



**RLS Series**  
**Tape Libraries**  
Product Specification

501490 Rev. N

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# 1.

# Introduction

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## 1.1 Scope

This product specification describes the Qualstar RLS family of tape libraries, subsequently referred to in this specification as the RLS. It also provides detailed specifications of the product and is intended for use by individuals evaluating, purchasing and/or integrating the RLS library products.

## 1.2 Supplemental Documentation

For information about the SCSI interface, or other information outside the scope of this manual, please refer to the appropriate documents listed below. The following Qualstar and ANSI documents supplement this specification:

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<b>Subject</b>	<b>Document</b>	<b>Qualstar Document Number</b>
Installation & Operation	RLS Installation and Operation Manual	<a href="#">501500</a>
Service	RLS Technical Service Manual	<a href="#">501510</a>
Supported Tape Drives	Product Information Note	<a href="#">PIN-014</a>
Approved Data Cartridges	Product Information Note	<a href="#">PIN-038</a>
Barcode Label Specifications	Product Information Note	<a href="#">PIN-040</a>
Capacity on Demand	Ordering & Installing Capacity on Demand	<a href="#">PIN-044</a>
SCSI Command Information	RLS SCSI-2 Interface Manual	<a href="#">501551</a>
SCSI-2	ANSI X3.131-1994	N/A
SCSI SPI-2 Specification	ANSI X3.302-1998 SCSI Parallel Interface-2 (SPI-2)	N/A

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**Table 1-1 Applicable Documents**

# 2.

# Product Description

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## 2.1 General Description

The RLS Series is a family of automated rack-mountable tape libraries. All RLS Models are 5 rack-units tall (5U = 8.75-inches). There are presently 11 models that utilize AIT and LTO tape technology. The tape drives supported by the RLS are listed in [Product Information Note #014](#) available at Qualstar's Web Site: [www.qualstar.com](http://www.qualstar.com).

Models are available with native capacities from 2.2-terabytes to over 35-terabytes. The library is under host control via an Ultra-160 compatible SCSI interface. A Fibre Channel interface is available.

Each library contains a high performance robotics system for handling data cartridges, one to four tape drive bays and removable magazines 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 is reduced to replacing the air filter and cleaning the gripper pads, when so prompted by the control panel display.

## 2.2 Standard Features Found in All Models

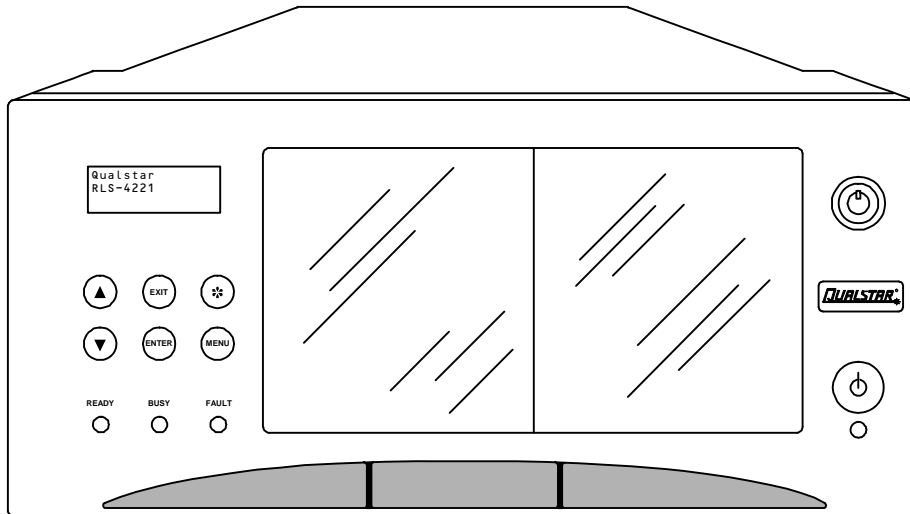
- Plug-in Interface Personality Module (IPM) provides LVD/SE SCSI Interface
- Barcode scanning of data cartridge labels
- Q-Link web-based library manager can remotely control the RLS and automatically e-mail alarm messages to a contact list (operating firmware may be remotely updated)
- Rack mount slide kit
- Simultaneous Random and Multi-Sequential operating modes with two tape drives
- Logical Libraries feature supports simultaneous connections to as many as four hosts (LVD only)
- The key-lockable front panel has two windows for good visibility into the lighted interior
- Control panel utilizes six pushbuttons and a white backlit 80-character display
- Easy-to-use menu system for configuration, operation and maintenance
- VIOP (Variable I/O Port) allows users to set the number of storage slots, including entire magazines, dedicated to inserting/removing tape cartridges

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- Tape drives are in quick-change carriers that plug in/out from the front
  - Automated tape drive cleaning
  - Operating firmware may be updated via the SCSI interface or Q-Link
  - Mean-Exchanges-Between-Failures (MEBF) exceeds 2,000,000 exchanges
  - Maintenance-friendly by design: no adjustments, quick-swap drives, plug-in power supply modules
  - Filtered, forced-air cooling of library and tape drives provided by redundant fans and front replaceable air filter (single fan on RLS-4221)
  - Universal input power rating (100- to 240-VAC, 50/60 Hz)
  - Power Factor Corrected (PFC) power supply is very efficient and fully CE compliant

### **2.3 Optional Features Available on Most Models**

- Plug-in 2Gb/second Fibre Channel Interface Personality Module (IPM)  
(operating firmware may be updated via this interface)
- Hot-Swappable Drive Interface Adapters (HS-DIA) facilitate hot-swapping tape drives without resetting SCSI busses. Available on RLS-4000 models.
- Dual-redundant, hot-swappable Power supply modules with independent power cords  
Not available on RLS-4221 (with Q-Link, automatic e-mail alarm message sent when any power supply or fan fails)

## 2.4 Models



FEATURE/MODEL	RLS-4221	RLS-4445	RLS-4470
Tape Technology	AIT	AIT	AIT
Maximum No. of Drives	2	4	4
Max. Number of Cartridges	22 <sup>①</sup>	45	70
Number of Magazines	4	9	14
Cartridges per Magazine	5	5	5
Barcode Reader	Standard	Standard	Standard
LVD/SE SCSI Interface Personality Module (IPM)	Standard	Standard	Standard
2Gb/S Fibre Channel IPM	Optional	Optional	Optional
Q-Link Remote Library Manager	Standard	Standard	Standard
Quick-swap Tape Drive Carriers	Standard	Standard	Standard
Hot-Swappable Drive Interface Adapter for each tape drive	Optional	Optional	Optional
Redundant, Hot-Swappable Power Supply Modules	N/A	Optional	Optional

