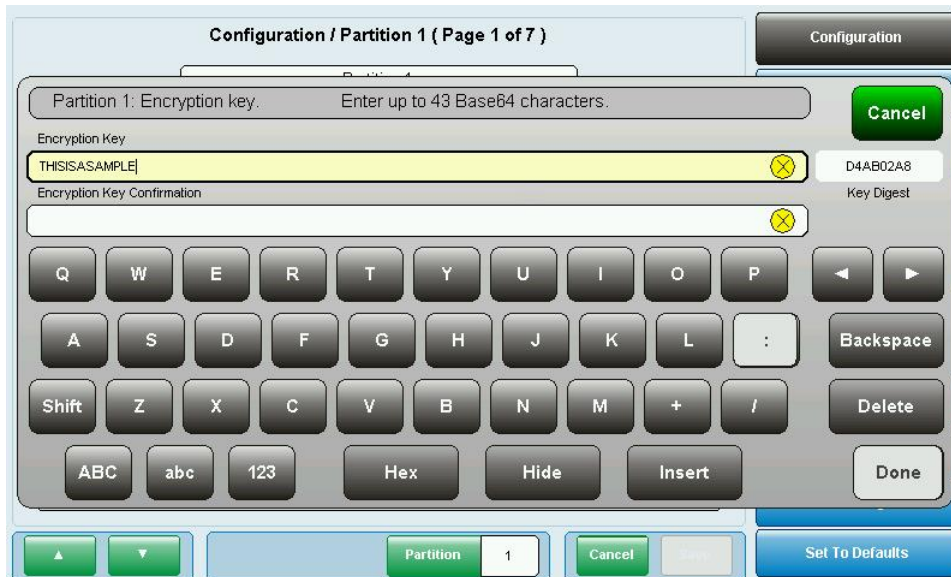


Figure 9-12   Entering the Encryption Key

**6.** To confirm that you entered the key you intended to enter and/or determine if there were any errors when the encryption key was entered, press on the Encryption Key Confirmation field and once again enter the characters that make up the encryption key. When completed the Encryption Key and Encryption Key Confirmation fields will be the same shade of green and the Save button will become active if the encryption key characters are identical. If the key digests are different, there is a typo somewhere that needs to be corrected before proceeding.

Figure 9-13   Example of Matching Key Digests

**7.**   Press the Done button to proceed to the next screen.



Figure 9-14   Warning Screen for Adding an Encryption Key

**8.**   Press the Proceed button to advance to the screen which allows the encryption key to be saved.

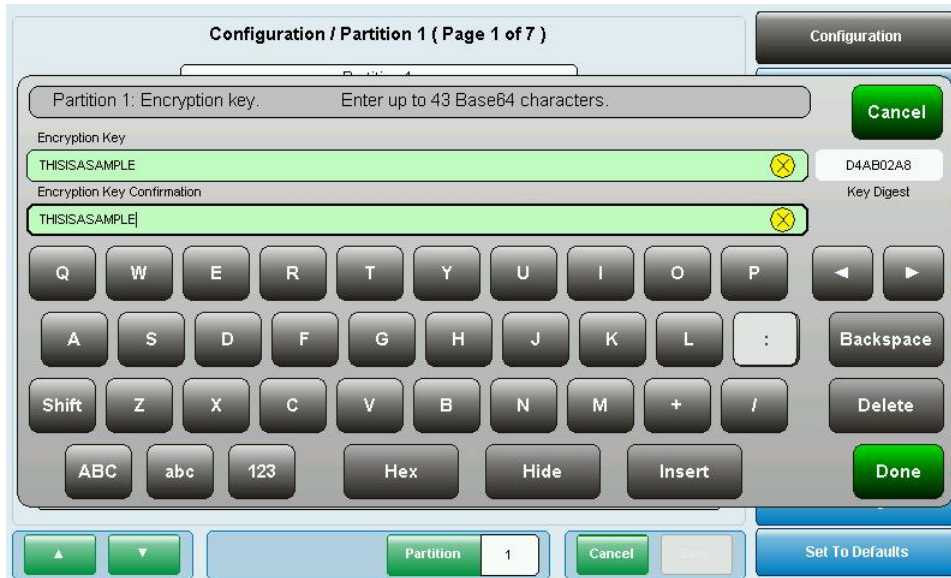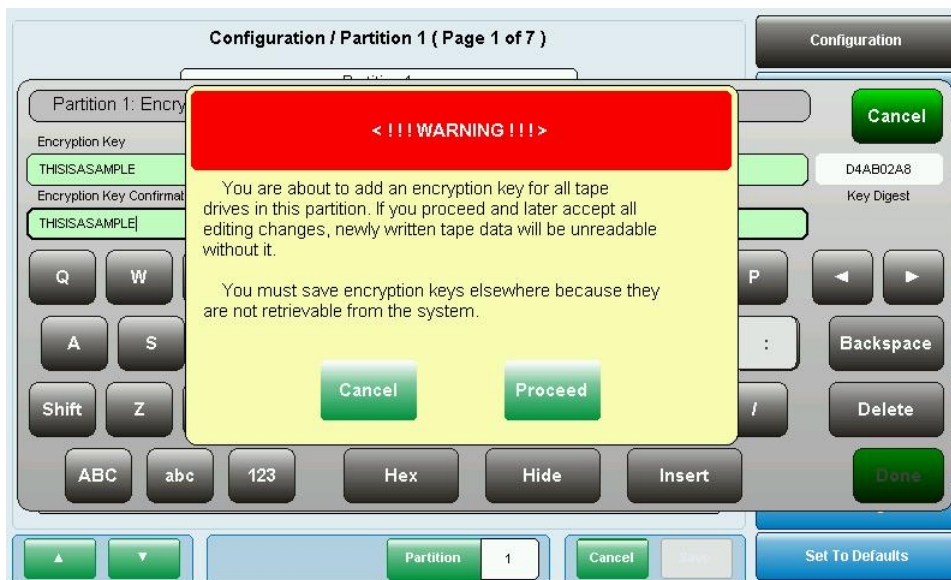**9.**   Take note of the key digest and press the Save button to enter the encryption key data into the library.

Figure 9-15   Press Save to Save the Encryption Key

**10.** To change the encryption key simply repeat Steps 1 thru 9 using different characters for the encryption key data.

**11.** To remove an encryption key and return the tape drives in a partition to non-encrypting mode, repeat Steps 1 thru 9 making sure to enter no characters for the encryption key data. Leaving this field blank will cause the key digest to read invalid.

## CAUTION

*It is highly recommended that a short write and read test be performed after any tape drives have had an encryption key added or changed to determine if the newly encrypted tape cartridge can be read.*

## NOTE

*Encryption keys may be changed as frequently as desired: daily, weekly, monthly, etc. If it is changed during the use of a tape cartridge, that tape will have multiple keys on it and it is possible to have a different key for each block written on the cartridge.*

## 9.3    Configuration/Partition Items Page

The Configuration/Partition Items page allows for logical library partition items to be assigned simply by selecting the available elements displayed on the screen. Note that the Configuration Screen displays what resources are possible, not what is currently installed. The elements may be viewed by either their physical addresses or which partition they are currently assigned to by touching the view button. Each of the possible partitions may be viewed by touching the partition button. Note that changes to these screens will not be saved until the Save button is pressed. Pressing the Cancel button will remove all of the current editing and revert to the last saved library configuration.



Figure 9-16   Partition Configuration Screen

Figure 9-16 shows a library with seven tape drives (T1 – T7) with left and right storage matrices (MAGL and MAGR). The left and right I/O ports are represented by IOL and IOR. Note that the Handler (H) is not shown because it is a shared resource that cannot be dedicated to any particular partition.

Elements assigned to the partition currently being viewed are displayed in green, elements reserved for a different partition will be gray and unassigned elements will be white. Yellow elements represent the output slots assigned in a partition containing a tape drive operating in Dual Bin sequential mode. Touching an element not assigned to the current partition will toggle it to being assigned to the current partition. Touching it again will toggle it back to its previous assignment.

