

StorageTek SL3000

Library Guide

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StorageTek SL3000 Library Guide

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Preface

Oracle's StorageTek SL3000 Modular Library System is an enterprise storage solution that provides fully automated tape cartridge storage and retrieval. This guide provides a general overview of Oracle's StorageTek SL3000 modular tape library and covers installation planning, configuration, and operation of the library.

Related Documentation

Additional SL3000 library documentation can be found at:

<https://docs.oracle.com/en/storage/tape-storage/index.html>

IMPORTANT: Starting with FRS_4.51, the content of this document has been frozen. All subsequent product updates are documented within the SL3000 Release Notes. Refer to that document for the latest changes and product information.

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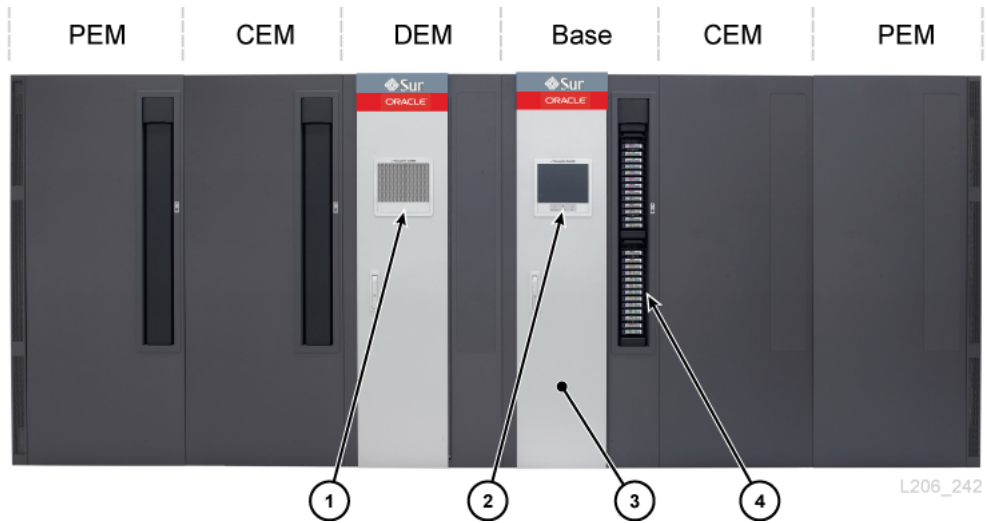
<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

Library Overview

- Library Modules
- Hardware Components
- Power Configurations
- Cooling
- Storage Capacity
- Host Connectivity
- Library Monitoring
- Media Validation
- Library Management Software
- Ordering

Library Modules

- **Base Module** — one required per library.
- **Drive Expansion Module (DEM)** — maximum of one on the left side of a Base module only.
- **Cartridge Expansion Module (CEM)** — maximum of eight with four on the left side of the library and four on the right side.
- **Access Expansion Module (AEM)** — maximum of two with one on each end of the library. An AEM cannot be installed directly to the left of the Base module.
- **Parking Expansion Module (PEM)** — an alternative to an AEM for redundant electronics support. PEMs must be installed as a pair, with one on each end of the library. A PEM is a converted CEM.

Figure 1–1 SL3000 Library Configuration Example**Figure Legend:**

1. Perforated window
2. Operator panel
3. Service door
4. CAP (open)

Base Module

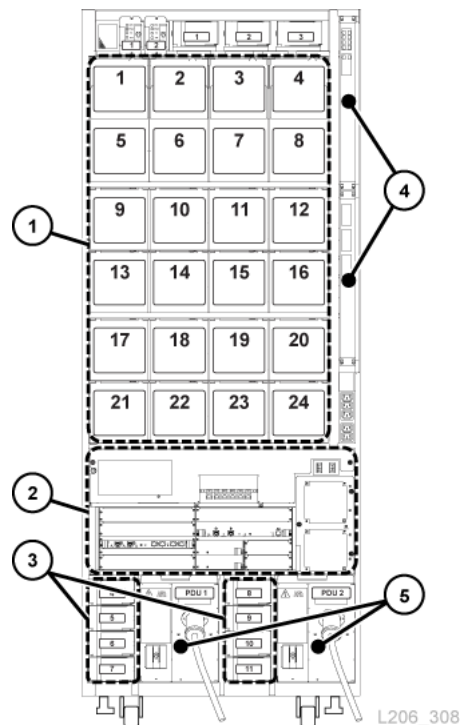
One Base module is required in every library. A standalone Base module is the smallest possible configuration of an SL3000 library.

Base Module Configuration Options

- 205 to 431 cartridge capacity (see ["Calculating Physical Capacity"](#) on page 1-17).
- 8 (standard), 16, or 24 drive slots.
- Perforated window (standard), window storage array, or operator panel.
- CAP (standard). See ["Rotational Cartridge Access Port \(CAP\)"](#) on page 1-7.

Base Module Components

The front of the Base module contains a single CAP, service door, front panel with LEDs, and a perforated window, optional operator panel, or window storage array. The rear of the Base module contains the electronics module, power distribution units (PDUs), DC power supplies, tape drives, and two 1-unit rack spaces.

Figure 1–2 Base Module Rear View**Figure Legend:**

1. Tape drives
2. Electronics module
3. Drive DC power supplies
4. Ethernet switches (optional)
5. Power distribution units

Drive Expansion Module (DEM)

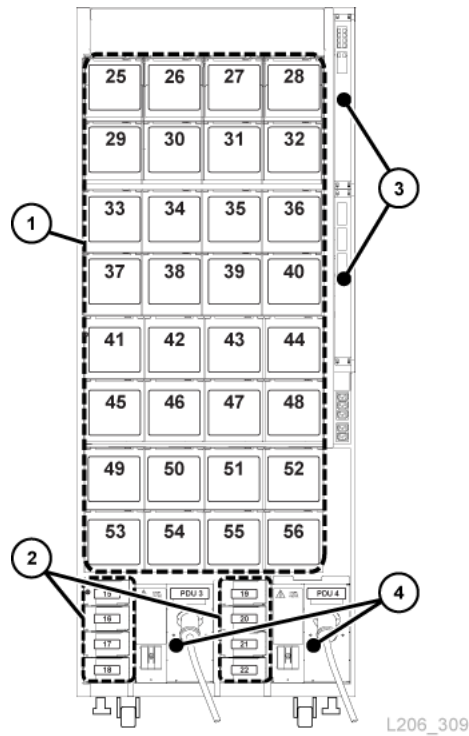
The DEM is attached to the left side of the Base module (when viewed from the front of the library). The DEM expands the number of tape drives and provides additional cartridge storage. There can be only one DEM per library.

DEM Configuration Options

- 153 to 522 cartridge capacity (see ["Calculating Physical Capacity"](#) on page 1-17).
- 8 (standard), 16, 24, or 32 drive slots.
- Perforated window (standard), window storage array, or operator panel.
- CAP (optional), See ["Rotational Cartridge Access Port \(CAP\)"](#) on page 1-7.

DEM Components

The front of the DEM contains a service door, optional CAP, and a perforated window or optional operator panel (if not already in the Base module) or window storage array. The rear of the DEM contains tape drives, PDUs, DC power supplies, and two 1-unit rack spaces.

Figure 1-3 DEM Rear View**Figure Legend:**

1. Tape drives
2. Drive DC power supplies
3. Ethernet switches (optional)
4. Power distribution unit

Cartridge Expansion Module (CEM)

The CEM provides additional cartridge storage. There are no tape drives present within this module. CEMs on the end of the library can be converted to PEMs (see ["Parking Expansion Module \(PEM\)"](#) on page 1-5). A maximum of eight CEMs are supported in a single library. The initial CEM should be installed to the right of a Base module, then a second to the left of the DEM/Base module, a third to the right, and the fourth one to the left, and so on. This alternating method maximizes library performance.

CEM Configuration Options

- 438 to 620 cartridge capacity (see ["Calculating Physical Capacity"](#) on page 1-17).
- CAP (optional). See ["Rotational Cartridge Access Port \(CAP\)"](#) on page 1-7.
- Placement to the left or right of a Base module and DEM
- A maximum of four CEMs on each side of centerline (eight total)

Access Expansion Module (AEM)

An AEM has a large cartridge access door used for bulk loading and unloading of up to 234 cartridges. Additionally, a library with two AEMs supports the redundant

robotics feature (see ["Robotics"](#) on page 1-7). A sliding safety door sections off a defective robot, allowing a service representative to access the disabled robot while the library remains online.

Note: AEMs and PEMs cannot be installed in the same library.

AEM Configuration Options

- Must be placed on the ends of the library. An AEM cannot be installed directly to the left of the Base module; there must be a module in between.
- A single AEM supports bulk load capabilities only. You should install a single AEM on the left for an additional 104 storage slots (see ["Calculating Physical Capacity"](#) on page 1-17).
- Dual AEMs support bulk load and redundant robotics support.

Parking Expansion Module (PEM)

The PEM is a converted CEM used to "park" a defective robot without blocking access for the operational robot in a redundant robotics configuration (see ["Robotics"](#) on page 1-7). Performing maintenance on a disabled robot in a PEM is disruptive to library operations.

The parking space causes six columns of cartridge arrays in the PEM to become inaccessible (three on the front wall and three on the rear wall). You do not need to remove the inaccessible arrays. The module can be restored to a CEM at anytime.

PEM Configuration Options

- 230 to 312 cartridge capacity (see ["Calculating Physical Capacity"](#) on page 1-17).
- Only the left PEM can have an optional CAP.
- Must be installed on each end of the library.