<sup>①</sup> Includes 2 fixed cartridge storage locations

**Table 2-1 RLS-4000 Models, Features and Options**

FEATURE/MODEL	RLS-8202 <sup>①</sup>	RLS-8204 <sup>①</sup>	RLS-8204D <sup>②</sup>	RLS-8236	RLS-8236D <sup>②</sup>
Tape Technology	LTO	LTO	LTO	LTO	LTO
Maximum No. of Drives	2	2	2	2	2
Max. Number of Cartridges	12-36	12-44	12-44	36	36
Number of Magazines	3-9	3-11	3-11	9	9
Cartridges per Magazine	4	4	4	4	4
Barcode Reader	Standard	Standard	Standard	Standard	Standard
LVD/SE SCSI Interface Personality Module (IPM)	Standard	Standard	Standard	Standard	Standard
2Gb/S Fibre Channel IPM	Optional	Optional	Optional	Optional	Optional
Q-Link Remote Library Manager	Standard	Standard	Standard	Standard	Standard
Quick-swap Tape Drive Carriers	Standard	Standard	Standard	Standard	Standard
Redundant, Hot-Swappable Power Supply Modules	Optional	Optional	Optional	Optional	Optional

- ① Features field-upgradeable Capacity on Demand  
 ② “D” models support LTO DFA fibre channel tape drives

**Table 2-2 RLS-8000 Models, Features and Options (continued below)**

FEATURE/MODEL	RLS-8244	RLS-8244D <sup>②</sup>	RLS-8444H
Tape Technology	LTO	LTO	LTO (HH) <sup>③</sup>
Maximum No. of Drives	2	2	4
Max. Number of Cartridges	44	44	44
Number of Magazines	11	11	11
Cartridges per Magazine	4	4	4
Barcode Reader	Standard	Standard	Standard
LVD/SE SCSI Interface Personality Module (IPM)	Standard	Standard	Standard
2Gb/S Fibre Channel IPM	Optional	Optional	Optional
Q-Link Remote Library Manager	Standard	Standard	Standard
Quick-swap Tape Drive Carriers	Standard	Standard	Standard
Redundant, Hot-Swappable Power Supply Modules	Optional	Optional	Optional

- ② “D” models support LTO DFA fibre channel tape drives  
 ③ HH = Half-High tape drives

**Table 2-3 RLS-8000 Models, Features and Options**

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## 2.5 Major Features

### 2.5.1 Capacity on Demand

The Capacity on Demand (COD) feature allows the storage capacity of the RLS-8202 model to be field expanded from 12 tape cartridges up to 36 and the RLS-8204 can be expanded to 44 cartridges in increments of eight.

Each upgrade kit includes two magazines and a unique upgrade command that must be entered into a menu before installing the new magazines and tapes. Refer to [PIN-044](#) on the Qualstar website or the RLS Installation and Operations Manual for additional information.

### 2.5.2 Cabinet

The cabinet has a hinged top cover to provide easy access for upgrades and field service. Interface Personality Modules (IPMs) plug into the rear as does a single or two redundant power supply modules. All power and data connections are in the rear.

### 2.5.3 Front Panel Components

The entire front panel is actually a door that hinges down for servicing tape drives. A key-operated lock secures the door. Figure 2-1 shows the various features of the front panel. When the front door is opened, an interlock switch prevents further robotic movement until the door is closed.

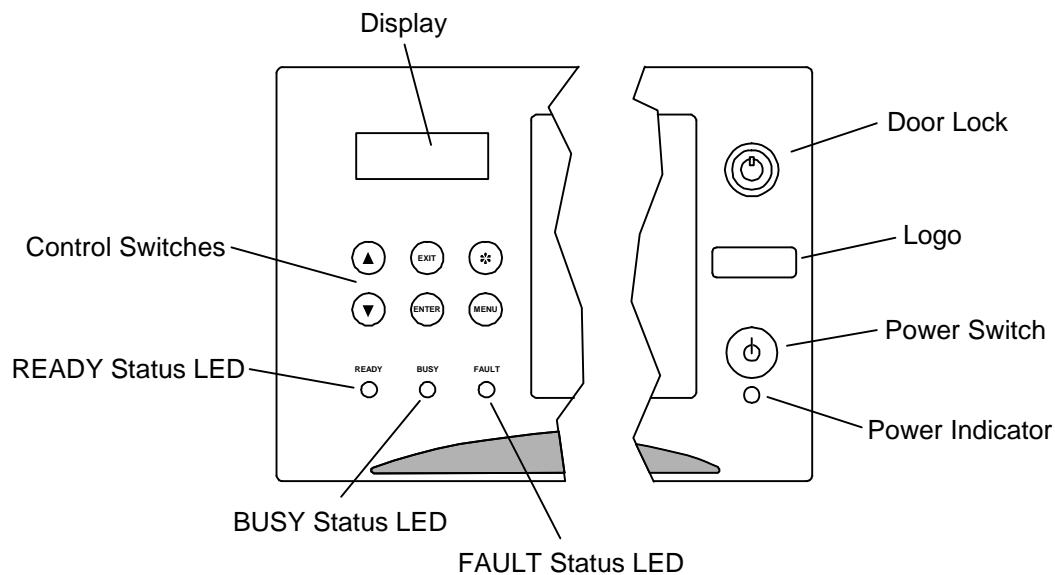


Figure 2-1 Front Panel Details

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### 2.5.3.1 Control Panel

The control panel has a four-line, 80-character, backlit display, six control keys, three color-coded status LEDs (READY, BUSY and FAULT) and an audible alarm. The operator uses the control keys and display to configure and operate the RLS and to observe its status. The following information can be displayed:

- Model number and all firmware revisions
- Extensive menu system for configuration, maintenance and operation
- Operational status (indicates all active cartridge movements)
- SCSI command history log which stores the most recent commands and status
- Error conditions
- Configuration status of the Q-Link interface
- Configuration status of optional Fibre Channel interface

The six pushbutton switches are used to manually control the RLS by means of the menu system and are identified in Table 2-4.