When more than one partition has been created their contents may be viewed and edited simply by touching the elements and arranging them into the desired logical library partitions.

Figure 9-17 Example Partition Configuration Screen

Figure 9-17 shows an example library with three partitions. Partition 1 contains the left I/O port, the left storage matrix and tape drives T1 and T2. Partition 2 contains tape drive T3, and T4, the right side I/O port, along with columns A and B of the right side storage matrix. Partition 3 contains tape drives T5, T6 and T7 along with columns C and D of the right side storage matrix.

## 9.4    Configuration/Drive Page

The Configuration/Drive page consists of multiple pages (up to seven of these in a single RLS-85XX while an RLS-8350 can have up to four.) When the FastPass elevator expansion option is used, up to four RLS-85XX libraries can be interconnected for a total of up to 22 potential drive configuration pages. Each page can be viewed by pressing the up or down buttons in the bottom left corner of the page. Information on these pages may be edited by pressing the Edit button. Note that changes to these screens will not be saved until the Save button is pressed. Pressing the Cancel button will remove all of the current editing and revert to the last saved library configuration.
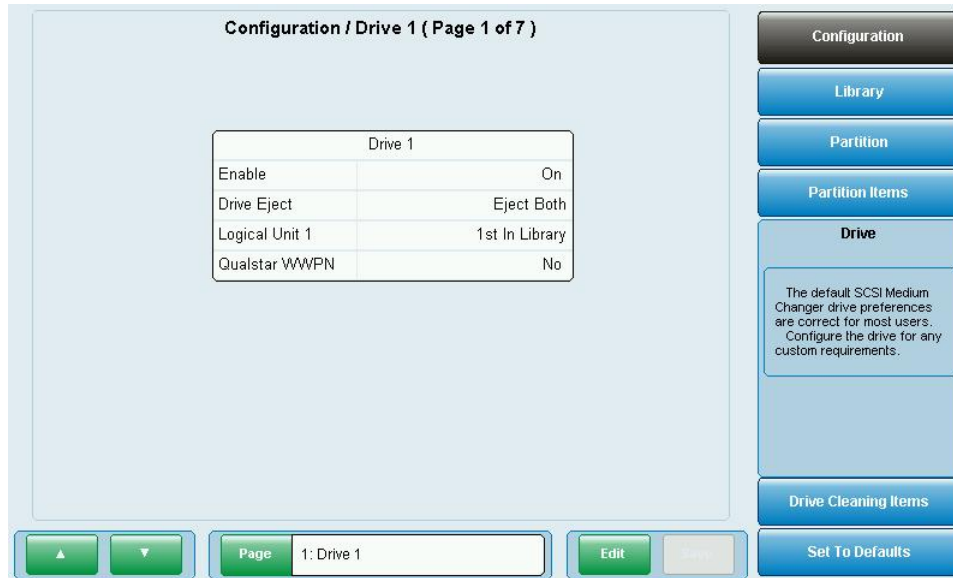
Figure 9-18   Drive 1 Configuration Screen from a RLS-85120

The Drive Configuration screens allow for the functionality of each installed tape drive to be configured. Information on this screen may be edited by pressing the Edit button. Note that changes to the screen will not be saved until the Save button is pressed. Pressing the Cancel button will remove all of the current editing and revert to the last saved library configuration.

| Field | Option | Description |
|---|---|---|
| Enable | On or Off | When On, the tape drive can be used by the host computer. When Off, the tape drive is not accessible to the host computer. |
| Drive Eject | Eject Both or Eject Host | When set to Eject Host, only the host computer can command the tape drive to eject a tape cartridge. When set to Eject Both, the host computer and the library can both command the tape drive to eject a tape cartridge. |
| Logical Unit 1 | Disable, $1^{st}$ In Library, Library, Enable | Disable – The drive will only appear as a logical unit 0 device.<br><br>$1^{st}$ In Library – Only the first drive that is present in a partition of the type "Library" will be enabled as a logical unit 1 device.<br><br>Library – The drive is enabled as a logical unit 1 device only if it is part of a partition of the type "Library".<br><br>Enable – The drive is enabled as a logical unit 1 device. |
| Qualstar WWPN | Yes or No | The Qualstar WWPN (world wide port name) for the tape drive will be reported to the host system. |

Table 9-6   Drive Configuration Screen Information

## 9.5    Configuration/Drive Cleaning Items Page

The Configuration/Drive Cleaning Items page allows for tape drive cleaning cartridges to be assigned to storage locations anywhere within the left or right storage matrices. The cartridge locations may be viewed by either their physical addresses or which partition they are currently assigned to by touching the view button. The cartridges assigned to each of the seven possible tape drives may be viewed by touching the drive button. Note that changes to this screen will not be saved until the Save button is pressed. Pressing the Cancel button will remove all of the current editing and revert to the last saved library configuration.
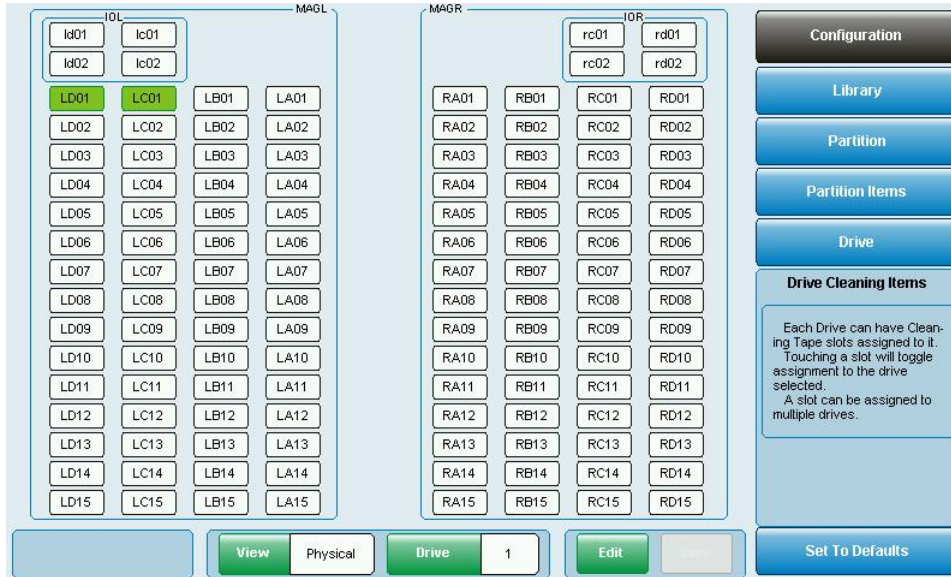


Figure 9-19   Drive Cleaning Items Screen

Figure 9-19 shows a library with two cleaning cartridges (LD01 & LC01) assigned to tape drive 1 (T1). Note that cleaning cartridges can be shared by different partitions.

## 9.6 Configuration/Set To Defaults Page

The Configuration/Set To Defaults page contains a single Set Defaults button that resets most items in the Configuration menu having a default value to their factory default settings. Default values, if any exist, are given in the individual descriptions for each menu item.
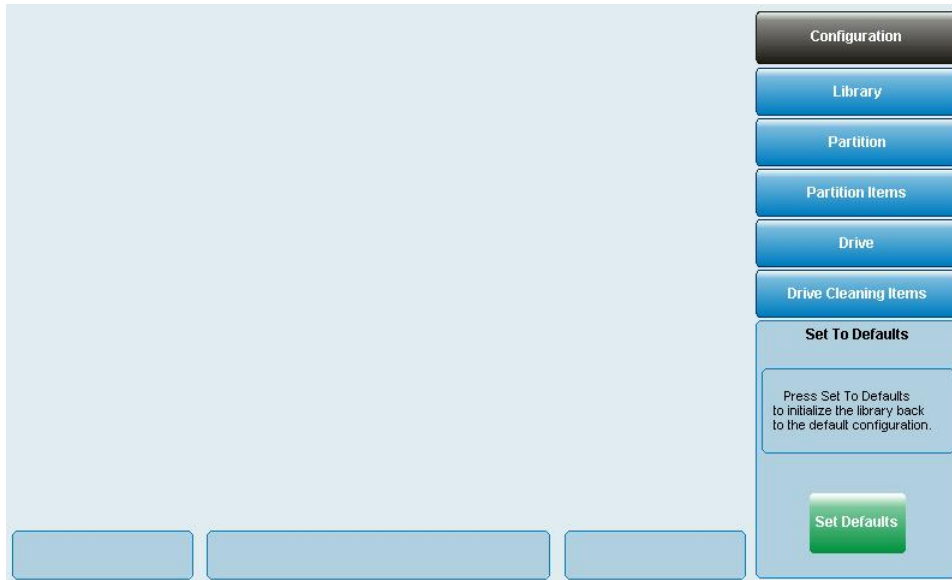


Figure 9-20   Set To Defaults Screen

# 10.                                        The Operation Page



Figure 10-1   Operation Page

The Operation page provides the operator with the commands needed to manually operate the library. It contains commands to: move cartridges, load or unload tape drives, clean tape drives and position the handler. It also provides Quick Operation buttons to allow for the handler to be parked.