Figure 1–4 PEMs attached to a Base Module

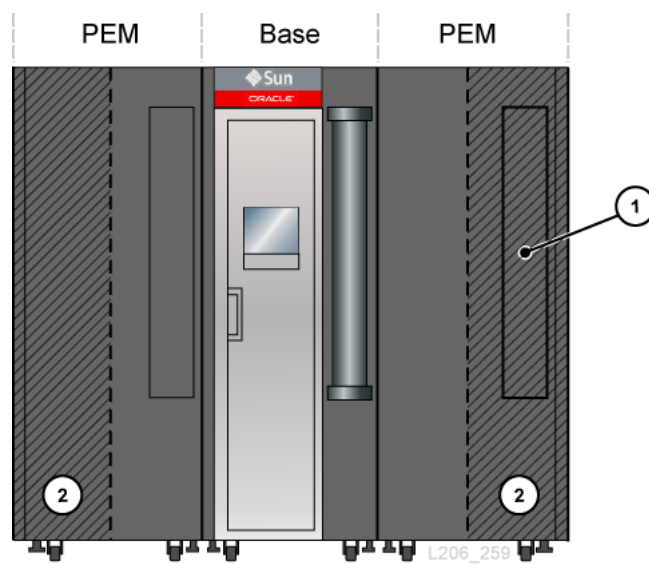


Figure Legend:

1. Inaccessible CAP area
2. Robot parking area (inaccessible cartridge slots)

Hardware Components

- [Electronics Control Module](#)
- [Robotics](#)
- [Rotational Cartridge Access Port \(CAP\)](#)
- [Bulk Load Cartridge Access Ports \(AEM\)](#)

Electronics Control Module

The electronics control module (ECM) is responsible for electronics control, robot and drive control, and host connectivity. The ECM is located in the rear of the Base module (see [Figure 1–2](#)). The main controller cards are the HBCR (library controller) and HBT (drive controller).

Figure 1–5 Electronics Control Module

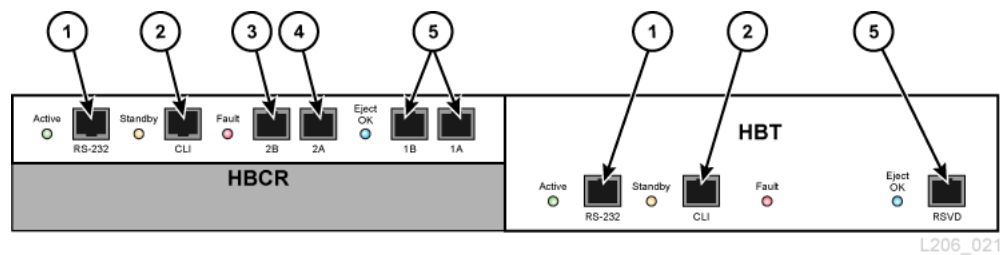


Figure Legend:

1. Serial port (reserved)
2. Serial port (CSE port for CLI)
3. Primary Ethernet port
4. Dual TCP/IP Ethernet port
5. Ethernet port (reserved)

Note: The ECM ships with an optional MPU2 card (2Gb) or PUA2 card (8 Gb) for Fibre Channel interface connections. This card is not shown in the figure but is installed below the HBCR card.

Command Line Interface

The command line interface (CLI) can be used by Oracle support to configure and diagnose the library. Service representatives can access the CLI through the electronic control module using either of the following:

- Serial Port Connection on the HBCR card (RS-232) and a HyperTerminal connection to enter the commands
- Ethernet Port Connection (ports 1A, 2A, or 2B) on the HBCR card and a secure shell (PuTTY) to enter the commands

Redundant Electronics

The optional redundant electronics (RE) feature is available for failover protection for the HBCR controller card. With the RE feature, each library has two HBCR controller cards. If the active library controller experiences errors, operations switch automatically to the stand-by library controller, with minimal disruption to library and host operations.

RE is not available for libraries that use the direct FC-SCSI connection to hosts.

For more information, see "[Redundant Electronics Overview](#)" on page B-1.

Robotics

Each library can have either one (standard) or two robots (known as redundant robotics). Robots retrieve and insert cartridges into CAPs or slots and mount or dismount cartridges from tape drives.

Robots move along two rails on the rear wall of the library. One rail is at the top of the library and one rail attaches to the floor. Two copper strips in the top rail provide power and a signal path between the robot and library controller (HBCR) card. Power is supplied from +48 VDC 1200 W load-sharing supplies (see "[Power Configurations](#)" on page 1-9).

Robots contain a barcode scanner that reads the configuration blocks in each module during library initialization and identifies volume serial numbers (VOLSERs) of cartridges during CAP entries and audits.

Redundant Robotics

The optional redundant robotics feature increases the speed for robotic operations and allows library operations to continue if one robot fails. Redundant robotics requires 240 VAC, 2N power, and either two PEMs or two AEMs.

Rotational Cartridge Access Port (CAP)

A CAP is a vertically-mounted, rotating cylinder with two removable 13-slot magazines.

- The Base module comes standard with a CAP.
- The DEM and CEMs can have one optional CAP per module. Only the left PEM can contain a CAP.
- There can be a maximum of 10 rotational CAPs per library.
- Each CAP has a keypad with an unlock indicator and a button to open the CAP.

Figure 1-6 Library CAPs



Figure Legend:

- 1. CAP (closed)
- 2. No CAP installed
- 3. CAP (open)
- 4. Keypad

Bulk Load Cartridge Access Ports (AEM)

An AEM allow you to enter and eject up to 234 cartridges without disrupting library operations. Only one AEM is required in a library to support the bulk loading feature (see "[Access Expansion Module \(AEM\)](#)" on page 1-4).

Supported Tape Drives

- StorageTek T-Series (T9840C and D)
- StorageTek T-Series (T10000A, B, C, and D)
- HP LTO generations 3, 4, 5, and 6
- IBM LTO generations 3, 4, 5, 6, 7, and 8

Note: LTO-8 drives can read and write one generation back. LTO-5, 6, and 7 drives can read two generations back and write one generation back. For best capacity and performance, always use cartridges of the same generation as your drives.

Note: Tape drives must support the dynamic World Wide Name feature to be placed online by the SL3000 library.

Most drives are capable of reading the data recorded by an earlier generation tape drive from the same family. Therefore, you can use existing cartridges if they are within their warranty period.

For more information, refer to the tape drive section on the Oracle website:

<http://www.oracle.com/us/products/servers-storage/storage/tape-storage/overview/index.html>

Encryption Capable Tape Drives

- StorageTek T10000 A, B, C, D
- StorageTek T9840 D
- HP LTO generations 4, 5, 6
- IBM LTO generations 4, 5, 6, 7

For more information, see "[Tape Drive Encryption](#)" on page 1-26.

Power Configurations

The power configuration depends on the power source and redundancy.

AC Power Source Options

Each PDU installed in the library requires a separate AC power source. There can be a maximum of four PDUs in the library depending on the configuration selected (two in the Base module and two in the DEM). There are two AC power source options. Both are single phase:

- 120 VAC, 50/60 Hz, at 20 amps (range: 100–127 VAC, 47–63 Hz, 16 amps)
 - Limited support for T9840 and T10000 drives; no redundant robotics support
- 240 VAC, 50/60 Hz, at 30 amps (range: 200–240 VAC, 47–63 Hz, 24 amps)
 - Supports all drive types and redundant robotics

Power Redundancy Options

There are three power configurations that offer various levels of power redundancy.

N+1 power configuration (standard)

- Offers DC power redundancy only
- Consists of one PDU (per Base module or DEM), with one extra drive DC supply and one extra robotics DC supply
- Provides N+1 DC power supply redundancy
- Limited support for T9840 and T10000 drives and no redundant robotics support

2N power configuration

- Offers both AC and DC power redundancy
- Consists of two PDUs (per Base module or DEM) for AC redundancy, with a set of DC power supplies for each PDU
- Provides N DC power supplies per PDU
- Requires two separate AC input sources per Base module or DEM

- Required for redundant robotics and redundant electronics support

2N+1 power configuration

- Offers both AC and DC power redundancy with additional DC redundancy
- Consists of two PDUs (per Base module or DEM) for AC redundancy, with additional DC power supplies for each PDU
- Provides N+1 DC power redundancy for each PDU (except the second PDU only has N DC power supply redundancy for the robot)
- Requires two separate AC input sources per Base module or DEM
- Supports redundant robotics and redundant electronics

DC Power Supplies

There are two types of DC power supplies:

- Load sharing 1200W DC — used for the robotics unit and tape drives
- 200W cPCI — used for the electronics control module

Figure 1-7 Power Supply Locations - Base and DEM (Rear View)