NAME	FUNCTION
▲	Scrolls up through menu items.
▼	Scrolls down through menu items.
ENTER	Accepts the currently displayed menu choice.
EXIT	Exits the present menu and returns to the previous menu level.
*	Displays The Quick Operation menu
MENU	Always takes you to the Top Menu.

**Table 2-4 Control Panel Switches**

### 2.5.3.2 Variable I/O Port (VIOP)

The operator gains access to the media through a window that is opened automatically by the RLS. Once opened, tape cartridges and/or an entire magazine of cartridges may be removed or inserted. The window must be manually closed by the operator. While the window is open, the RLS can respond to a SCSI command with either a busy status, a not ready status or it can accept the command and wait for VIOP door closure to complete the command.

### 2.5.3.3 Door Lock

The door lock is key operated. When locked by the key, the front panel/door cannot be opened under any circumstances, however the VIOP window can still be opened by the RLS if allowed by the host computer. Even when unlocked by the key, the front panel/door cannot be opened if a host computer has commanded the RLS to prevent media removal. When unlocked by the key and allowed by the host, the front panel/door can be opened via a Quick Menu command.

### 2.5.3.4 Power Switch and Indicator

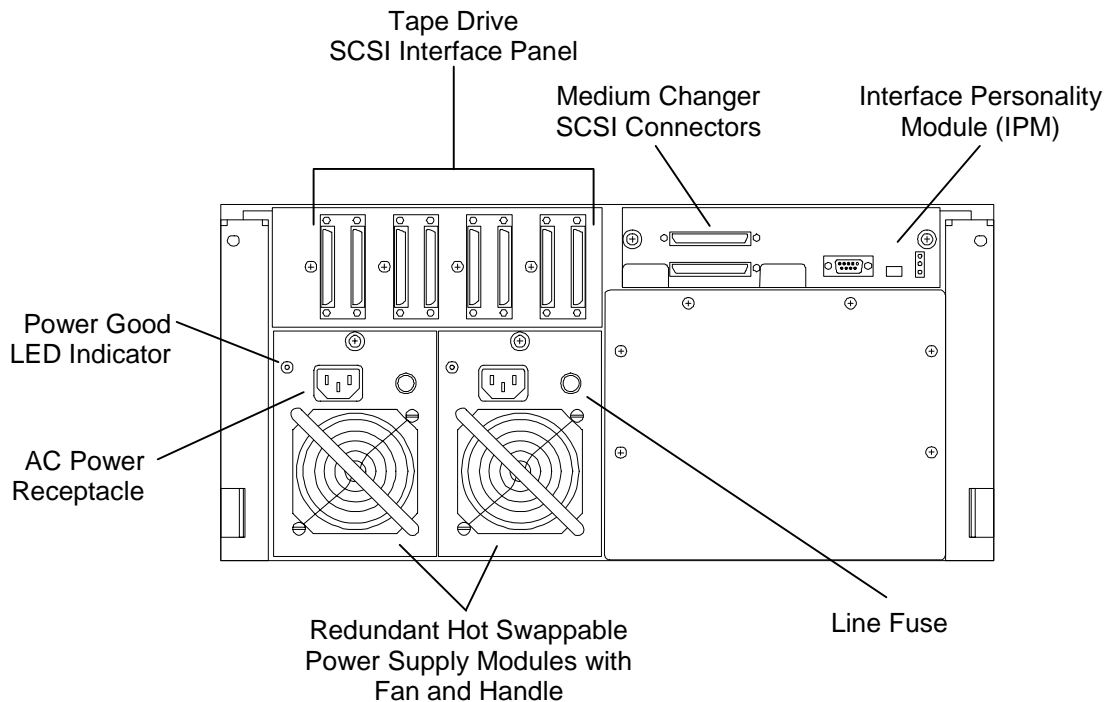
A push-on/push-off switch controls primary power (AC or D.C.). A green LED Power Indicator illuminates when the power is on.

## 2.5.4 Rear Panel Components

### 2.5.4.1 Power Supply Module (PSM)

There are three power supply configurations available.

1. A 125-watt full-sized PSM is standard on the RLS-4221
2. A 250-watt full-sized PSM is standard on all other models
3. Two, 250-watt, half-sized PSMs running in a redundant, hot swappable configuration are optional on all models except the RLS-4221.



**Figure 2-2 Rear Panel Details**

All PSMs supply regulated 24-volts DC to the RLS. The first two configurations are powered from AC mains of 100- to 240-volts, 50 or 60 Hertz. Each PSM also contains a power receptacle (safety disconnect), line fuse and power cord receptacle.

In the second configuration, two PSMs operate in parallel and equally share the load. This reduces the stress on the power supplies and greatly extends their MTBF (Mean Time Between Failure). The two PSMs are identical and either one is capable or running the RLS on its own. Should a PSM fail, the other one will run the RLS indefinitely. The RLS and tape drives will continue to function, uninterrupted by the failure and subsequent replacement of the failed PSM. A green Power Good LED

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indicates that a half-sized PSM is operating properly. Each PSM has its own power cord and it is recommended that these be connected to different AC power sources (usually two UPS) to enhance overall system availability. A failed PSM or power source causes an alarm condition that can result in e-mail notification by the Q-Link remote library manager.

Each half-sized PSM contains a fan and full-sized 250-watt PSMs have two fans. A failed fan also causes an alarm condition that can result in e-mail notification with the Q-Link remote library manager. With dual PSMs, both fans continue to run even when a PSM fails.

#### **2.5.4.2 Interface Personality Module (IPM)**

The IPM is a plug-in module that can be changed when the RLS is powered-down. It always contains the SCSI connectors to the RLS medium changer and an RS-232 serial port that can be used for remote management.

The standard medium changer interface is LVD/SE (Multi-mode) SCSI and includes the Q-Link remote library manager. Q-Link provides a 10BaseT half-duplex connection to LANs and the Internet.

An optional two-gigabit per second (2Gb) Fibre Channel to SCSI Bridge IPM is available. This IPM connects the medium changer to a single, 2Gb/second Fibre Channel port. The Q-Link Remote library manager is also standard on this IPM.

#### **2.5.4.3 Tape Drive SCSI Interface Panel**

There is a pair of HD-68 SCSI connectors provided on the Interface Panel for each tape drive, even if a drive is not installed. The standard SCSI interface is a loop, from one of these connectors to the tape drive's SCSI connector and back to the other connector. This scheme provides for quick drive changes without unplugging the SCSI cables attached to the interface panel. However, when a tape drive is removed, the connection between the pair of SCSI connectors on the interface panel is broken. Thus, unplugging a tape drive on a live system may cause the SCSI bus to hang.