Figure 10-1 shows a library with the Handler (H), seven tape drives (T1 – T7) with left and right storage matrices (MAGL and MAGR). The left and right I/O ports are represented by IOL and IOR.

Figure 10-2 shows two libraries that have been interconnected with the FastPass elevator expansion option. Note that in this example the upper and lower libraries are represented by a 1 and 2 placed in front of the Handler, tape drives, storage matrices and I/O ports. Additionally the elevator (E1) is represented in both of the libraries.

Figure 10-2   Operation Pages from two libraries using the FastPass Elevator Expansion Option

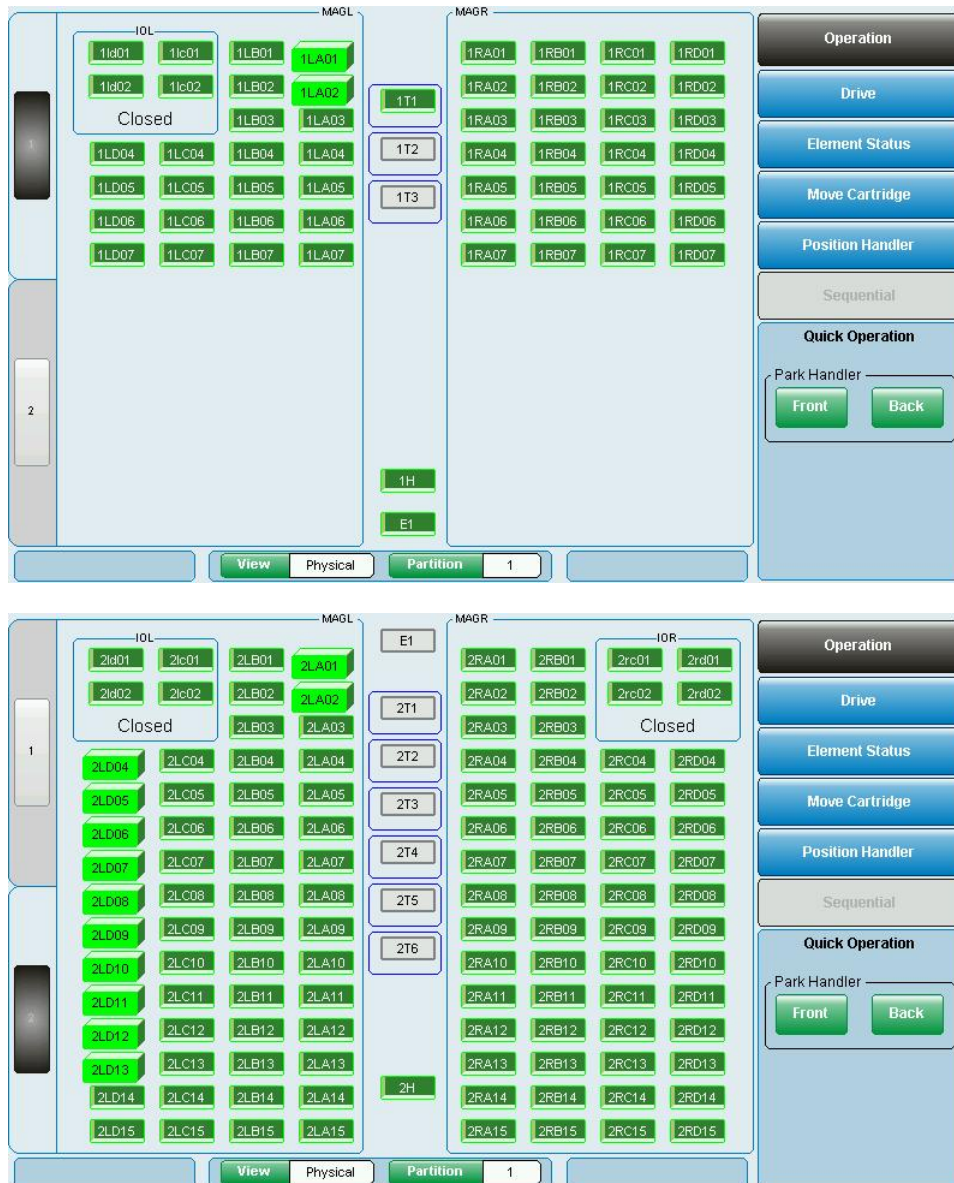The Operation page shows a graphic representation of the location of every tape cartridge in the library. The storage elements that are "extended" contain a cartridge and the "retracted" elements are currently empty.

Contains a
Tape Cartridge

LD11  LC11  LB11

Empty

LD12  LC12  LB12

LD13  LC13  LB13
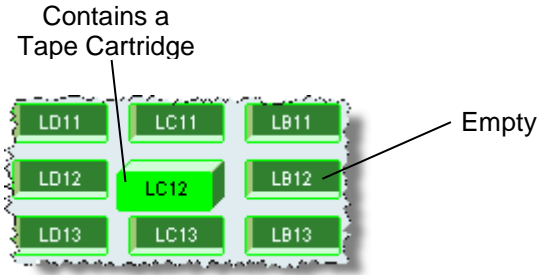
Figure 10-3   Full and Empty Storage Elements

Tape drives that are loaded with a cartridge will be shown as extended as shown in Figure 10-4. The "retracted" tape drives are currently empty. A flat, gray tape drive indicates that no tape drive is installed.

Tape Cartridge is Loaded
in the Tape Drive

T1

Empty

T2

No Tape Drive Installed

T3
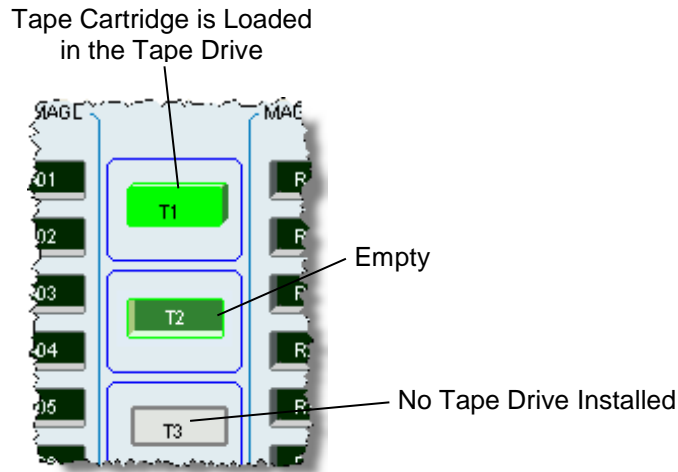
Figure 10-4   Loaded and Empty Storage Elements