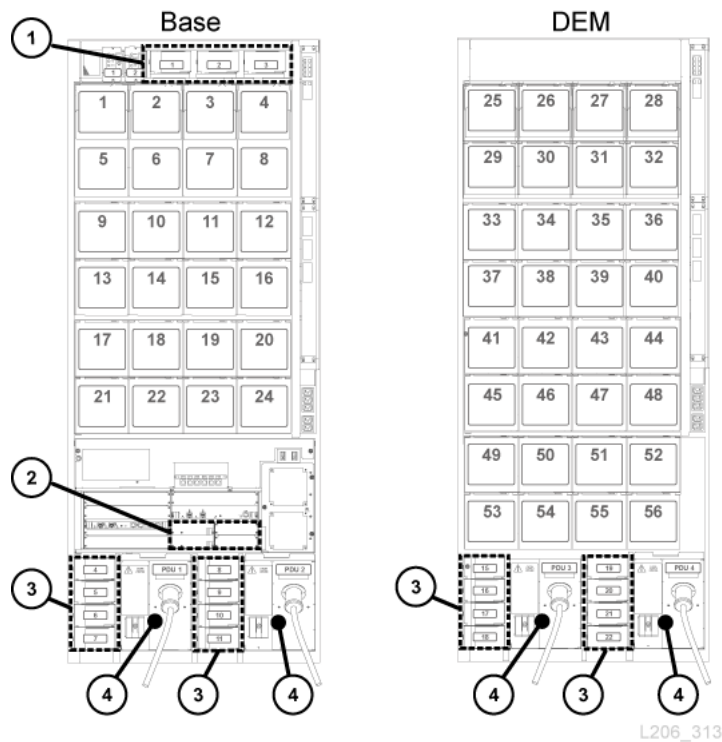


Figure Legend:

- Robotics DC power supplies (1200W DC)
- Electronics module DC power supplies (200W cPCI)
- Tape drive DC power supplies (1200W DC)
- Power distribution unit (120 VAC or 240 VAC)

Electronics Control Module Power Supplies

The electronics control module (ECM) uses 200 W cPCI power supplies. These power supplies are located below the HBT card in the Base module (there are no ECM power supplies in the DEM) — see [Figure 1-7](#). The power supply for the electronics control module is different from the power supplies used for the robotics unit and the tape drives.

Each Base module ships standard with two ECM power supplies used for N+1 and 2N configurations. Order two additional ECM supplies for the 2N+1 configuration (see "[DC Power Supplies](#)" on page 1-28).

Robotics Unit Power Supplies

The robotics unit uses load-sharing 1200 W DC power supplies located at the top of the Base module (the DEM does not contain robotics DC supplies) — see [Figure 1-7](#). The 1200 W DC power supply used for the robotics unit is the same power supply used for the tape drives.

Each Base module ships standard with two robotics DC power supplies used for N+1 and 2N configurations. Order a third DC power supply for the 2N+1 configuration (see "[DC Power Supplies](#)" on page 1-28).

Tape Drive Power Supplies

The tape drives use load-sharing 1200 W DC power supplies. Up to four tape drive power supplies are located to the left of each PDU in both the Base module and the DEM — see [Figure 1-7](#).

The library ships with two tape drive DC power supplies per Base module and two tape drive DC power supplies per DEM. The number of tape drive DC power supplies required depends on the power configuration selected and the number and type of tape drives in the library. To calculate the number of power supplies to order, see "[Calculating Tape Drive Power Supply Quantities](#)" below.

Calculating Tape Drive Power Supply Quantities

The number of power supplies required depends on:

- Power configuration (120 VAC or 240 VAC with N+1, 2N, or 2N+1)
- Number and type of tape drive (T10000, T9840, or LTO)

To determine the number of power supplies required for a library configuration:

1. Determine the total number of each drive type.
2. Multiply by the watts-per-drive for each drive type, see [Table 1-1, "Watts Per Drive"](#).
3. Add together the watts used by each drive type to calculate the total watts consumed.
4. Use [Table 1-2](#) through [Table 1-5](#) to determine the number of DC power supplies needed.

For ordering part numbers, see "[DC Power Supplies](#)" on page 1-28.

Watt Consumption Per Drive

Table 1–1 Watts Per Drive

Drive Type	Maximum Watts Used by Each Drive
T9840D	100
T10000A/B/C	93
T10000D	127
LTO	46

Power Supplies Required for 120 VAC PDUs

To use 120 VAC PDUs, the total watts used by the drives must be less than 843 W in the Base module and less than 1,481 W in the DEM. If the total watts exceeds 843 W in the Base module or 1,481 W in the DEM, 240 VAC PDUs are required. You cannot mix 120 VAC with 240 VAC PDUs within the library. All PDUs must be the same type.

Table 1–2 DC Power Supplies for Base (120 VAC PDU)

Total Watts Used by All Drives	Power Supplies Required for N+1	Power Supplies Required for 2N	Power Supplies Required for 2N+1
1 - 563	2	2	4
564-843	3	4	6

Table 1–3 DC Power Supplies for DEM (120 VAC PDU)

Total Watts Used by All Drives	Power Supplies Required for N+1	Power Supplies Required for 2N	Power Supplies Required for 2N+1
1 - 700	2	2	4
701 - 1,400	3	4	6
1,401-1,481	4	6	8

Power Supplies Required for 240 VAC PDUs

If the total watts used by the drives exceeds 843 W in the Base module or 1,481 W in the DEM, 240 VAC PDUs are required. You cannot mix 120 VAC with 240 VAC PDUs within the library. All PDUs must be the same type.

Table 1–4 DC Power Supplies for Base (240 VAC PDU)

Total Watts Used by All Drives	Power Supplies Required for N+1	Power Supplies Required for 2N	Power Supplies Required for 2N+1
1 - 1,063	2	2	4
1,064 - 2,263	3	4	6
2,264 - 3,463	4	6	8
3,464 - 3,805	5	8	8

Table 1–5 DC Power Supplies for DEM (240 VAC PDU)

Total Watts Used by All Drives	Power Supplies Required for N+1	Power Supplies Required for 2N	Power Supplies Required for 2N+1
1 - 1,200	2	2	4
1,201 - 2,400	3	4	6
2,401 - 3,600	4	6	8
3,601 - 4,443	5	8	8

Example: Calculating Required Number of Drive DC Power Supplies

The example library has a Base module and a DEM with all three drive types (T10000, T9840, LTO). [Table 1–6](#) and [Table 1–7](#) show how to calculate the total watts used by the tape drives in the Base module and DEM:

Table 1–6 Base Module Tape Drive Watts Consumption Example

Drive Type	Quantity of Drives	Multiply by Watts Per Drive	Total Watts Per Drive Type
T10000D	6	127	762
T9840D	6	100	600
LTO7	4	46	184

The drives in the Base module use 1,546 W. In [Table 1–2](#), 1,546 W exceeds the maximum 843 W supported by a 120 VAC PDU. Therefore, the Base module requires a 240 VAC PDU to support the drive configuration — refer to [Table 1–4](#).

Table 1–7 DEM Tape Drive Watts Consumption Example

Drive Type	Quantity of Drives	Multiply by Watts Per Drive	Total Watts Per Drive Type
T10000C	4	93	372
T9840D	2	100	200
LTO5	4	46	184

The drives in the DEM use 756 W. In [Table 1–3](#) and [Table 1–5](#), either a 120 VAC or 240 VAC PDU can support 756 W. However, you cannot mix 120 VAC with 240 VAC PDUs within the library. Therefore, the example library requires 240 VAC PDUs.

Two tape drive DC power supplies ship standard with the Base module and two power supplies ship standard with the DEM. Therefore, subtract two from the DC supplies required. Use [Table 1–4](#) and [Table 1–5](#) to determine what to order.

The tables below list the power supplies required for the example library.

Table 1–8 DC Supplies Required for Base Example

Configuration Option	DC Supplies Required	DC Supplies to Order (= Required - 2)
N+1 (240 VAC PDU)	3	1
2N (240 VAC PDU)	4	2
2N+1 (240 VAC PDU)	6	4

Table 1–9 DC Supplies Required for Drive Expansion Module - Example

Configuration Option	DC Supplies Required	DC Supplies to Order (= Required - 2)
N+1 (240VAC PDU)	2	0
2N (240VAC PDU)	2	0
2N+1 (240VAC PDU)	4	2

The number of drive DC supplies that must be ordered depends on the power configuration selected. For instance, if the example library had a 2N+1 configuration, it would require an order of six additional drive DC power supplies (four supplies for the Base module and two supplies for the DEM). The 2N+1 also requires an additional DC supply for the robotics and an additional ECM 200W cPCI power supply. The ECM power supply is different than the tape drive and robot power supplies listed in this example. For ordering information, see "[DC Power Supplies](#)" on page 1-28.

AC Power Cables

The following table lists the cables required for each power configuration. You must order one power cord per PDU installed:

- N+1 — order one power cord for the Base module and an additional power cord for the DEM (if installed)
- 2N or 2N+1 — two power cords for the Base module and two additional power cords for the DEM (if installed)

Table 1–10 Power Cable Descriptions

Power Source	Description	Circuit Breaker	Wall Connector	Library Connector	Power Cord Length/Type
120 VAC/20A	US/Japan	20A	L5-20P	L5-20R	3.7 m (12 ft) 12 AWG
240 VAC/30A	US	30A	L6-30P	L6-30R	3.7 m (12 ft) 12 AWG
240 VAC/30A	International	30A	330P6W	L6-30R	4 m (13 ft) HAR

Power Consumption

For environmental or economical reasons, you might want to determine the total power consumption (watts), CO₂ emission values, and British Thermal Units (Btu/hr) for the SL3000 library and tape drives. The table below provides power consumption in watts.

Table 1–11 Power Consumption Values

Components	Quantity	Idle Watts	Max Watts
Base Library (required) Includes: 1 ECM, 1 robot, and 1 CAP	1	156	197
Redundant Electronics (optional)	1	100	100
Redundant Robotics (optional)	1	28	55
Operator Panel (optional)	1	29	37
Additional CAPs (optional)	Each	10	14
Access Expansion Module (optional)	Each	8	30

Table 1–11 (Cont.) Power Consumption Values

Components	Quantity	Idle Watts	Max Watts
T9840	Each	79	100
T10000A/B/C	Each	61	93
T10000D	Each	64	127
LTO	Each	30	46

Calculating Total Watts, CO₂ Emissions, and Btu/hr

To calculate the total power consumption in Watts for the library, add up all the applicable wattage values for the library configuration from [Table 1–11](#).