The Buffered Drive Interface Adapter (BDIA) option for RLS-4000 libraries, places active circuitry between the interface panel connectors and each tape drive. Thus, when a drive is unplugged, the connection between the SCSI connectors and the SCSI termination power remain intact, preventing bus hangs or resets.

## 2.5.5 Medium Changer Components

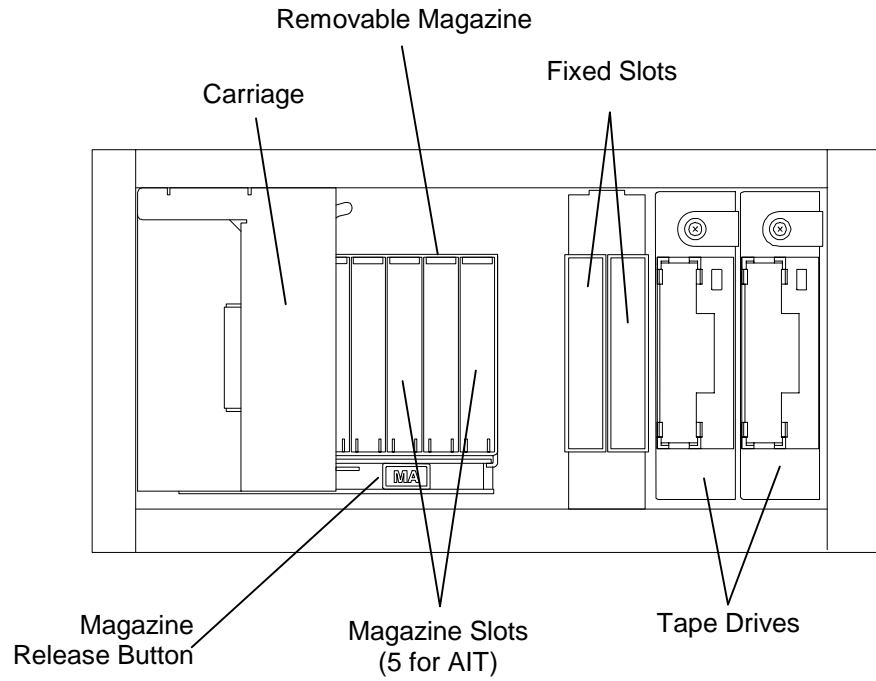


Figure 2-3 RLS-4221 Components

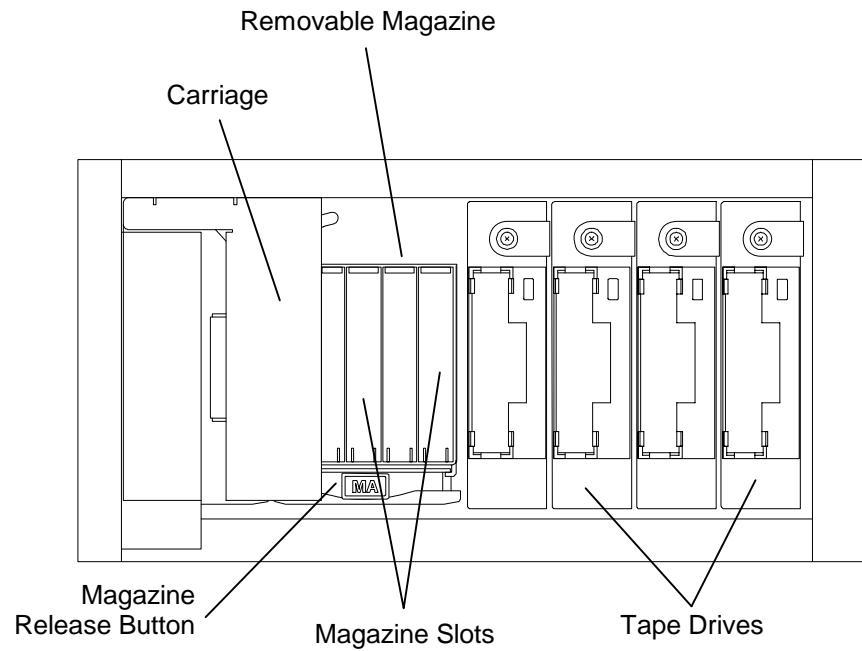


Figure 2-4 RLS-4445 and RLS-4470 Components

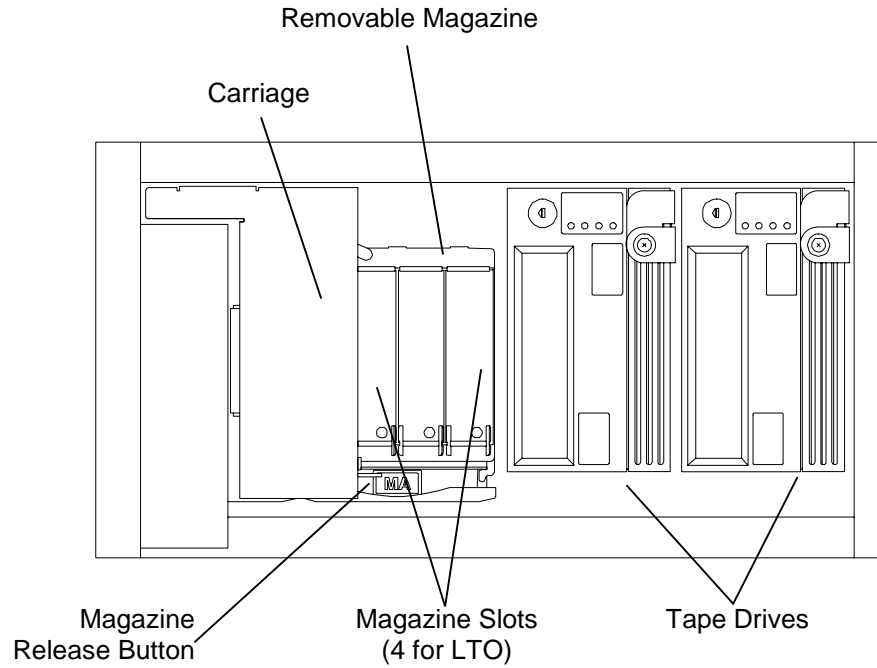


Figure 2-5 RLS-8202, 8204, RLS-8236 & RLS-8244 Components

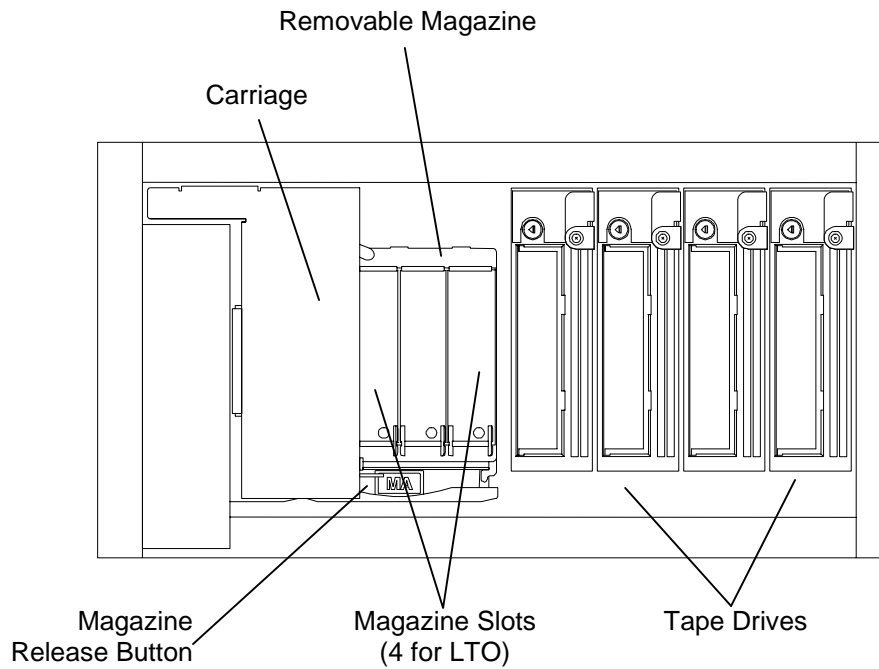


Figure 2-6 RLS-8444H Components

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### **2.5.5.1 Magazines**

A magazine is a multi-compartment container that, depending on the tape technology, can hold four or five tape cartridges. A magazine and its cartridges can be removed from the RLS as a unit. A dust cover is provided for storage. Magazines self-lock on their mounts and are easily removed by pressing a release button. See Table 2-1 for the number of cartridges held by the different magazines. Additionally, each cartridge is individually retained within the magazine to prevent mishandling or damage.

### **2.5.5.2 Carousel**

The RLS-4221 utilizes a rotating carousel to hold four magazines containing data cartridges. The carousel rotates in 90-degree increments to present one magazine to the robotic handler. The carousel can rotate in either direction to minimize the access time to magazine.

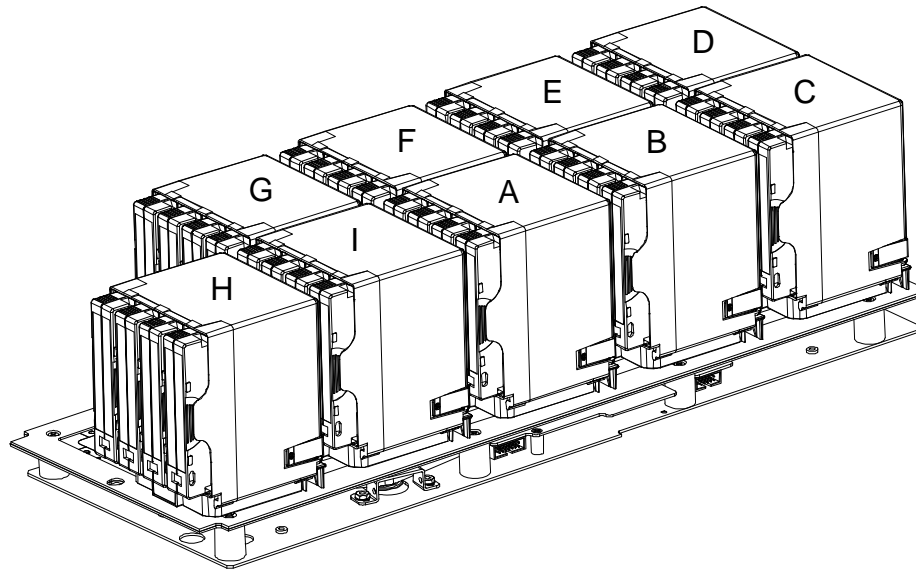
### **2.5.5.3 Fixed Slots**

The RLS-4221 is the only model containing fixed cartridge storage slots. These two slots are identified as F1 and F2 and may be accessed when the front panel/door is opened. The fixed slots can hold data or cleaning cartridges.

### **2.5.5.4 Storage Array**

Except for the RLS-4221, all models utilize a patented storage array that holds 9, 11 or 14 magazines in a rectangular array. The magazines move around the racetrack-like array in either direction. The direction of movement is chosen to minimize the time to access the desired magazine.