The elements may be viewed by either their physical addresses, their SCSI element addresses or which partition they are currently assigned to by touching the view button. Each of the possible partitions may be viewed by touching the partition button (up to seven partitions in a single RLS-85xx while an RLS-83xx can have up to four.) When the FastPass elevator expansion option is used, up to four RLS-85xx libraries can be interconnected for a total of up to 22 potential partitions.
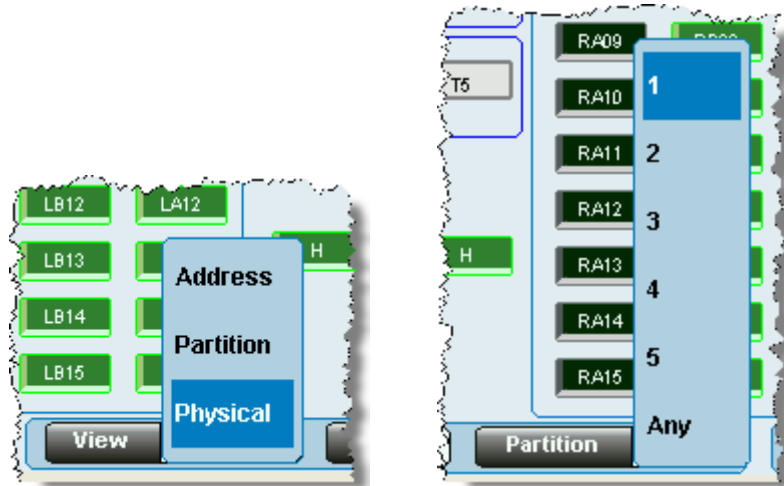
Figure 10-5   View by Address, Partition or Physical options

# 10.1    Operation/Drive Page

The Operation/Drive page allows for tape drives to be loaded, unloaded and cleaned. Select an available tape drive by touching its element (T1 – 4T6) on the screen to determine its status.



Figure 10-6   Operation/Drive Page

Table 10-1 describes the Operation/Drive Page screen information displayed.

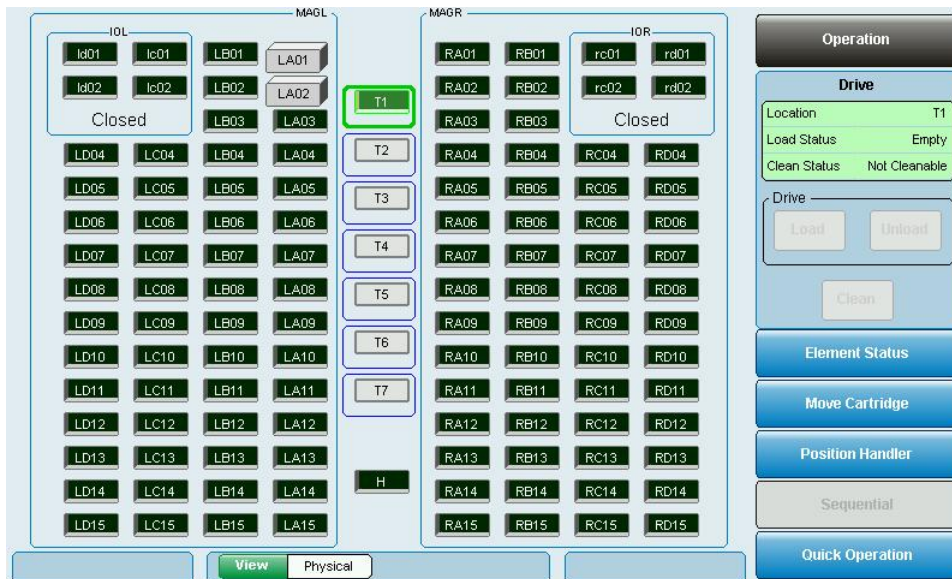| Field | Option | Description |
|---|---|---|
| Location | T1, T2,… 4T6 | The number of the drive whose information is being displayed. T1, T2, T3, T4, T5, T6 or T7 for a single library. When the FastPass elevator expansion option is used, the library locations will read: 1T1, 1T2… 3T1, 3T2, etc all the way up to 4T6 when four RLS-85XX libraries are interconnected. |
| Load Status | Empty | The drive has no cartridge present. |
| | Unloaded | The drive has a cartridge present, but it has not been loaded into the drive. |
| | Loaded | The drive has a cartridge loaded and is ready to read and write. |
| | No Drive | A drive is currently not installed in this location. |
| Clean Status | Not Cleanable | The drive has a cartridge loaded or has no cleaning cartridge available. |
| | Cleanable | The drive does not have a cartridge loaded and is ready to accept a cleaning cartridge to begin the cleaning process. |
| | Cleaning | The drive is in the process of using the cleaning cartridge. After the tape drive has been cleaned, and it has ejected the cleaning cartridge, the cleaning cartridge is automatically returned to its original location. |
| | *Blank* | A drive is currently not installed in this location. |
| Load | | If a cartridge is in a drive, but not loaded, touching the Load button will command the tape drive to load the tape cartridge. |
| Unload | | When the selected drive has a cartridge loaded, touching the Unload button will command the tape drive to unload the tape cartridge. |
| Clean | | Commands the tape drive to begin the drive cleaning process. |

Table 10-1   Operation/Drive Page Description

## 10.2    Operation/Element Status Page

The Operation/Element Status page displays specific information about any element in the library. It displays the same information about a given element that the host would receive from issuing a SCSI-2 Read Element Status command. The SCSI-2 Read Element Status command is described in the RLS SCSI-2 Interface Reference (Qualstar document 501551). Please refer to this document for a detailed explanation of all the element status values displayed.

Figure 10-7   Operation/Element Status Page

Table 10-2 describes the Operation/Element Status screen information displayed.

| Field | Option | Description |
|---|---|---|
| Partition | 1, 2, 3, 4,… 22 | The number of the partition where the element is assigned. Depending on how the resources are allocated a single RLS-85XX can have up to seven partitions while a RLS-8350 can have up to four. When the elevator expansion option is used, up to four RLS-85XX libraries can be interconnected for a total of up to 22 potential partitions. |
| Address | | The SCSI address assigned to the element. |
| Type | Slot, Drive, Handler, IO Port | The type of element; Slot, Drive, Handler or IO Port. |
| Location | | The physical location of the element. |
| Full | Yes or No | Indicates if a cartridge is in the location. |
| Access | Yes or No | The library can access the cartridge. When a tape is inside the tape drive, its present, but not accessible. |
| Pri. Tag | Yes or No | This value is set to Yes when there a barcode label attached to the tape cartridge. |
| Label | | The value read from the barcode label attached to the tape cartridge. |
| Source Valid | Yes or No | This value is set to Yes when the source data is valid. |
| Address | | Contains the SCSI address of the last storage element from which the cartridge came. |
| Location | | This item only displays when the value of Source Valid is Yes. |

Table 10-2   Operation/Element Status Description

## 10.3 Operation/Move Cartridge Page

The Operation/Move Cartridge page allows for moving cartridges from one cartridge slot to another. Select an available tape cartridge by touching its element on the screen and its physical location and slot type will appear in the Move From box. For the Move To selection touch an element that is currently empty and then its physical location and slot type will appear. Touching the Move button will activate the library to move the tape cartridge between the selected locations.



Figure 10-8  Operation/Move Cartridge Page

## 10.4 Operation/Position Handler Page

The Operation/Position Handler page allows for positioning the handler at a specific location and is a convenient way to locate a particular slot, tape drive or I/O port location. It performs the same function as the SCSI-2 Position to Element command.

Simply select an element to move the handler to by touching it on the screen and its physical location and slot type will appear in the Position To box. Touching the Position button will activate the library to move the handler to the selected location. Moving the handler will not disrupt Random or Sequential operations, nor change the changer inventory status.

Figure 10-9   Operation/Position Handler Page

## 10.5   Operation/Sequential Operations Page

The Operation/Sequential Operations page only appears if at least one tape drive is configured for the Sequential, Recycle or Dual Bin modes. For Sequential and Recycle operation the starting point may be designated by selecting any element in a partition that has a tape cartridge in it. This will allow the sequential operation to begin at the selected element and will appear as the Input Slot. For Dual Bin operation the starting point may be selected as described above from the input set. Additionally it has the option of being able to select an empty element from the output set as the first location for a cartridge to be placed, rather than the default of the first available slot. If this output set element is selected it will appear in the Output Slot.

Figure 10-10   The Operation/Sequential Operations Page

## 10.6   Operation/Quick Operation Page

The Operation/Quick Operation page allows for the handler to be parked.