To calculate kilograms of CO₂ emissions per day, multiply watts by the CO₂ emissions constant. Use the constant that is applicable for your country (0.02497 for US).

To convert electrical values to Btu/hr, multiply the number of watts by 3.412 (1 W = 3.412 Btu/hr). Many manufacturers publish kW, kVA, and Btus for their equipment. Use the information provided by the manufacturer. Otherwise, use the formula below.

- $3.41214 \times \text{Watts} = \text{Btu/hr}$

Power Consumption Example 1

Using the maximum continuous values for the following components:

Table 1–12 Power Consumption Example

Quantity	Component Description	Watts
1	SL3000 Base (including one ECM, one robot, one CAP)	197
16	LTO7 Tape Drives	736
--	Total	933

- Emissions: $933\text{W} \times 0.02497 = 23.3 \text{ Kg of CO}_2$
- Power consumption: $933\text{W} \times 3.412 = 3,183 \text{ Btu/hr}$

Power Consumption Example 2

Using the maximum continuous values for the following components:

Table 1–13 Power Consumption Example

Quantity	Component Description	Watts
1	SL3000 Base (including one ECM, one robot, one CAP)	197
8	T9840D Tape Drives	800
1	Drive Expansion Module	--
8	T10000C Tape Drives	744
1	Cartridge Expansion Module	--
3	CAPs (3 at 10 Watts each)	30
--	Total	1,771

- Emissions: $1,771\text{W} \times 0.02497 = 44.2 \text{ Kg of CO}_2$

- Power consumption: $1,771\text{W} \times 3.412 = 6,043 \text{ Btu/hr}$

Cooling

Cooling within the SL3000 library is divided into three areas:

- Electronics control module
- Tape drives
- DC power supplies

Library Electronics Control Module

Two fans, located to the right of the electronics control module, provide cooling for the electronics in the library. Air is drawn from the sides of the library and flows through the fans to the rear of the library.

- The library controller card (HBCR) monitors these fans for proper operation.
- The amber Fault indicator on the fan assembly indicates a failure.

While there are two dedicated fans, one fan is sufficient to provide adequate cooling for the library and the electronics. The fans can be replaced without interfering with library operations. Replace a defective fan when it is detected.

Tape Drives

Each tape drive tray contains a fan for drive cooling. The tape drive's power converter card supplies power for the fans. Air is drawn from the front of the drive and flows through the fan to the rear of the drive/library.

DC Power Supplies

Each 1200 Watt DC power supply contains a fan that pulls air from the library, through the rear of the supply, and out the rear of the library.

Storage Capacity

There are two types of capacity:

- Physical Capacity — the number of cartridge slots in the library, excluding reserved slots. Physical storage capacity can range from 205 to 5,925 data cartridge slots and 1 to 56 tape drives.
- Active Capacity — the number of slots in the library activated by a hardware activation file. Only activated slots can be used for data storage and accessed by a client. Inactivated slots are not recognized by the library.

Note: Oracle recommends adding physical capacity in advance to meet future storage needs. Although modules can be added to an SL3000 library at any time, adding a module is disruptive to library operations.

A diagram of the slot locations within each module can be helpful for understanding capacity (for wall maps, see "[Library Addressing Reference](#)" on page E-1).

Calculating Physical Capacity

Use the table below to calculate the physical capacity of a library configuration. For each module in the library, start with the standard slot count. Then, either add or subtract slots based on the module's position and add-on options. Finally, add the slot counts of each module together to get the total capacity of the library.

Table 1–14 Physical Slot Capacity Per Module

Physical Configuration	Left AEM	Left PEM	Left CEM	DEM	Base	Right CEM	Right PEM	Right AEM
Standard	0	308	516	410	320	620	312	0
2nd Drive Array ¹	--	--	--	-55/-66	-55/-66	--	--	--
3rd Drive Array ¹	--	--	--	-60/-72	-60/-72	--	--	--
4th Drive Array ¹	--	--	--	-65/-78	--	--	--	--
Module to Left	--	--	+104	+88	+88	0	0	0
Module to Right	0	0	0	0	+13	0	--	--
CAP	--	-78	-78	-77	Std.	-78	--	--
Window Storage Array	--	--	--	+23	+23	--	--	--

¹ For additional drive arrays, the first number listed is the change in capacity when there is no module to the left, and the second number is the change in capacity when there is a module to the left.

Calculation Example 1: Base, DEM, CEMs, PEMs

The example library has a Base module, a DEM, two CEMs (one on each side of centerline), and two PEMs (one on each end of the library).

Base module

Contains an op panel and three drive arrays. There are modules to the right and left.

$$320 \text{ (standard)} + 0 \text{ (op panel)} + 13 \text{ (right module)} + 88 \text{ (left module)} - 66 \text{ (2nd drive array)} - 72 \text{ (3rd drive array)} = 283$$

DEM

Contains a window array, a CAP, and four drive arrays. There is a module to the left.

$$410 \text{ (standard)} + 88 \text{ (left module)} + 23 \text{ (window array)} - 77 \text{ (CAP)} - 66 \text{ (2nd drive array)} - 72 \text{ (3rd drive array)} - 78 \text{ (4th drive array)} = 228$$

Left CEM

The module is installed left of centerline. There is a module to the left.

$$516 \text{ (standard)} + 104 \text{ (left module)} = 620$$

Right CEM

Contains a CAP. The module is installed right of centerline with a module to the right.

$$620 \text{ (standard)} - 78 \text{ (CAP)} = 542$$

PEMs

There are two PEMs, one on each end of the library. The left PEM contains a CAP.

$$313 \text{ (standard right PEM)} + 308 \text{ (standard left PEM)} - 78 \text{ (CAP)} = 542$$

Library Total

$$283 \text{ (Base)} + 228 \text{ (DEM)} + 620 \text{ (left CEM)} + 542 \text{ (right CEM)} + 542 \text{ (PEMs)} = 2,215$$

Calculation Example 2: Base and CEM

The example library has a Base module and a CEM to the right of centerline.

Base module

Contains a window array and three drive arrays. There is a module to the right.

$$320 \text{ (standard)} + 13 \text{ (right module)} + 23 \text{ (window array)} - 55 \text{ (2nd drive array)} \\ - 60 \text{ (3rd drive array)} = 241$$

Right CEM

Contains a CAP. The module is installed right of centerline with a module to the left.

$$516 \text{ (standard)} + 104 \text{ (left module)} - 78 \text{ (CAP)} = 542$$

Library Total

$$241 \text{ (Base)} + 542 \text{ (right CEM)} = 783$$

Calculation Example 3: Base, DEM, CEMs, AEM

The example library has a Base module, DEM, two CEMs (one on each side of centerline), and a single AEM on the right for bulk loading. Oracle does not recommend installing a single AEM on the right. If the AEM was installed on the left end of the library, 104 additional cartridge slots would be accessible in the far left CEM.

Base module

Contains window array and two drive arrays. There are modules to the right and left.

$$320 \text{ (standard)} + 23 \text{ (window array)} + 13 \text{ (right module)} + 88 \text{ (left module)} \\ - 66 \text{ (2nd drive array)} = 378$$

DEM

Contains an op panel and three drive arrays. There is a module to the left.

$$410 \text{ (standard)} + 88 \text{ (left module)} + 0 \text{ (op panel)} - 66 \text{ (2nd drive array)} \\ - 72 \text{ (3rd drive array)} = 360$$

Left CEM

Module is installed left of centerline with no module to the left.

$$516 \text{ (standard)} = 516$$

Right CEM

Module is installed right of centerline with modules to the right and left.

$$516 \text{ (standard)} + 104 \text{ (left module)} = 620$$

AEM

Module is installed right of centerline (not recommended for single AEM).

$$0 \text{ (standard)} = 0$$

Library Total

$$378 \text{ (Base)} + 360 \text{ (DEM)} + 516 \text{ (left CEM)} + 620 \text{ (right CEM)} + 0 \text{ (AEM)} = 1,874$$

Host Connectivity

The SL3000 library supports two types of host connections:

- Small computer system interface over a physical Fibre Channel interface (FC-SCSI)

- Ethernet using 10/100 Base-T and CAT-5 cable (TCP/IP)

In a non-partitioned configuration, the library can use only one interface type, either FC-SCSI or TCP/IP. In a partitioned configuration, the library can have one interface type per partition. The SL3000 does not support DHCP.

FC-SCSI Connection

The SL3000 comes standard with a PUA2 Fibre Channel card, which provides an 8GB interface and contains two ports. You can use the ports for two independent connections to applications. Or, if your application supports two ports for failover, you can use the ports for failover protection.

The *SL3000 SCSI Reference Guide* contains information about the SCSI command set, FC operations, command implementations, topologies, cables, and connectors.

Supported Topologies

- *Switched Fabric* — Oracle recommends this topology. It provides dynamic interconnections between nodes and multiple, simultaneous FC connections. If the library is connected to a FC switch or fabric-capable host, it configures itself as a switched topology and can support up to 16 million ports logged into the fabric.
- *Arbitrated Loop* — While the library supports the arbitrated loop topology, Oracle does not recommend it. This topology provides multiple connections for devices that share a single loop and allows only point-to-point connections between an initiator and target during communications. An arbitrated loop can connect only up to 126 ports.