Storage arrays employ a high-reliability mechanism that utilizes a single brushless DC motor. If no power is available, a blade screwdriver can be inserted through a hole in the bottom of the RLS to manually move the storage array in either direction.



**Figure 2-7 Storage Array Layout (Model 8236 Shown, Letters Identify Magazines)**

#### **2.5.5.5 Tape Drives**

Depending upon the model, each RLS accommodates either 2 or 4 tape drives but can be used with fewer. The drives are housed in plug-in drive carriers that may be installed or removed while the other drives within the RLS 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 RLS executive processor and is available to the host computer whenever a new drive is plugged-in. The drive's SCSI ID 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 via the front panel/door. A drive can be changed within a minute and no tools are required.

#### **2.5.5.6 Robotics**

The RLS utilizes a simple two-axis robotic cartridge handling mechanism that moves cartridges between the storage slots and the tape drives. All motion is powered by brushless DC motors turning precision leadscews and drive shafts. Magnetic sensors provide position and velocity feedback while optical sensors provide absolute positional information. This unique design produces optimum positioning accuracy, reliability and long life. The servo systems are all-digital and do not require adjustments.

#### **2.5.5.7 Cooling System**

Two rear mounted axial fans (single-fan on RLS-4221) draw outside air into the cabinet through a front-mounted replaceable air filter. The air is exhausted out the rear of the unit. Temperature sensors monitor internal temperatures and sound an

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audible alarm and display an alarm message when the RLS operating temperature limits are exceeded. A temperature alarm message can also be sent to a list of e-mail recipients via the Q-Link remote library manager. The RLS periodically prompts the user to replace the air filter. This message can also be e-mailed via Q-Link.