- Touching the Park Handler Front or Park Handler Back buttons commands the handler (the robotics that handle the tape cartridges) to park itself at either the front or rear of the library.

Figure 10-11   The Operation/Quick Operation Page

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# 11.                    Sequential Operation

## 11.1    Introduction

A sequential tape drive looks to the host computer as a singular tape drive with an operator supplying it with tapes. A host backup application which is not aware of tape libraries can simply write its backup data to the drive until the tape becomes filled. It then causes the tape to be rewound and ejected from the drive. A human operator or the Medium-changer can then insert the next tape needed to complete the backup operation. The host application is completely unaware of how the next tape gets inserted into the drive as well as where the tapes come from and go to. When the Medium-changer does the work of supplying tapes to and removing them from a tape drive, the process is called Sequential operation.

Each tape drive and cartridge storage location in the RLS may be configured for library or sequential operation. If a tape drive is configured for the library mode, it becomes a resource under the control of a host computer. If a drive and associated cartridge storage locations are configured for one of the Sequential modes, then the drive is referred to as a sequential drive and it cannot be allocated for any other use. The insertion and removal of tapes to and from a Sequential tape drive is automatically performed by the Medium-changer when configured and manually started via the menu system.

There are three types of Sequential operation: Sequential, Recycle and Dual Bin. For Sequential or Recycle operation, a single set of cartridge locations is assigned to each sequential drive for its exclusive use. In these modes, each tape cartridge is returned to its original storage location after it is ejected from the tape drive.

For Dual Bin operation, two separate sets of cartridge locations are assigned to each sequential drive for its exclusive use. The input set of locations is where the changer removes cartridges to be placed in the sequential drive. The output set of locations is where those cartridges are returned after the drive has ejected them. Note that the number of output locations must be greater than the input locations.

Cartridge storage locations assigned to a given sequential drive belong exclusively to that drive and may not be assigned to any other sequential drive or library partition. Empty slots in a Sequential, Recycle or Dual Bin drive's storage location set will not adversely affect operation.

When a Sequential or Recycle operation is started (via the menu system), the changer moves the first cartridge, found at (or after) the initial specified storage location into the drive. When the drive ejects the cartridge, the changer automatically returns the cartridge to its original location. The changer then places the next cartridge, found within the drive's location set into the drive. This process is repeated, until the last specified cartridge is ejected and returned to storage. This sequence may be started at any location within a Sequential drive's location set but will always end at the last

storage location. In Recycle operations, the handler will return to the starting position and repeat the cartridge movement cycle indefinitely.

When a Dual Bin operation is interactively started (via the menu system), the changer moves the cartridge found at (or after) the initial specified storage location in the input set into the drive. When the drive ejects the cartridge, the changer automatically places it in the first empty cartridge location in the drive's output location set. This process is repeated, until the last specified cartridge in the input set has been ejected from the drive and placed into the output set of locations.

The host computer communicating with a sequential drive only communicates with the drive and not the changer. This allows the use of applications lacking library-specific, cartridge-movement, operating software.

All tape drives can be configured for concurrent Sequential, Recycle or Dual Bin operation.

This flexible design allows the user to partition the library's resources to best meet overall system needs. It is possible to have one library serve as the tape storage device for multiple systems.

## 11.2    Configuration/Partition Page



Figure 11-1   Partition 1-7 Configuration Screen

Before Sequential operation can begin, the user must first configure one or more tape drives for Sequential operation. This is done by setting up one or more partitions in the Configuration page. Touch the Edit button to allow the Type to be selected and the choices will appear as seen in Figure 11-2.
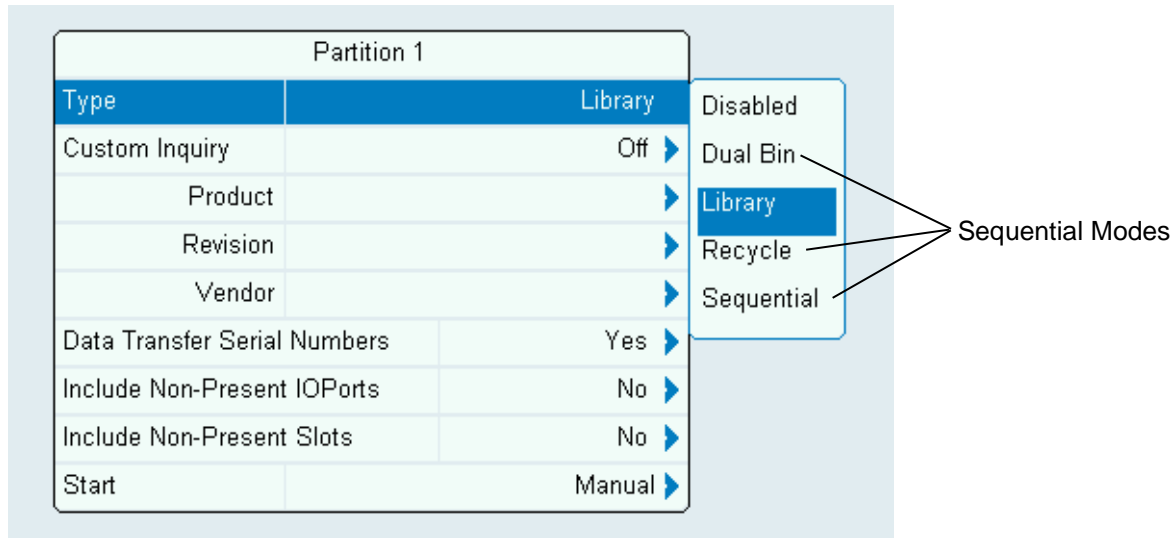
Figure 11-2   Partition 1 Type Choices

## 11.2.1    Type

Each partition in the RLS will be one of five types: Disabled, Library, Sequential, Recycle or Dual Bin. Briefly, based on the Library type, the tape drive's allocated to the partitions are available to the host computer as a source/destination location for cartridge movements. In the Sequential, Recycle and Dual Bin modes, the host computer cannot directly cause cartridge movements to or from the tape drive.

| | |
|---|---|
| **Disabled** | This partition is not active and will not appear as an available option. If the partition type and the partition items are not correctly configured, the partition type will remain disabled. For example, the Dual Bin mode requires the number of outputs locations be greater than the number of input locations. |
| **Dual Bin** | The tape drive allocated to this partition is dedicated to receiving cartridges under changer control. The changer will not perform host-requested cartridge movements to this device. This mode is similar to Sequential except the source and destination cartridge locations are separate and distinct. |
| **Library** | The tape drive allocated to this partition is available for normal cartridge movement operations to and from the drive under host computer control. |
| **Recycle** | The Recycle mode shares the attributes of the Sequential mode. It has the additional feature of automatically restarting the cartridge movement cycle after the last cartridge in the drive's location set has been returned. |

**Sequential**  The tape drive allocated to this partition is dedicated to receiving cartridges under changer control. The changer will not perform host-requested cartridge movements to this device.