TCP/IP Connection

The TCP/IP connection provides the host library interface (HLI) used to communicate with library management applications, such as:

- Open system platforms with ACSLS
- Enterprise-level mainframes with ELS /HSC

The library controller card is responsible for coordinating all component operations within the library and providing the interface connection with the host. There are two separate Ethernet connections for host to library communications — Ports 2A and 2B.

- Port 2B provides the primary host connection (standard).
- Port 2A provides the dual TCP/IP connection (optional) or can be connected to StorageTek Library Console (SLC).

The dual TCP/IP feature uses both ports to provide two connections between the library and ACSLS or ELS/HSC hosts, eliminating a single point of failure. For more information, refer to "[Dual TCP/IP Overview](#)" on page C-1.

Port Bonding

Port bonding combines multiple ports to create redundancy. The SL3000 library uses an active-backup mode. In active-backup mode, there is one bond with two slave Ethernet interfaces. If the active interface fails, the backup interface becomes active. With minimum library firmware FRS_4.30 and a second Ethernet switch installed in the library, port bonding is automatically enabled — no command or activation file is required.

Library Monitoring

The library can be monitored using SLC or Simple Network Management Protocol (SNMP). Additionally, service representatives can use the Log SnapShot feature to collect logs from the controller cards.

StorageTek Library Console (SLC)

SLC is a GUI application for configuring, monitoring, and managing the SL3000 library. SLC is included with the purchase of an SL3000 library. You can access SLC from the local operator panel, a workstation, or through a browser. For installation requirements and additional information, refer to "[Installing StorageTek Library Console](#)" on page 3-1.

Simple Network Management Protocol

The SL3000 library supports SNMP v2c and SNMP v3 (preferred). For more information, refer to the *SNMP Reference Guide*.

Log SnapShot Feature

Log SnapShot gathers, compresses, and encrypts library logs. You can use the CLI or SLC to generate a log snapshot and send it to an Oracle representative to assist with troubleshooting.

Media Validation

The SL3000 library supports media validation, which allows you to verify the integrity of T10000 cartridges using SLC or StorageTek Tape Analytics (STA). The following validation methods are available: Basic Verify, Standard Verify, and Complete Verify.

For more information about media validation using SLC, refer to "[Validating a Cartridge](#)" on page 12-1. For more information about media validation using STA, refer to the STA documentation on OTN.

Library Management Software

Library management software controls the library by allocating drives and requesting library operations, such as entering, mounting, dismounting, and ejecting cartridges. Library management software manages the library database, which tracks volume identifiers (vol-ids), attributes, and locations of cartridges.

There are two main library management options:

- [Automated Cartridge System Library Software \(ACSL\)](#)
- [Enterprise Library Software](#)

Automated Cartridge System Library Software (ACSL)

ACSL is a centralized, multi-platform library management software product for an open-systems environment. ACSL manages all library operations and shares library resources with any ACSL-enabled application. A single instance of ACSL can manage multiple libraries. The key benefits of ACSL include:

- Centralized library control across multiple StorageTek libraries, including legacy technology

- Optimized library performance by load-balancing hardware and executing parallel commands
- Reduced downtime through dynamic configuration capabilities and queuing commands during short-term library outages
- Enriched reporting and management capabilities for ease of use

ACSL version 7.3 or greater is required for interfacing with the SL3000 library. ACSLS 7.3 requires PUT 0801 for AEM support.

Enterprise Library Software

Enterprise Library Software (ELS) incorporates multiple software products to monitor and manage tape libraries and virtual solutions for a mainframe environment.

Host Software Component (HSC) and Storage Management Component (SMC)

HSC manages volume pools and communication with the SL3000 library. HSC resides on the host, but is transparent to the operating system. A separate component, SMC, provides the interface between z/OS operating systems and HSC. SMC resides on all MVS hosts that perform tape processing with HSC. HSC and SMC work together to influence allocations and determine policies, volume locations, and drive ownership. HSC and SMC translate user requests into library commands and provide message handling.

Virtual Tape Control System (VTCS)

VTCS is host software that enables centralized management of StorageTek virtual tape libraries, such as Virtual Storage Manager (VSM) and Virtual Library Extension (VLE). VTCS manages virtual tape volumes and drives, which includes the migration and recall of virtual volumes and the use of real tape cartridges and drives.

Concurrent Disaster Recovery Test (CDRT)

CDRT enables disaster recovery testing while the library or virtual storage is in use.

Independent Software Vendors (ISVs)

There are a variety of ISVs that support the SL3000 library. Most ISV applications connect through ACSLS or direct-attach. Some applications include:

- BakBone NetVault
- CA ArcServe
- HP Data Protector
- Legato NetWorker
- SAM FS
- Tivoli Storage Manager
- Veritas BackupExec
- Veritas Netbackup

Not every application is tested on every platform or version. To make sure the software is supported, contact an Oracle sales representative or application vendor.

Other Storage System Solutions

The following Oracle products are compatible with the SL3000 library to provide a multifaceted storage solution. This list is not all-inclusive. For more information, contact an Oracle sales representative or visit:

<http://www.oracle.com/us/products/servers-storage/storage/tape-storage/overview/index.html>

Client System Component (CSC)

The client system component (MVS/CSC) allows SMC on MVS to use ACSLS as its library server. One CSC is Library Station, which allows an open systems client to use HSC on MVS as its library server.

Expert Performance Reporter

Expert Performance Reporter (ExPR) software collects performance data and generates reports about status and performance. It provides information on manual tape systems as well as Nearline and VSM tape systems. ExPR has both an MVS component and a PC component.

Extended High Performance Data Mover

Extended High Performance Data Mover (ExHPDM) is utility software that performs high-speed backup and restore of data sets by interleaving very large block sizes on high-speed, high-capacity tape devices. ExHPDM achieves its speed by treating all data equally regardless of the type. Its only function is to move data from disk to tape and back again.

The ExHPDM software moves blocks of data in parallel from several concurrently executing MVS application programs. The data from the application programs is buffered into 256 KB tape block sizes in the application program's address space, and the 256 KB blocks are interleaved onto single or multiple tape volumes.

Library Content Manager (LCM)

Library Content Manager (LCM) — formerly Expert Library Manager (ExLM) — manages Nearline and VSM resources. LCM optimizes overall performance by assuring there are adequate resources available for a scheduled job. LCM also includes LCM Explorer, a graphical user interface that allows a user to configure LCM by creating configuration files instead of parameter files.

Linear Tape File System (LTFS)

LTFS software improves file access and portability of data on StorageTek T10000 or LTO media. LTFS software enables applications to write and retrieve files directly from tape through standard file format interfaces: CIFS or POSIX. Files may also be accessed with ease through a browser or operating system graphical interface. You can drag and drop files to and from any storage medium: disk, tape, or flash.

Oracle's Linear Tape File System, Library Edition (LTFS-LE) software supports the SL3000 tape library, managing multiple tape drives and media. When you select a file, the library automatically mounts the corresponding tape and the file is made available to that application.

StorageTek Tape Analytics

Oracle's StorageTek Tape Analytics (STA) is an intelligent monitoring application available for StorageTek Modular Tape Libraries. It simplifies tape storage

management so you can make informed decisions about future tape storage investments based on the current health of the tape storage environment.

STA can monitor multiple libraries from a single, browser-based user interface. STA supports open systems and mainframe, mixed-media, and mixed-drive environments across multiple library platforms. Using STA, you can increase the utilization and performance of tape investments by performing detailed performance trending analyses. These analyses are based on a regularly updated database of library operations.

Virtual Storage Manager (VSM)

VSM stores virtual tape volumes on a disk buffer called the Virtual Tape Storage Subsystem (VTSS). VSM then migrates the virtual tape volumes to tape media mounted on real tape drives in the library. This optimizes access time and throughput of data to physical tape media. The primary host software for VSM is the Virtual Tape Control System (VTCS). VTCS manages virtual tape volumes and drives, which includes the migration and recall of virtual volumes and the use of real tape cartridges and drives.

Virtual Library Extension (VLE) Virtual Library Extension (VLE) can be added to a VSM for additional capacity. VLE provides an economical second tier of disk storage that can be used to boost the overall VSM storage capacity or use VSM as a tapeless virtual library.

Ordering

Contact Sales Assistance at +1.888.672.2534.

The tables in this chapter provide the part numbers for library components and upgrade options. The ATO number is for initial orders and the PTO is for upgrade orders after the initial purchase of an SL3000 library.

1. **Physical Configuration** — choose library modules. You should plan for future growth.
2. **Module Add-ons** — select module specific add-ons (drive arrays, CAPs, and so on).
3. **Tape Drives** — order tape drives (T10000 and LTO).
4. **Cartridges and Labels** — order tape cartridges and labels.
5. **Power Options** — select a power redundancy option: N+1, 2N, or 2N+1. Order the required number of power supplies, AC power cords, and PDUs (to calculate requirements, see "Power Configurations" on page 1-9).
6. **Hardware Activation Files** — determine the active capacity required. Quantity options include: +25, +100, +200, +500, +700, +1000. Select options: dual TCP/IP, dual fibre channel, redundant electronics, library management software, and network connectivity.
7. **Cables** — select required cables.
8. **Support** — select maintenance options and professional service options.

Physical Configuration

Before selecting a physical configuration, read the options and requirements for each module in "Library Modules" on page 1-1.

Base Module (required)

A standalone Base module is the smallest library configuration.