#### **2.5.5.8 Variable I/O Port**

The VIOP feature allows users to set the number of storage slots dedicated to inserting/removing tape cartridges. The range is in one-slot increments from none up to all of the slots available in the RLS. If the number of storage slots selected equals the number in a magazine, then the entire magazine may be removed. The VIOP door can be opened or locked by the host computer as well as opened by a control panel request if already unlocked. The operator must always manually close the VIOP door.

#### **2.5.5.9 Barcode Reader**

A barcode reader is included on all RLS models. The barcode reader consists of a charge-coupled sensor and associated electronics. The barcode reader can scan all cartridges in the RLS (except those within tape drives), as well as cartridges introduced into the VIOP. Barcode data is stored internally in the RLS' non-volatile RAM (the internal inventory database) and is available to the host computer upon request.

#### **2.5.5.10 Inventory Sentry**

The Inventory Sentry utilizes infrared beams that pass in front of all cartridge storage locations and tape drives. If the front door is opened to inspect the inventory and the inventory is not disturbed, closing the door immediately returns the RLS to operational status.

If the Inventory Sentry beam is broken while the door is open, the inventory status is invalidated. When the door is subsequently closed, the RLS will automatically rescan the cartridge inventory (and barcode labels if present) and update its internal inventory database before becoming operational.

### **2.5.6 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](http://www.qualstar.com) (click on Support tab) for more information.

By default, the RLS expects a modulus 43 check character at the end of each label. The use of a check character helps assure that labels are read error-free. The RLS configuration must be changed before using barcode labels without a check character. All of the labels within the RLS must match the check character configuration: either all with or all without a check character.



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## 2.7 RLS Operation

### 2.7.1 Medium Changer Control System

There are several microprocessors utilized throughout the RLS to form an efficient distributed control system. The Executive Processor orchestrates the performance. All of the microprocessors utilize FLASH memory for storing their operating firmware. In addition to its own needs, the Executive Processor firmware contains the firmware images for all of the other microprocessors in the RLS. Thus all of the RLS operating firmware gets updated with a single code load to the Executive Processor. This code load can be accomplished via the SCSI, Fibre Channel, Q-Link and serial interfaces.

### 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 (the address where the cartridge came from – its source). The Inventory Database is maintained in non-volatile RAM and is always available to the host application.

### 2.7.3 Manual Operation

The menu system provides a means of manually moving cartridges to or from all available locations (drives, magazine slots and VIOP). The menu system is accessed using the control keys on the front panel, or via the Q-Link interface. 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).

### 2.7.4 Logical Libraries

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 *logical libraries*. Each logical library requires at least one dedicated tape drive.

Logical library partitioning is only possible when the hosts and the Medium Changer use SCSI to communicate. This feature is not available when the Medium Changer is connected via Fibre Channel.

# 3. Physical Specifications

## 3.1 Dimensions

Model	"A" Dimension	"B" Dimension
XXX4	36.9" / 93.7 cm	34.9" / 88.6 cm
All Others	32.1" / 81.5 cm	30.1" / 76.4 cm

Model	"C" Dimension Minimum	"C" Dimension Maximum
XXX4	27.5" / 69.9 cm	36.2" / 92.0 cm
All Others	22.0" / 55.9 cm	30.6" / 77.7 cm

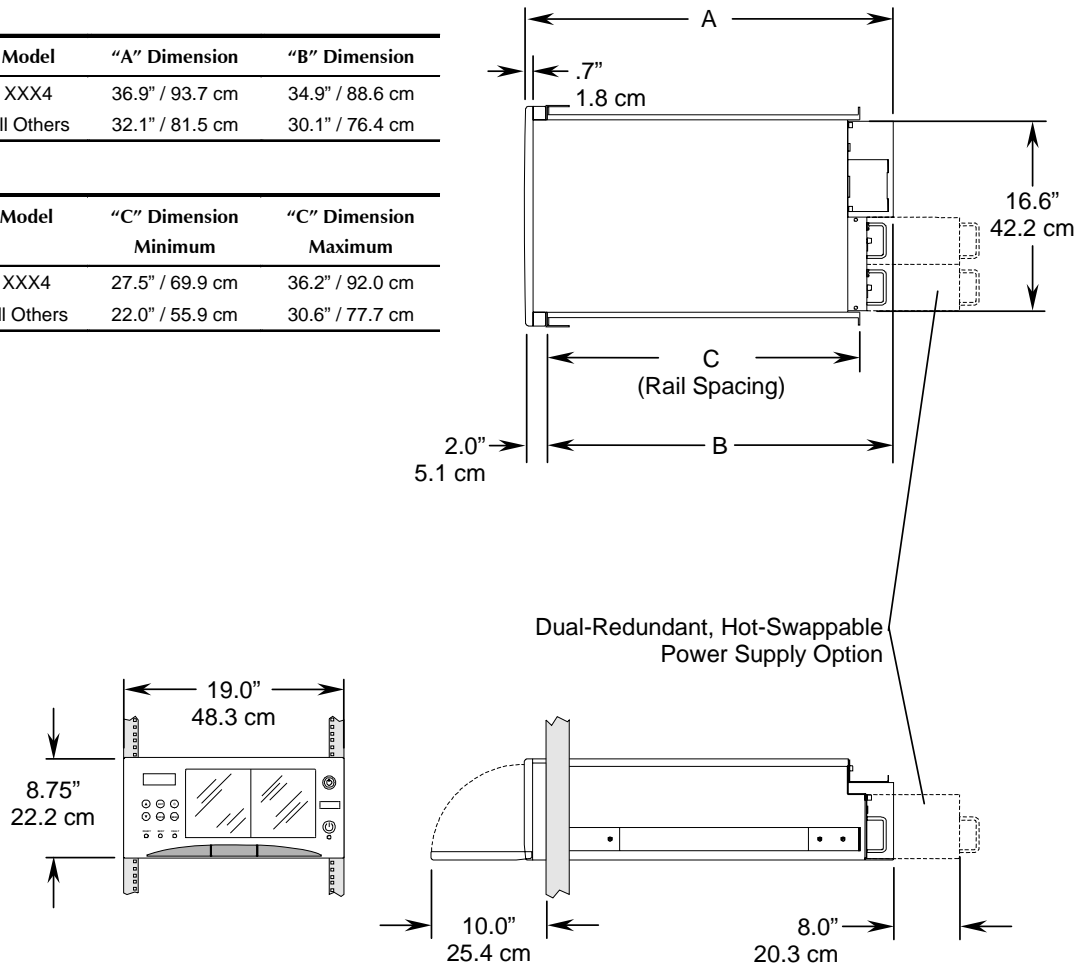


Figure 3-1 RLS External Dimensions

Note: Eight additional inches (20.3 cm) of depth are required to hot-swap the optional Redundant power supply modules.