## 11.2.2    Sequential or Recycle Configuration Example

In the following example partition 2 has been configured to contain a single drive (T1), two slots from the left side I/O port (ld01, ld02) and a column of magazine slots (LD01 to LD15). It was created by using the Partition Items page under Configuration. Touching the Edit button allows for any available elements to be assigned to a partition simply by touching them. In Figure 11-3 the elements assigned to Partition 2 are shown in green, gray elements are assigned to a different partition and white elements are unassigned. Note: if the left I/O port is installed, the actual number of physical slot locations is LD04 to LD15. The slot locations LD01 to LD03 are lost to the presence of the left I/O Port slots.
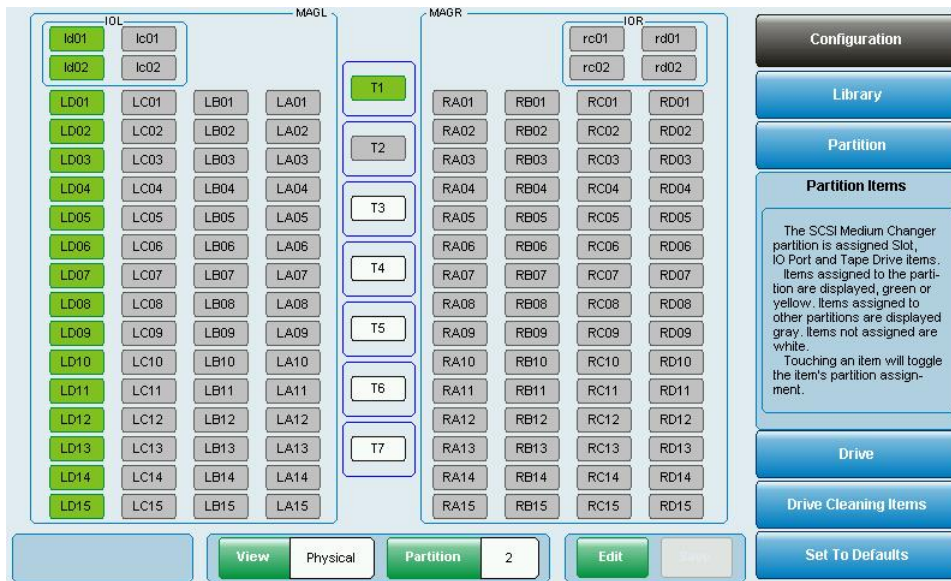


Figure 11-3    Sequential or Recycle Configuration Example

## 11.2.3    Dual Bin Configuration Example

In the following example partition 3 has been configured to contain a single dual bin drive (T3), two slots from the left side I/O port (ld01, ld02) and two columns of magazine slots. In this case column LA01 to LA13 is the source cartridge location and column RA01 to RA15 is the destination location.

It was created by using the Partition Items page under Configuration. Touching the Edit button allows for any available elements to be assigned to a partition simply by touching them. In Figure 11-4 the source elements assigned to Partition 3 are shown in

green, the destination elements are yellow, gray elements are assigned to a different partition and white elements are unassigned. Under dual bin configuration touching an available tape cartridge storage element will cycle it between its three options; white for unassigned, green for source element and yellow for destination element.



Figure 11-4   Dual Bin Configuration Example

*NOTE*

*The amount of usable destination slots must be set equal to or greater than the usable source slots for Dual Bin operation. An IO port, will replace the slot locations it physically occupies.*

## 11.2.4    Start

The Start value allows a tape drive that is configured for one of the three sequential types to automatically start at power-on or after an inventory violation has stopped the library when set for Inventory or PowerOn. Any tape drives configured for the Library mode will ignore the Start value. See Section 9.2 for Start configuration.

The Start value has three possible settings:

**Manual**            If a cartridge is in the tape drive at power-on, the library stops and waits for the operator to either manually eject the cartridge or call upon the host system to eject it. After the cartridge is ejected it must be moved back to the location it came from.

If a cartridge is in the tape drive after a library has stopped because of an inventory violation, the library attempts to continue from where it left off.

**Inventory**      If a cartridge is in the tape drive at power-on or after an inventory violation, the previous input and output slots are invalidated. If after the library completes an inventory scan and finds the input and output slots are both valid, the library attempts to continue from where it left off. If the input and output slots are both invalid, the library will search at the beginning of the set for the first empty slot. It will then restart using the next tape that was found after the first empty slot in the input set. In any other case the library will stop.

**PowerOn**      This mode behaves like INVENTORY, but it only starts the library at power-on.

## 11.3    Interruptions

This section deals with the effects of interruptions to Sequential operation. These interruptions include:

- Power Failure/Interruption.
- Violation of the Inventory
- Unrecoverable Handler Fault.

### 11.3.1    Power Failure/Interruption

A power failure is an unintentional occurrence, while a power interruption is most likely the result of someone intentionally turning the power off. Unfortunately, the changer cannot distinguish between the two events. Under the Manual mode of the Start menu the changer cancels any previously–running sequential operations when power is applied (or reapplied). Under the Inventory and PowerOn modes the changer will attempt to continue from where it left off when power is applied (or reapplied).

If a cartridge was in a sequential tape drive configured for the Manual mode of the Start menu when the power was interrupted, it will remain in the drive when the power comes back on. In this case, either open the door and manually eject the cartridge from the drive, eject it using the menus on the touch screen, or call upon the host system (which may also have experienced a power interruption) to eject it. Then use the Move command in the Operation/Move Cartridge page to return the cartridge to its proper magazine storage location.

## 11.3.2    Unrecoverable Handler Fault

An unrecoverable handler fault is a condition that requires operator intervention: for example, a cartridge incorrectly inserted into a storage matrix slot. The condition should be corrected before continuing.

# 12. Preventive Maintenance

This chapter describes the things that can be done to keep the RLS running reliably.

*DANGER*

> TO AVOID THE POSSIBILITY OF PERSONAL INJURY, BE SURE TO TURN OFF THE RLS'S POWER AND DISCONNECT THE POWER CORD BEFORE DOING ANY WORK INSIDE THE CABINET.

*GEFAHR*

> UM EVENTUELLE PERSÖNLICHE VERLETZUNGEN ZU VERMEIDEN, VERSICHERN SIE SICH VOR JEGLICHER ARBEIT INNERHALB DES GEHÄUSES DAß DER STROM DES RLS AUSGESCHALTET UND DAS STROMKABEL AUSGESTECKT IST.

## 12.1.1    Cleaning the Exterior

Use any standard office equipment cleaner and a soft, clean cloth to clean the exterior of the RLS. Do not use ammonia-based cleaners, or other harsh cleaning solutions, as these may damage the unit's paint. The window is made of polycarbonate plastic and should be cleaned with an appropriate, ammonia-free, plastic-cleaning solution. Kleenmaster Brillianize is recommended.

*NOTE*

> *Kleenmaster® Brillianize® is produced by Chemical Products Co., Inc., Omaha, Nebraska.*

## 12.1.2    Cleaning the Interior

The inside of the RLS cabinet is pressurized to keep out dust and cooled by filtered air to ensure an optimum operating environment. If a build-up of dust inside the unit should be noticed, check the condition of the air filter element and replace it if it is dirty. Instructions for checking and changing the air filter are given in Section 12.2 and Section 12.3.

Plastic dust from the cartridges may eventually accumulate on the gripper assembly and the bottom of the cabinet. This should be removed with a vacuum cleaner or slightly damp cloth.

### 12.1.3    Cleaning the Tape Drives

The cleaning procedure can be automated by storing a cleaning cartridge in one of the storage matrices slots, and then using a host system's maintenance program to automatically load the cleaning cartridge into each tape drive.

## 12.2    Checking the Air Filter

The RLS and the tape drives are cooled by outside air that is drawn into the RLS enclosure through an air filter attached to the front of each storage matrix. This filter keeps dust and dirt from entering the enclosure, as its presence could degrade the reliability of the tape drives and media. If the filter becomes clogged with dust and dirt, the amount of airflow will be diminished. Diminished airflow could cause the tape drives to run hotter, again degrading their reliability. Therefore, it is important to periodically check the air filter(s) and replace it when it becomes dirty.

1.    Visually inspect the air filter element in the front of each storage matrix (Figure 12-1 and Figure 12-2).

2.    New air filters in RLS-85XX libraries are green and the filters in RLS-8350 models are black. A color change indicates the presence of some dirt, which is acceptable. However, if dirt is clinging to the outside filter surface, it is time to replace the filter.