Base Module Part Number	Description	ATO
	Base module, no active slots, one drive array (eight drive slots), CAP	SL3000-BASE-Z
	Base module, no active slots, one drive array (eight drive slots), CAP for non-EU countries	7114504

Options:

- 8 (standard), 16, or 24 drive slots. To order additional drive arrays, see ["Tape Drive Arrays"](#) on page 1-25.
- Perforated window (standard), window storage array, or operator panel. To order, see ["Module Add-ons"](#) on page 1-25.

Requirements:

- You must purchase a minimum of 200 activated slots, see ["Capacity Activation"](#) on page 1-29.

Drive Expansion Module (DEM)

The library can have one DEM.

DEM Part Number	Description	ATO	PTO
	DEM, 200 active slots, one drive array (eight drive slots)	SL3000K-DEM200-Z	XSL3000-DEM200-F
	DEM, 200 active slots, one drive array (eight drive slots) for non-EU countries	7114505	7114531

Options:

- 8 (standard), 16, 24, or 32 drive slots. To order additional drive arrays, see ["Tape Drive Arrays"](#) on page 1-25.
- Perforated window (standard), window storage array, operator panel, or CAP. To order, see ["Module Add-ons"](#) on page 1-25.
- The DEM includes 200 active slots. To activate more capacity, see ["Capacity Activation"](#) on page 1-29.

Cartridge Expansion Module (CEM)

CEM Part Number	Description	ATO	PTO
	CEM, no active slots (438 to 620 cartridge slots)	SL3000-1CEM-Z	XSL3000-CEM-Z-N

Options:

- One CAP per module. To order, see ["Cartridge Access Ports"](#) on page 1-26.
- A CEM can be converted to PEMs at any time if the dual robotics option is selected. There is a loss of capacity when converting a CEM to a PEM. Ensure that the library has the required capacity.

Requirements:

- Maximum of eight CEMs per library.

- Purchase activation permits to activate storage capacity in this module (see ["Capacity Activation"](#) on page 1-29).

Access Expansion Module (AEM)

AEMs can provide bulk loading and dual robotics support. AEMs can only be placed at the ends of the library. An AEM cannot be placed directly to the left of the Base module; there must be a module in between.

AEM Part Number Descriptions	ATO	PTO
Left AEM, 234 bulk loading CAP	SL3000-LEFTAEM-Z	XSL3000-AEM-LFT-N
Left AEM, 234 bulk loading CAP for non-EU countries	7114506	7114532
Right AEM, 234 bulk loading CAP	SL3000-RIGHTAEM-Z	XSL3000-AEM-RT-Z-N
Right AEM, 234 bulk loading CAP for non-EU countries	7114507	7114533

Options:

- One AEM supports bulk loading capability only; dual robotics is not supported. Oracle recommends installing a single AEM on the left for maximum storage slot capacity.
- Two AEMs support bulk loading and dual robotics.

Dual Robotics

Dual robotics requires either two PEMs or two AEMs and a minimum 2N power with 240 VAC.

Dual Robotic Part Number Descriptions	ATO	PTO
Dual robot	SL3000-DUALBOT-Z	XSL3000K-DUALBOT-N
Dual robot for non-EU countries	7114511	7114536

Module Add-ons

- [Tape Drive Arrays](#)
- [Cartridge Access Ports](#)
- [Window Cartridge Array](#)
- [Local Op Panel](#)
- [Redundant Electronics](#)

Note: Some options are only compatible with a specific module.

Tape Drive Arrays

You can order up to two additional drive arrays for the Base module and up to three arrays for the DEM.

Tape Drive Array Part Number Description	ATO	PTO
Tape Drive Array (eight drive slots)	SL3000-DRVARRAY-Z	XSL3000-DRVARY-Z-N
Tape Drive Array (eight drive slots) for non-EU countries	7114512	7114537

Cartridge Access Ports

Order a maximum of one CAP per CEM or DEM module. The Base module comes standard with one CAP.

Note: Bulk cartridge loading is available with an AEM (see "[Dual Robotics](#)" on page 1-25).

Rotational CAPs Part Number Description	ATO	PTO
Cartridge Access Port (26 slots)	SL3000-1CAP-Z	XSL3000-CAP-Z-N
Cartridge Access Port (26 slots) for non-EU countries	7114539	7114541
Spare CAP Magazine (13 slots)	SL3000-CAPMAG-Z	XSL3000-CAP-MAG-N

Window Cartridge Array

The window array replaces the perforated window in the Base module and DEM with 23 storage slots

Window Cartridge Array Part Number Description	ATO	PTO
Cartridge Window Array (+23 slots)	SL3000-WARRAY-Z	XSL3000-W-ARRAY-N

Local Op Panel

There can only be one local op panel per library. The operations panel replaces the perforated window on the Base module or DEM.

Local Op Panel Description	ATO	PTO
Operations Panel	SL3000-OPPANL-Z	XSL3000-OP-PANL-N

Redundant Electronics

Redundant electronics provides failover protection if a library controller card fails.

RE Description	ATO	PTO
Redundant Electronics	SL3000-REDELCT-Z	XSL3000-REDELCT-Z
Redundant Electronics for non-EU countries	7114538	7114540

Tape Drives

Refer to the tape media section on the Oracle website for additional information: <http://www.oracle.com/us/products/servers-storage/storage/tape-storage/overview/index.html>.

For more information about encryption, see the *Oracle Key Management Overview and Planning Guide* on OTN.

Tape Drive Encryption

There are two encryption key management options:

- Application-managed — an application manages the keys using the data path.
- OKM-managed — Oracle Key Manager (OKM) appliance manages the keys using an ethernet connection outside the data path which is generally more secure.

Support for application-managed and OKM-managed encryption depends on the drive type.

T10000 Encryption All T10000 generations are encryption-ready, however enabling either application-managed or OKM-managed encryption requires a T10K-EKEY-A-N encryption activation permit. You can order an encryption activation permit at any time (during initial purchase or afterwards). After purchasing the permit, use Virtual Operator Panel (VOP) to enable encryption. T10000C and T10000D drives no longer require encryption license keys to enable encryption.

LTO Encryption OKM-managed encryption requires an LTO-ENCRYPT-ACTIVE encryption activation permit. Application-managed encryption using the data path does not require a permit.

HP LTO 5 and 6 drives support both OKM-managed and application-managed encryption.

IBM LTO 5, 6, and 7 drives require a Belisarius card in the drive tray to interface with OKM. You may purchase a drive with or without OKM compatibility. To upgrade a non-OKM-compatible drive, you can purchase a kit to add the Belisarius card.

Re-using Encryption Activation Permits If you previously purchased an activation permit for an older drive, you can re-use the activation permit when upgrading to a newer generation drive of the same family, as long as the total number of encryption enabled drives does not exceed your total number activation permits for that family. For example, if you have six T10K-EKEY-A-N activation permits, you can only have a total of six encryption-enabled T10000 drives (regardless of generation).

T10000 Drives

There may be other configurations for the T10000 tape drives than those listed below. For more information, see the drive specific *Systems Assurance Guide* on the OTN.

Description	Part Number
T10000D 16 Gb Fibre Channel	7105799
T10000D 16 Gb FICON	7105800
T10000 encryption activation permit for one drive ¹	T10K-EKEY-A-N

¹ See "[T10000 Encryption](#)" and "[Re-using Encryption Activation Permits](#)" above.

LTO Drives

Description	Part Number
IBM LTO8 Fibre Channel without OKM compatibility	7118443
IBM LTO7 Fibre Channel with OKM compatibility	7113979
IBM LTO7 Fibre Channel without OKM compatibility	7113981
OKM Interface Upgrade Kit for IBM LTO (Belisarius card)	7113290
LTO encryption activation permit for one drive ¹	LTO-ENCRYPT-ACTIVE

¹ See "[LTO Encryption](#)" and "[Re-using Encryption Activation Permits](#)" above.

Conversion Kits

Tape drive conversion kits convert drives previously used in an SL8500 library for use in the SL3000 library.

Tape Drive Conversion Kit Description	Part Number
IBM LTO generation 3 or higher	7110132
HP LTO generation 3 or higher	7110133
T9840C/D	7110134
T10000A/B/C	7110135
T10000D	7110136

Port Conversions Kits

Port conversion kits convert the port type or install additional ports. For single port to dual port upgrades or dual port long to short wave conversions, order two kits.

Tape Drive Port Conversion Kit Description	Part Number
T10000C Fibre Channel to FICON conversion kit	T10C-FC/FI-CKITZ
T10000A/B 4GB Fibre Channel and FICON single 4GB long wave SFP	XT10K-4GB-LW-Z-N
T10000A/B 4GB Fibre Channel and FICON single 4GB short wave SFP	XT10K-4GB-SW-Z-N
T9840C/D and T10000A 2GB FC and FICON single 2GB long wave SFP	X984/T10K-2GB-LW-N
T9840C/D and T10000A 2GB FC and FICON single 2GB short wave SFP	X984/T10K-2GB-SW-N
HP LTO4 FC dual-port conversion kit for installation of a second data port	XL4-HF-SL30-DPCK-N
IBM LTO4 FC dual-port conversion kit for installation of a second data port	XL4-IF-SL30-DPCK-N
LTO5 FC dual-port conversion kit for installation of a second data port	XL5-SL85-SL30-DPCK

Cartridges and Labels

You must order tape cartridges separately. You can use existing cartridges if they are compatible and still within their warranty period. Professional Services and Data Center Services offer media and drive migration services.

- Call 1-877-STK-TAPE to order media from your local reseller or to obtain media pre-sales support.
- E-mail: tapemediaorders_ww@oracle.com

Label kits are available in either 60 or 200 piece quantities. The 60 piece kit has 60 data and 6 cleaning cartridge labels. The 200 piece kit has 200 data and 20 cleaning cartridge labels. The label ranges are sequentially numbered, non-repeating, and cannot be customized.