## 3.2 Color

The exterior color is black.

### 3.3 Shipping Cartons

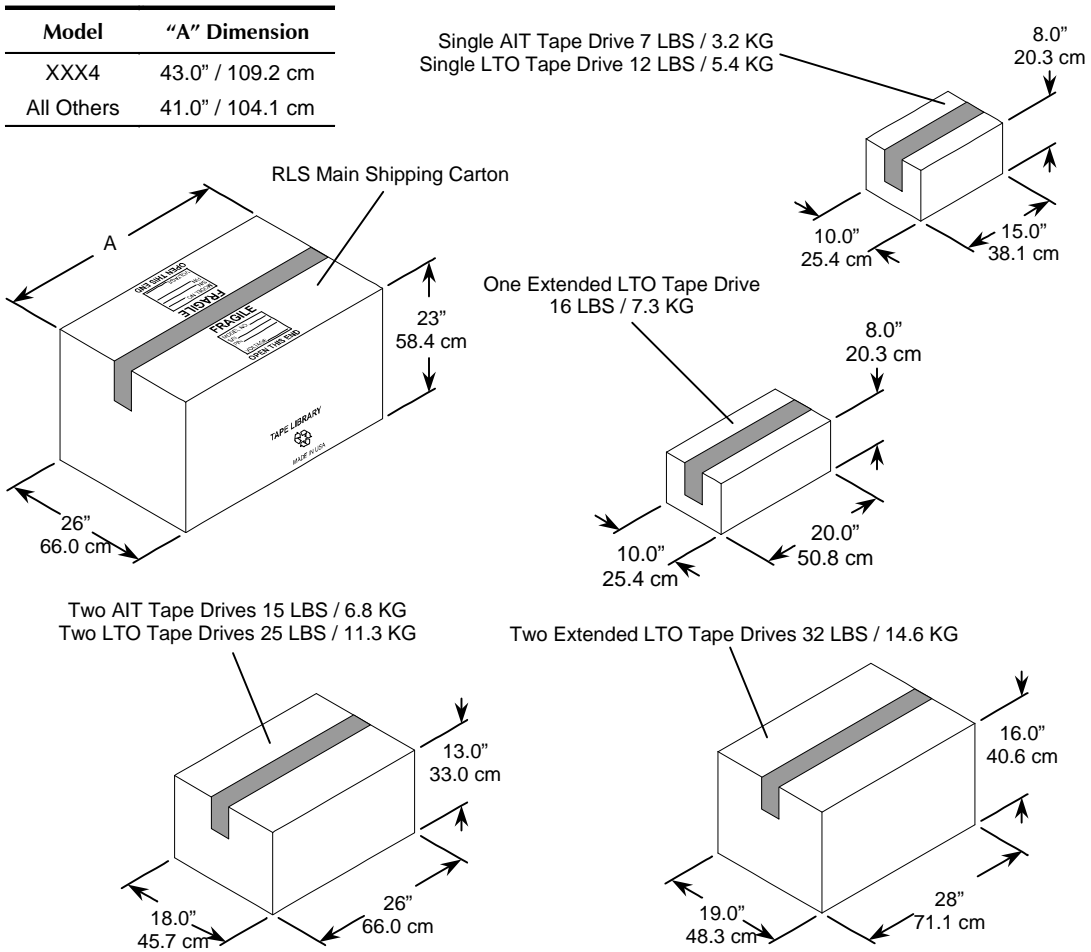


Figure 3-2 RLS Shipping Cartons

### 3.4 Weights

MODEL	NET WEIGHT FULLY LOADED <sup>①</sup> (LBS / KG)	COMBINED SHIPPING WEIGHT <sup>②</sup> (LBS / KG)
RLS-4221	67 / 30	87 / 39
RLS-4445	87 / 39	107 / 49
RLS-4470	92 / 42	112 / 51
RLS-8204/8204D	147 / 67	177 / 80
RLS-8202/8236-8236D	104 / 47	132 / 60
RLS-8244/8244D	147 / 67	177 / 80
RLS-8444H	151 / 69	181 / 82

① Includes rack slides and a full complement of tape drives, magazines and tape cartridges

② Not including tape cartridges

Table 3-1 RLS Weights

# 4. Electrical Specifications

## 4.1 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	4 AMPS	254 VAC	90 VAC	48–62 Hz

**Table 4-1 RLS Mains Requirements**

Other than selecting the appropriate AC power cord for connection to the mains, the RLS requires no changes (switches, etc.) to operate from any input voltage within the rated line voltage.

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

MODEL	SCSI INTERFACE		FIBRE CHANNEL INTERFACE	
	IDLE	PEAK	IDLE	PEAK
RLS-4221	45 watts 154 BTUs/hr	115 watts 394 BTUs/hr	60 watts 205 BTUs/hr	130 watts 445 BTUs/hr
RLS-4445/4470	80 watts 274 BTUs/hr	130 watts 445 BTUs/hr	95 watts 326 BTUs/hr	145 watts 497 BTUs/hr
RLS-8202/8236/ 8236D	85 watts 291 BTUs/hr	155 watts 530 BTUs/hr	100 watts 342 BTUs/hr	170 watts 582 BTUs/hr
RLS-8204/8204D/ 8244/8244D	95 watts 326 BTUs/hr	165 watts 565 BTUs/hr	110 watts 377 BTUs/hr	180 watts 617 BTUs/hr
RLS-8444H	140 watts 478 BTUs/hr	220 watts 751 BTUs/hr	155 watts 529 BTUs/hr	235 watts 802 BTUs/hr

**Table 4-2 RLS Power Consumption**

Power consumption varies with the number of tape drives installed and the particular operation being performed. Table 4-2 is 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. The

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current drawn from the power line (mains) is equal to the watts indicated in Table 4-2 divided by the AC voltage.