## 12.3    Replacing the Air Filter

### 12.3.1    Replacing an Air Filter in a RLS-85XX library



Front of
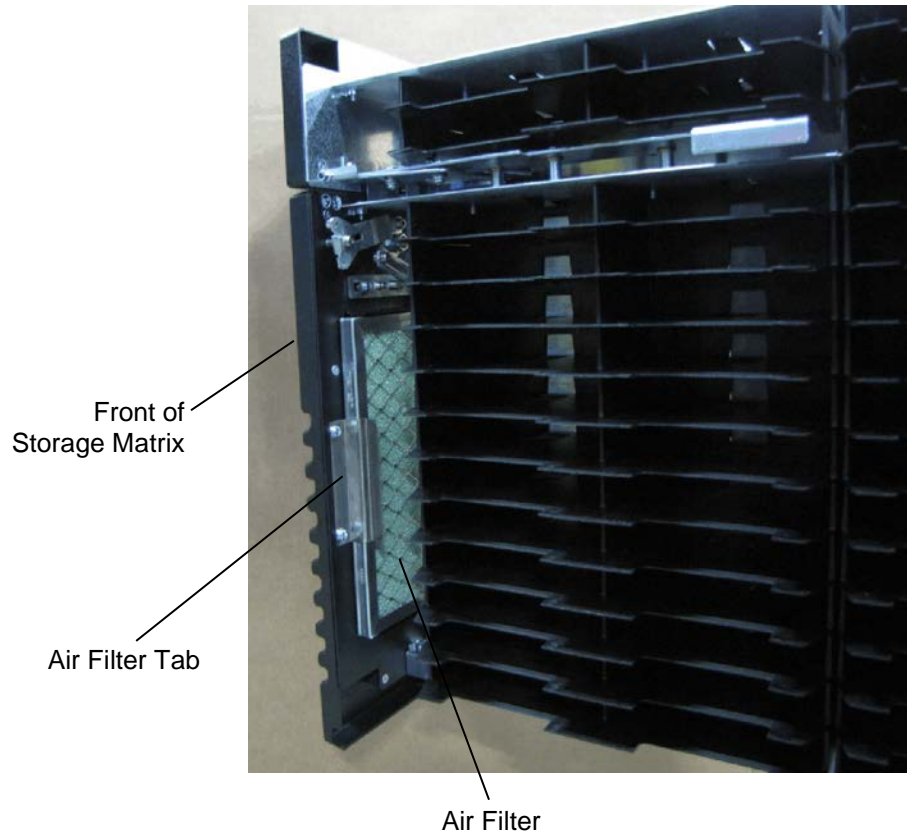Storage Matrix

Air Filter Tab

Air Filter

Figure 12-1   Air Filter with a Storage Matrix Open (RLS-85XX shown)

1.    Slide the storage matrix forward until the air filter can be accessed.

2.    Grasp the air filter and lift the nearest edge while pulling back the air filter tab
      to release it from the tab.

3.    Replace the air filter with a new one (Qualstar P/N 500584-01-6). If an old air
      filter is not yet dirty enough to be replaced and is being reinstalled, make sure
      that the side that was facing the inside of the library is placed in the same
      direction as it was when it was removed. Reversing the direction of an old air
      filter may cause dirt to be transferred into the library.

4.    Slide the air filter past the air filter tab until it is touching the stops on the
      storage matrix front panel, and then turn it while pulling back the air filter tab
      until it pops securely under the tab.

**5.** Slide the storage matrix closed and lock it.

**6.** Repeat these steps for the second storage matrix if installed on the library.

## 12.3.2 Replacing an Air Filter in a RLS-8350 library



Front of
Storage Matrix

Tuck the Air
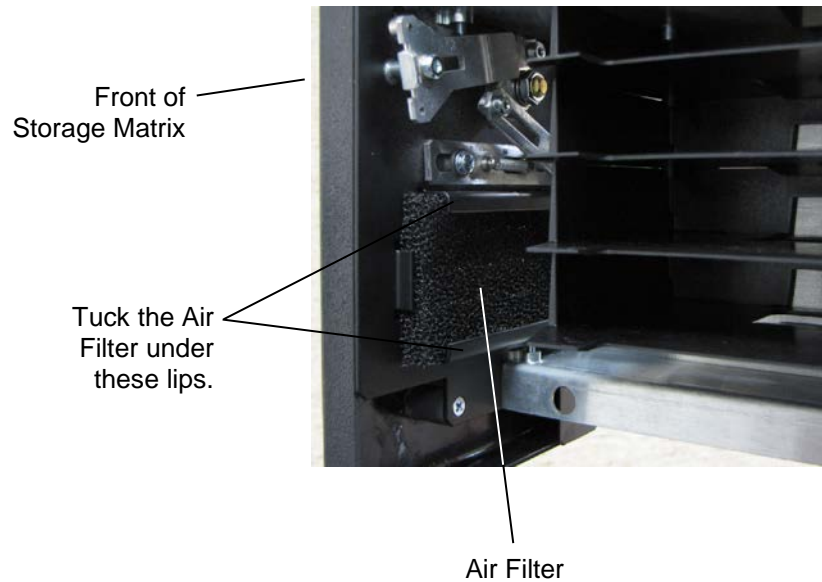Filter under
these lips.

Air Filter

Figure 12-2   Air Filter with a Storage Matrix Open (RLS-8350 shown)

**1.** Slide the storage matrix forward until the air filter can be accessed.

**2.** Grasp the air filter and pull it free from the lips securing it to the front of the storage matrix.

**3.** Replace the air filter with a new one (Qualstar P/N 510787-01-3). If an old air filter is not yet dirty enough to be replaced and is being reinstalled, make sure that the side that was facing the inside of the library is placed in the same direction as it was when it was removed. Reversing the direction of an old air filter may cause dirt to be transferred into the library.

**4.** Insert the air filter into the opening in the front of the storage matrix making sure that it is centered.

**5.** Flatten the air filter and tuck it under the lips to secure it.

**6.** Slide the storage matrix closed and lock it.

**7.** Repeat these steps for the second storage matrix if installed on the library.

## 12.4    Storage Matrices

Be sure to inspect each matrix at least once per year. Replace a matrix if it has any broken parts. Clean with a slightly damp cloth if dusty.


## 12.5    Cartridges

Cartridges should be replaced when their door mechanism breaks. This requires transferring the data to another cartridge and applying a new (and probable different) barcode label to the cartridge. Caution must be exercised to prevent a loss of data. Clean with a dry, lint free cloth if dust has accumulated in the recesses of the gripping area or on the rear sides of the cartridges.

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# 13.                                          Repacking

This chapter explains how to properly repack the RLS for shipping.

## DANGER

DEPENDING UPON THE MODEL, THE RLS WEIGHS OVER 103 POUNDS (47 Kg), EXCLUDING MAGAZINES AND CARTRIDGE DRIVES. IMPROPER LIFTING TECHNIQUES CAN RESULT IN BACK INJURY AND/OR EQUIPMENT DAMAGE. GET HELP WHEN LIFTING OR MOVING THE RLS.

## GEFAHR

ABHAENGIG VOM MODELL BETRAEGT DAS GEWICHT DER RLS OHNE MAGAZIN UND CASSETTENLAUFWERK ÜBER 103 POUNDS (47 Kg). FALSCHES TRAGEN KANN ZU PERSONENVERLETZUNGEN UND/ODER ZU BESCHAEDIGUNGEN DES GERAETES FUEHREN. TRAGEN ODER BEWEGEN SIE DAS GERAET NIE OHNE MINDESTENS EINE ZWEITE HILFSPERSON.

The following items were packed in the original shipping carton:

- RLS Tape Library
- One Power Cord
- Two Door Keys

## 13.1 Repacking the RLS

The RLS was originally shipped in a specially designed carton. When shipping the RLS, use the original shipping container and packing materials. If the original shipping container and packing materials are not available, order a new shipping container by calling Qualstar Technical Support.

### CAUTION

Remove cartridges before proceeding. To prevent damage, do not ship the RLS with cartridges installed.

## 13.2 Preparation for Packing

Prepare the unit for packing as follows:

1. Remove all tape cartridges and cleaning cartridges.

2. Remove the power cord and place it in the accessory carton.

## 13.3 Packing the RLS

With the help of an assistant, follow the instructions below.

**Refer to Figure 13-1**

1. With the help on an assistant lift the library and place it in the box using the hand holds on the front right and left sides along with the hand hold on the rear.