#### 4.1.1 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). The UPS should be rated to handle the maximum wattage. When the optional dual-redundant, hot-swappable power supply modules are utilized, it is recommended that they be connected to two separate UPS' for optimum system availability.

#### 4.1.2 Power Entry

Except for the 48-volt DC power supply module, all RLS PSMs 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 noise on the power lines. The redundant, hot-swappable AC PSM option includes redundant AC power cords to allow RLS to be connected to independent power sources (preferred).

#### 4.1.3 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.

# 5.

# Agency Compliance

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## 5.1 EEC Directive Compliance (European Economic Community)

The RLS meets or exceeds the requirements of the CE Mark as set forth by:

- Electromagnetic Compatibility Directive 89/336/EEC
- Low Voltage Directive 73/23/EEC

## 5.2 Emissions/Immunity Standards Compliance

The RLS meets or exceeds the standards set forth by:

- FCC Rules, Part 15, Subpart B, Class A Computing Devices
- CE per EN55022 (1998) Class A and EN55024 (1998) including:  
EN61000-3-2, -3-3, -4-2, -4-3, -4-4, -4-5, -4-6, -4-8 and -4-11

## 5.3 Safety Standards Compliance

The RLS meets or exceeds the standards set forth by:

- ANSI/UL60950 Third Edition – Certified by ITS – usETL
- CAN/CSA-C22.2 No. 60950-00 Third Edition – Certified by ITS – cETL
- CE per EN 60950 – ITS CB Certificate & Report US/995/ITS

## 5.4 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

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identify the process for recycling the materials and components that make up a Qualstar tape library.

### **5.4.1 End of Life Instructions**

#### **Tools required**

- P1 and P2 Phillips head screwdrivers
- T20 Torx head screwdriver
- Hex head (Allen) wrench/driver set
- 1/4-inch hex nut driver

#### **Disassembly procedure**

1. Remove door.
2. Remove top panel.
3. Remove side external panels.
4. Remove internal subassemblies.

#### **Items recyclable using conventional methods**

- Aluminum: Door, exterior panels, frame, robotics
- Stainless steel: Robot guides
- Steel: Some frames, fasteners
- Plastic: Window, cartridge magazines, tape cassettes
- Copper: Internal wiring, motors, SCSI cables
- Paper: Manuals

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

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

#### **Items that may have salvage or resale value**

- Tape drives
- EMI line power filter

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## 5.5 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. 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 until the year 2010. Insofar as lead free solders are new to the electronics industry and no quality or reliability data is available, Qualstar invokes 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.

# 6. Performance Specifications

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## 6.1 Data Cartridge Handling Times

Table 6-1 lists the Average Time to pick a cartridge from its storage location and place it in a drive, or pick a cartridge from a drive and return it to its storage location.

MODEL	AVERAGE TIME
4221	15 seconds
4445	15 seconds
4470	22 seconds
8204/8204D	18 seconds
8202/8236/8236D	16 seconds
8244/8244D	18 seconds
8444H	18 seconds

Table 6-1 Cartridge Handling Times

## 6.2 Scan All Barcodes

In Table 6-2, the Typical Time values are the times required to scan a full complement of data cartridges. This assumes all cartridges are barcoded and that no retries are needed. Scanning of barcode labels will not commence for 12-seconds after power is turned on.

MODEL	TYPICAL TIME
4221	30 seconds
4445	62 seconds
4470	85 seconds
8204/8204D	78 seconds
8202/8236/8236D	62 seconds
8244/8244D	78 seconds
8444H	78 seconds

Table 6-2 Barcode Scanning Times

# 7. Environmental Specifications

These tape libraries are not intended for use in mobile applications. They were designed for use in an office environment.

## 7.1 Temperature, Humidity and Altitude

PARAMETER	OPERATING	NON-OPERATING <sup>①</sup>
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 to +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 -304.8 to +3,048 meters	-1000 to + 40,000 feet -304.8 to +12,192 meters

① Includes tape drives

Table 7-1 Environmental Specifications

### NOTE

*Rapid changes in temperature which produce condensation must never be allowed since the condensed liquid may contaminate bearing lubricants and possibly shorten the expected Mean Time Between Failures.*

## 7.2 Acoustical Noise

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

- With all tape drives operating: ≤ 55 dBA
- All tape drives plus robotic handler operating: ≤ 60 dBA

# 8. Reliability Specifications

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## 8.1 Mean Exchanges Between Failures

The Mean Exchanges Between Failures (MEBF) rating exceeds 2,000,000 exchange cycles. The MEBF rating excludes tape drives which are rated separately by their manufacturers. An exchange cycle consists of the following actions:

1. Pick a data cartridge from a storage location.
2. Place the cartridge into a tape drive.
3. Remove a cartridge from a drive.
4. Return the cartridge to a storage location.

Qualstar Corporation does not warrant either the MEBF or the historical failure rate to be representative of any particular unit installed for customer use. Failure rates are derived from a large database of test samples. The individual failure rate will vary from unit to unit.

# 9.

# Maintainability

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## 9.1 Mean Time To Repair

The Mean Time To Repair (MTTR) shall not exceed 30 minutes. The MTTR is the average time for an adequately trained and equipped technician to diagnose and correct a malfunction while following the service procedures in the Technical Service Manual. Servicing will be limited to replacing major subassemblies and printed circuit board assemblies (PCBAs). Repair time does not include system retest time.

## 9.2 Preventive Maintenance

The only routine preventive maintenance required by the RLS consists of periodically cleaning and replacing the air filter, which is located on the front panel. The RLS keeps track of its power-on hours in order to periodically remind the user to replace the filter. The replacement interval can be changed to match the local environmental conditions.

Gripper pads on the LTO models must be cleaned periodically. Again, the RLS keeps track of the number of cartridge moves in order to periodically remind the user to clean the gripper pads.

## 9.3 Automated Tape Drive Cleaning

The user can specify a location where a cleaning cartridge can be stored for each tape drive. Any number of cleaning cartridge locations from none up to the number of drives may be specified, but each drive can have only one location. Cleaning cartridge locations are not restricted from the resources available to random or sequential operations.

A menu command allows the user to specify a drive to be cleaned. If the drive is empty, the RLS will move the predetermined cleaning cartridge to the drive. When the drive ejects the cartridge, the RLS will return it to its original location.

## 9.4 Adjustments

The RLS does not require electrical or mechanical adjustments after any field replaceable unit (FRU) or tape drive is replaced. All adjustments, alignments and calibrations are performed automatically.