2. Place the two foam inserts on the top of the library chassis.

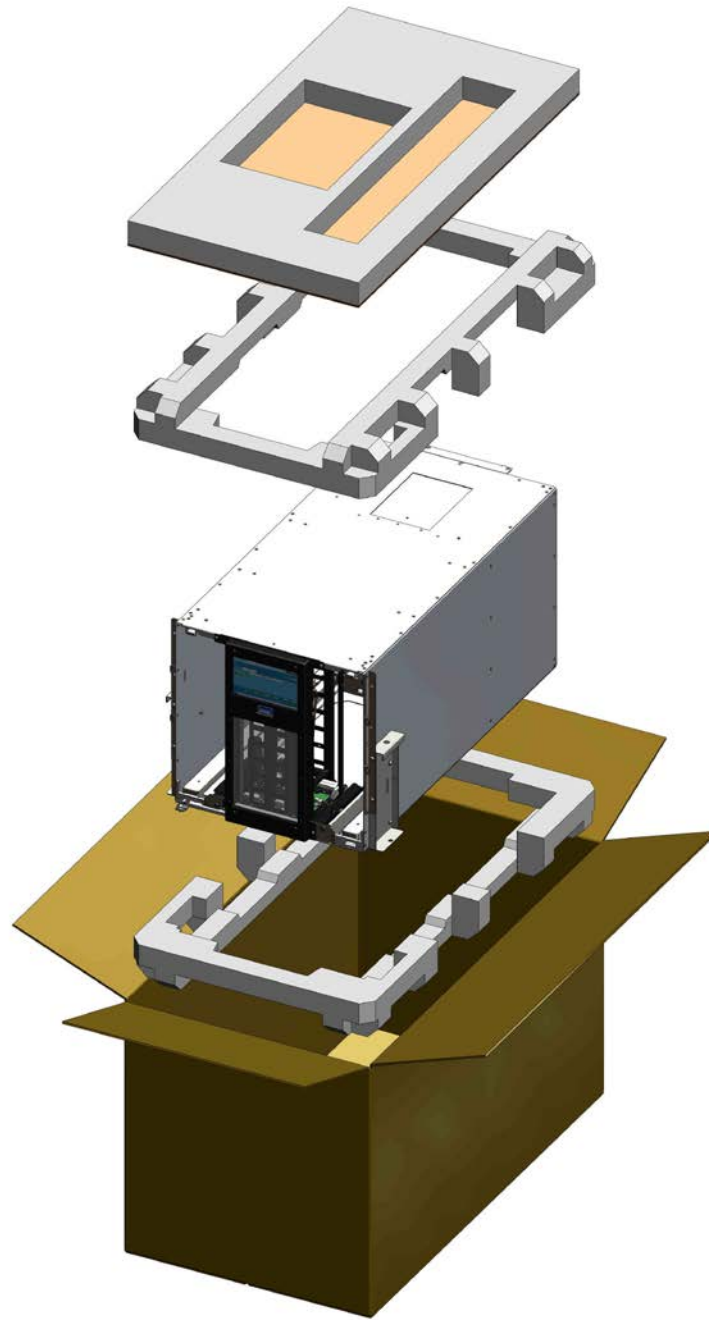3. Close and secure the top of the box with packing tape.

Figure 13-1   Repacking the RLS (RLS-85120 shown)

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# 14.                                                 Glossary

| | |
|---|---|
| <u>Barcode Reader</u> | This device reads barcode labels found on Tape Cartridges. Barcode label information may be used to identify each Tape Cartridge in the RLS. |
| <u>Browser</u> | An application program that runs on a computer and is used to browse the contents of web sites and pages on the Internet or LAN. |
| <u>Carriage</u> | A Carriage is the mechanism that travels within the RLS in order to move Tape Cartridges. It contains the Handler and the Barcode Reader. |
| <u>Changer</u> | The Changer is the central control system of the RLS. The Changer is the device that moves tapes to and from all locations. It is controlled by the SCSI host computer and/or the operator via the Control Panel. The Changer includes everything except the Tape Drives and Tape Cartridges. |
| <u>Cookies</u> | A very small data file deposited on a computer by a web-based site for future recovery of the client's identification and preferences. |
| <u>DHCP</u> | Dynamic Host Configuration Protocol – A system for dynamically allocating IP addresses. |
| <u>Elements</u> | The addressable locations in the library, including the tape drives, the cartridge slots, the handler, and the I/O ports slots. |
| <u>Ethernet</u> | The standard describing the physical characteristics and protocol used on most local area computer networks or LANs. |
| <u>FastPass</u> | An elevator expansion option that passes tapes from unit to unit easily allowing expanded capacity and data delivery performance. Up to four RLS-85XX libraries can be interconnected or a single RLS-8350 may be connected to an RLS-8560 or RLS-85120 library. |
| <u>Fibre Channel</u> | One of the communication protocols supported by the library. Fibre Channel is a set of standards for a serial I/O bus. |
| <u>Handler</u> | The Handler is a mechanism on the Carriage that holds a Tape Cartridge with its Gripper mechanism. The Handler travels to insert and remove Tape Cartridges from the Tape Drives and storage locations. A Handler is referred to as the Medium Transport Element in the SCSI specification. |
| <u>I/O port</u> | A sliding mechanism on the front of the libraries storage matrix through which cartridges can be inserted or removed without opening the storage matrix. |
| <u>Hot-Swappable</u> | A library component, such as tape drive assemblies and power supplies, that can be replaced without removing system power. |

| | |
|---|---|
| <u>http:</u> | Hypertext Transfer Protocol |
| <u>IP</u> | Internet Protocol – The data transport protocol used by the Internet. |
| <u>Java Script</u> | Java script used in web pages that is interpreted by the user's browser. |
| <u>Java Virtual Machine</u> | A program that interprets Java script. |
| <u>Location Designator</u> | A Location Designator contains alphanumeric characters used to describe any *physical* tape storage location within the RLS. |
| <u>LAN</u> | Local Area Network – A physical interconnection medium allowing computers to communicate with each other. |
| <u>Library</u> | A robotic media handler that is capable of storing multiple pieces of removable media and loading and unloading them from one or more tape drives in arbitrary order. |
| <u>Logical Library Partitions</u> | Logical library partitions ensure that each software application has dedicated and secure access to specific tape drives, cartridge slots, and I/O ports. The handler is shared among all logical library partitions. |
| <u>LTO<sup>©</sup></u> | Linear Tape Open – an industry standard ½-inch tape format also know as Ultrium. Copyrighted by HP, IBM and Seagate |
| <u>Medium-changer</u> | The official SCSI name for the portion of a tape library that actually moves tape cartridges (data medium). See Changer. |
| <u>PCBA</u> | Printed Circuit Board Assembly |
| <u>Physical Library</u> | The entire library, including all tape drives, cartridge slots, the robotics and the I/O ports. |
| <u>Robotics</u> | Any part of the library that moves automatically. This includes the Carriage, Gripper, Handler, etc. |
| <u>SAN</u> | Storage Area Network – usually provided by a Fibre Channel backbone. |
| <u>SMTP</u> | Simple Mail Transfer Protocol – The standard e-mail protocol on the Internet. |
| <u>Stacker</u> | A term that refers to a "Single-pass, sequential-only Changer." A Stacker device changes Tape Cartridges for a single Tape Drive from a stack of available Tapes Cartridges. The sequence cannot be repeated without operator intervention. A Stacker needs no commands from a host computer to perform its function. All that is required of the host computer is for it to write its data to tape and then eject the tape when it becomes full. |
| <u>Storage Matrix</u> | A Storage Matrix is a fixed matrix of tape cartridge storage slots. The storage matrices may be removed from the unit for bulk loading or removal of cartridges. The locations |

within storage matrices are referred to as Storage Elements in the SCSI specification.

**Subset Mask**
The mask used on a LAN to determine if a packet is destined for another site on the LAN or outbound for the Internet.

**Tape Cartridges**
Tape Cartridges are magnetic tape media used to store data. Tape Cartridges, including data and cleaning cartridges, may be placed in any of the physical locations.

**Tape Drives**
Tape Drives are devices used to write and read data to and from Tape Cartridges. They are mounted a Drive Carrier which plugs into the RLS drive bay. The Tape Drives are referred to as Sequential-access devices in the SCSI specification.

**Touch Screen**
The color screen on the library's front panel used to display the user interface.

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