Refer to the T-Series *Systems Assurance Guides* for information about the media part numbers for the T9840 and T10000 tape drives. Refer to "[Barcode Labels](#)" on page F-1 for more details about media labels.

Power Options

To determine the library's power configuration requirements, refer to "[Power Configurations](#)" on page 1-9.

DC Power Supplies

To calculate the DC power supplies required, see "[Calculating Tape Drive Power Supply Quantities](#)" on page 1-11.

Note: For the 2N+1 power option, order one additional 1200W DC supply and two additional 200W cPCI power supplies. These are in addition to the DC supplies required for the tape drives. For more information, see ["DC Power Supplies"](#) on page 1-10.

DC Power Supply Options	ATO	PTO
1200W DC power supply (for tape drives and robotics)	SL3000-1DCPWR-Z	XSL3000-DCPWR-Z-N
200W cPCI power supply (for ECM)	SL3000-EMDCPWR-Z	XSL3000-EM-DCPWR-N

AC Power Distribution Units (PDU)

You cannot mix PDU types within a library. To determine the number and type of PDUs to order, see ["Power Configurations"](#) on page 1-9.

PDU Power Options	ATO	PTO
100 - 127 VAC 20 Amp PDU	SL3000-PDU110-Z	XSL3000-PDU-110-N
200 - 240 VAC 30 Amp PDU	7114509	7114534
200 - 240 VAC 30 Amp PDU for non-EU countries	SL3000-PDU240-Z	XSL3000-PDU-240-N

AC Power Cords

- N+1 power requires one power cord for the Base module and an additional power cord for the DEM (if installed)
- 2N or 2N+1 power requires two power cords for the Base module and two additional power cords for the DEM (if installed)

AC Power Cords	ATO	PTO
US Power Cord 20A/110V, 3.7 meter	SL3000-PWCD20110	XSL3000-PC20110-N
US Power Cord 30A/220V, 3.7 meters	SL3000-PWCD30220	XSL3000-PC30220-N
International Power Cord, 30A/220V, 4 meters	SL3000-IPWCD30220	XSL3000-IPC30220-N

Hardware Activation Files

Hardware activation files activate these options. For download instructions, see ["Activating Optional Features"](#) on page 5-1.

Hardware Activation File	ATO	PTO
Dual TCP/IP	SL3000-2TCPIP	XSL3000-2TCPIP-F
Dual Fibre Channel Card	XSL3000-2FCCARD	XSL3000-2FCCARD
Dual Fibre Channel Port	SL3000K-2FCPORT	XSL3000-2FCPORT-F

Capacity Activation

You can purchase capacity upgrades at any time. Order larger quantities first and add smaller quantities to get the total desired active capacity. For more information, see ["Storage Capacity"](#) on page 1-16.

Quantity of Active Capacity	ATO	PTO
1000 Cartridge Slot Upgrade	SL3000K-1000SLOT	XSL3000-1000SLOT-F

Quantity of Active Capacity	ATO	PTO
700 Cartridge Slot Upgrade	SL3000K-700-SLOT	Not available
500 Cartridge Slot Upgrade	SL3000K-500-SLOT	XSL3000-500-SLOT-F
200 Cartridge Slot Upgrade	SL3000K-200-SLOT	XSL3000-200-SLOT-F
100 Cartridge Slot Upgrade	SL3000K-100-SLOT	XSL3000-100-SLOT-F
25 Cartridge Slot Upgrade	SL3000K-25SLOT	XSL3000-25-SLOT-F

Cables

The following tables list the cables available for the SL3000 library and tape drives. The cables are either Riser or Plenum. Plenum-rated cables have a higher flammability rating and are used for under-the-floor applications. SL3000 drive trays accept only LC fiber cable connectors. If you are using cables with SC connectors, you must add an adapter.

Fiber Optic Cables

LC connectors are the industry standard for all 2 Gb-capable or higher Fibre Channel devices. SL3000 drive trays accept only LC fiber cable connectors.

LC to LC 50/125 Micron, Multimode Cable	ATO	PTO
50 m (164 ft) FC cable OM4, 50/125 duplex riser	7106951	7106952
50 m (164 ft) FC cable OM4, 50/125 duplex plenum	7106953	7106954
3 m (9.8 ft) FC cable, duplex riser	CABLE10800340-Z-A	CABLE10800340-Z-N
5 m (16.4 ft) FC cable, duplex riser	CABLE10800341-Z-A	CABLE10800341-Z-N
10 m (32.8 ft) FC cable, duplex riser	CABLE10800310-Z-A	CABLE10800310-Z-N
10 m (32.8 ft) FC cable, duplex plenum	CABLE10800313-Z-A	CABLE10800313-Z-N

LC-to-LC, 9/125 Micron, Single Mode Cable	Part Number
3 m (9.8 ft) Optical Cable, LC-to-LC Duplex, Riser	CABLE10800302-Z-A
10 m (32.8 ft) Optical Cable, LC-to-LC Duplex, Riser	CABLE10800331-Z-A
50 m (164 ft) Optical Cable, LC-to-LC Duplex, Riser	CABLE10800333-Z-A
100 m (328 ft) Optical Cable, LC-to-LC Duplex, Riser	CABLE10800306-Z-A
10 m (32.8 ft) Optical Cable, LC-to-LC Duplex, Plenum	CABLE10800330-Z-A
50 m (164 ft) Optical Cable, LC-to-LC Duplex, Plenum	CABLE10800332-Z-A
100 m (328 ft) Optical Cable, LC-to-LC Duplex, Plenum	CABLE10800305-Z-A

LC-to-SC, 9/125 Micron Cable	Part Number
10 m (32.8 ft) Optical Cable, LC-to-SC Duplex, Riser	CABLE10800335-Z
50 m (164 ft) Optical Cable, LC-to-SC Duplex, Riser	CABLE10800337-Z
100 m (328 ft) Optical Cable, LC-to-SC Duplex, Riser	CABLE10800304-Z
10 m (32.8 ft) Optical Cable, LC-to-SC Duplex, Plenum	CABLE10800334-Z
50 m (164 ft) Optical Cable, LC-to-SC Duplex, Plenum	CABLE10800336-Z
100 m (328 ft) Optical Cable, LC-to-SC Duplex, Plenum	CABLE10800303-Z

ESCON Cable	Part Number
13 m (4 ft) Riser	CABLE10800289-Z
107 m (350 ft) Riser	CABLE10800292-Z
13 m (4 ft) Plenum	CABLE10800285-Z
31 m (100 ft) Plenum	CABLE10800286-Z
107 m (350 ft) Plenum	CABLE10800288-Z

Ethernet Cables

These cables provide the interface connection for TCP/IP (HLI-PRC). Only connect shielded cables to the library and tape drives.

Ethernet Cable	Part Number
2.4 m (8 ft), 24 AWG, CAT5, Shielded	CABLE10187033-Z-A
10.7 m (35 ft), 24 AWG, CAT5, Shielded	CABLE10187034-Z-A

Support

Service and support representatives are available to assist with hardware and software problem resolution. During the initial order and installation planning, you can contact local and remote support with any questions.

Service Delivery Platform

The Service Delivery Platform (SDP) is a support enhancement solution that provides faster problem resolution, analysis and trending, and improved diagnostic capabilities. The SDP consists of a smart appliance placed at the customer site that connects to the library and any StorageTek T-series tape drives. The SDP collects device events and alerts support analysts, providing remote diagnosis and auto service requests (ASR).

For more information, contact an Oracle representative or visit:

<http://www.oracle.com/technetwork/systems/asr/documentation/oracle-installed-storage-330027.html>

Oracle Premier Support for Systems

Oracle Premier Support is a fully integrated support solution that features:

- Complete system coverage and unlimited 24/7 access to Oracle system specialists
- Essential product updates, such as firmware
- Personalized, proactive IT support and rapid-response hardware service

For more information, visit:

<http://www.oracle.com/us/support/index.html>

Contacting Support

The Oracle Global Customer Support Contacts Directory can be found at:

<http://www.oracle.com/us/support/contact-068555.html>

To submit, update, or review service requests, go to My Oracle Support at:

<https://support.oracle.com/>

Installation Planning

- Physical Dimensions and Weights
- Installation Site Requirements
- Fire Suppression Planning
- Networking
- Cable Routing
- Approximate Installation Time
- Installation Tools

Physical Dimensions and Weights

Figure 2-1 Service Clearances and Dimensions (Side View)

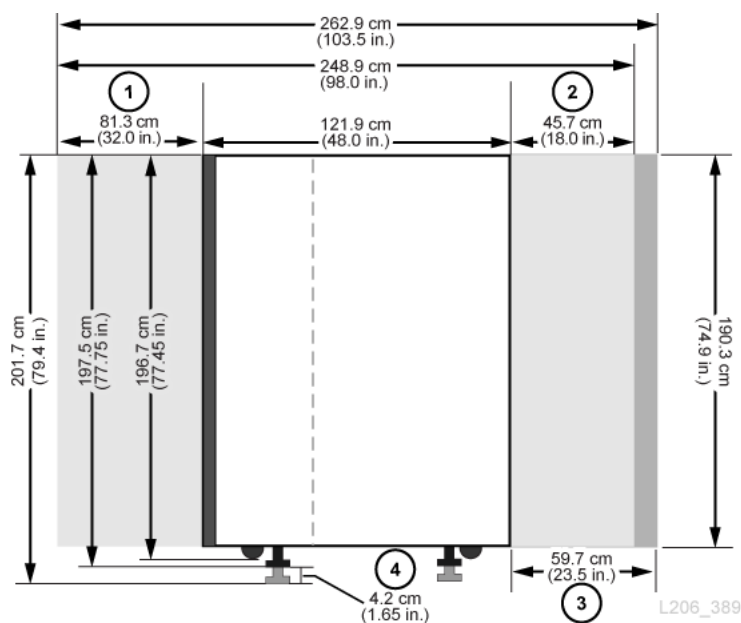


Figure Legend:

1. Base and DEM rear service clearance
2. Base and DEM front service clearance
3. AEM service clearance

4. Weight pad adjustment range

Figure 2-2 Service Clearances and Dimensions (Top View)

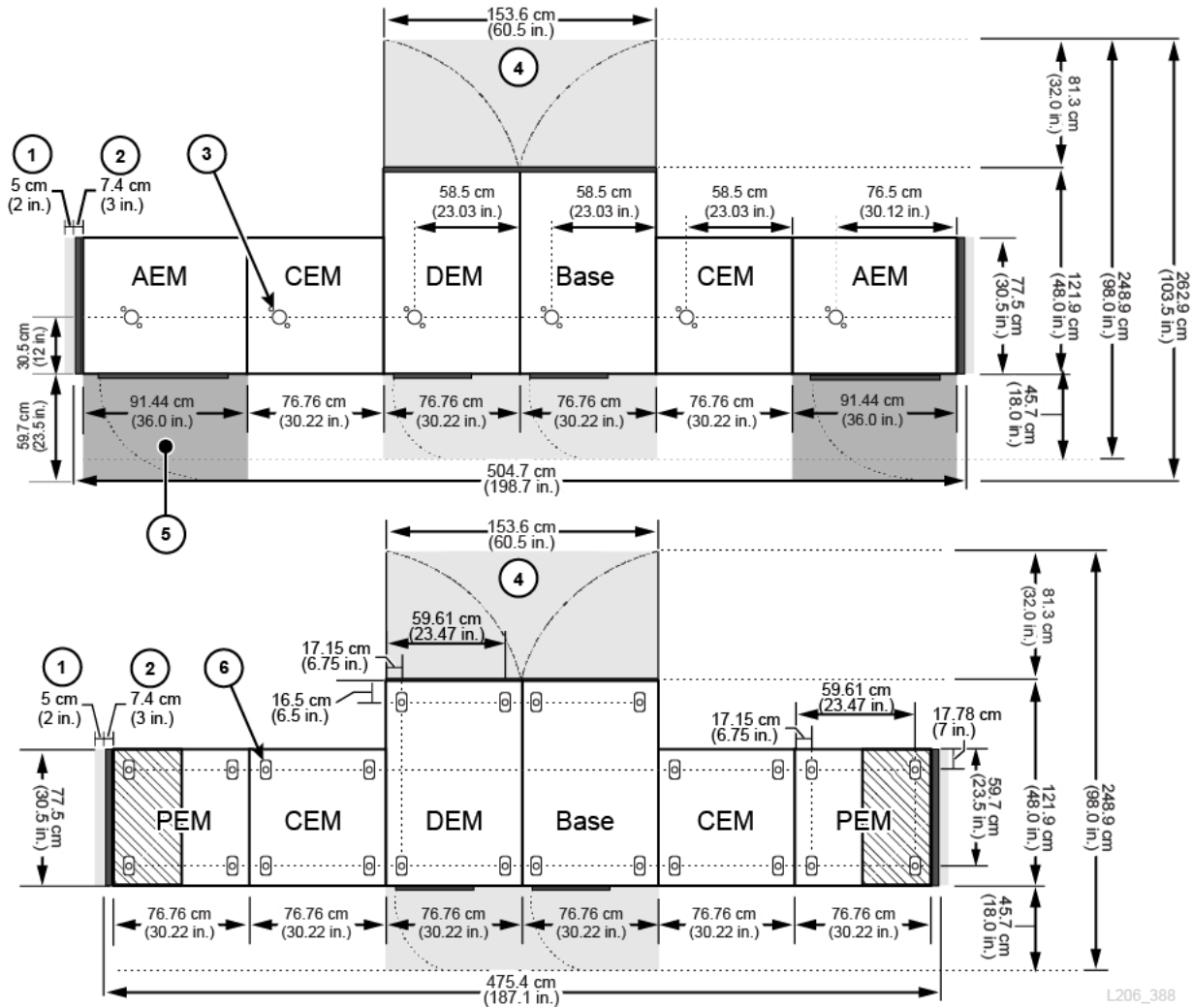


Figure Legend:

1. Side cooling area
2. Side cover
3. Nozzle cutout for fire suppression system
4. Base and DEM service clearance (light gray areas)
5. AEM service clearance (dark gray areas)
6. Weight distribution pad

Base Module

Table 2–1 Base Module Measurements

Dimension Type	Measurement
Height	196.7 cm (77.45 in.) on casters for transport
	197.5 cm (77.75 in.) to 201.68 cm (79.4 in.) on weight pads for permanent install
Width	76.8 cm (30.22 in.) when placed between modules
	81.3 cm (32 in.) transport width (no side covers) ¹
	91.5 cm (36 in.) standalone with side covers on both sides ²
Depth	121.9 cm (48 in.)
Service Area	Front: 45.7 cm (18.0 in.)
	Rear: 81.3 cm (32.0 in.)
	Side Cooling Area: 5 cm (2 in.)
	Side Install Area: 45.7 cm (18.0 in.)
Weight	Frame only: 361 kg (796 lb)
	8 drives and media: 623 kg (1372 lb)
	16 drives and media: 661 kg (1457 lb)
	24 drives and media: 687 kg (1514 lb)
	Side Covers: 18.5 kg (41 lb) per side

¹ Minimum transportation clearance. There are alignment tabs on each side of the module that add 4.5 cm to the 76.8 cm width of the module. Therefore, 81.3 cm is the minimum transportation width.

² One side cover adds 7.4 cm (2.9 in.) to the module width. Only the ends of the library require side covers.

Drive Expansion Module

Table 2–2 Drive Expansion Module Measurements

Dimension	Measurement
Height	196.7 cm (77.45 in.) on casters for transport:
	197.5 cm (77.75 in.) to 201.68 cm (79.4 in.) on weight pads for permanent install
Width (module only)	76.8 cm (30.22 in.) when placed between modules
	81.3 cm (32 in.) transport width (no side covers) ¹
	83.8 cm (33 in.) with one side cover
Depth (doors closed)	121.9 cm (48 in.)
Service Area	Front: 45.7 cm (18.0 in.)
	Rear: 81.3 cm (32.0 in.)
	Side Cooling Area: 5 cm (2 in.)
	Side Install Area: 45.7 cm (18.0 in.)
Weight	Frame only, no CAP: 265 kg (584 lb)
	8 drives and media: 540 kg (1190 lb), 582 kg (1284 lb) with CAP
	16 drives and media: 596 kg (1314 lb), 621 kg (1369 lb) with CAP
	24 drives and media: 647 kg (1426 lb), 660 kg (1456 lb) with CAP
	32 drives and media: 709 kg (1564 lb), 723 kg (1594 lb) with CAP

¹ Minimum transportation clearance. There are alignment tabs on each side of the module that add 4.5 cm to the 76.8 cm width of the module. Therefore, 81.3 cm is the minimum transportation width.

Cartridge and Parking Expansion Modules

Table 2–3 Cartridge and Parking Expansion Module Measurements

Dimension	Measurements
Height	196.7 cm (77.45 in.) on casters for transport 197.5 cm (77.75 in.) to 201.68 cm (79.4 in.) on weight pads for permanent install
Width (module only)	76.8 cm (30.22 in.) when placed between modules/side cover 81.3 cm (32 in.) transport width (no side covers) ¹ 83.8 cm (33 in.) with one side cover
Depth	77.5 cm (30.5 in.)
Weight (CEM)	Frame only: 175 kg (385 lb) Shipping: 213 kg (469 lb) Installed, with media: 340 kg (749 lb)
Weight (PEM)	Frame only: 175 kg (385 lb) Installed, with media: 257kg (567 lb)

¹ Minimum transportation clearance. There are alignment tabs on each side of the module that add 4.5 cm to the 76.8 cm width of the module. Therefore, 81.3 cm is the minimum transportation width.

Access Expansion Module

Table 2–4 Access Expansion Module Measurements

Dimension	Measurement
Height	196.7 cm (77.45 in.) on casters for transport 197.5 cm (77.75 in.) to 201.68 cm (79.4 in.) on weight pads for permanent install
Width	91.4 cm (36.0 in.) when placed between module and side cover 96 cm (37.8 in) transport width (no side covers) ¹ 99.1 cm (39 in.) with one side cover
Depth	77.5 cm (30.5 in.)
Service Area	Front: 59.7 cm (23.5 in.)
Weight	Frame only: 204.2 kg (450 lb)

¹ Minimum transportation clearance. There are alignment tabs on each side of the module that add 4.5 cm to the 91.5 cm width of the module. Therefore, 96 cm is the minimum transportation width.

Covers, Doors, and Service Clearances

Table 2–5 Covers, Doors, and Service Clearance Measurements

Dimension	Measurement
Height	190.3 cm (74.9 in.) frame only
Door thickness	Front: 1.9 cm (0.75 in.) Rear: 4.5 cm (1.75 in.)
Door latches	2.53 cm (0.9 in.)
Service clearance	Front: 45.7 cm (18 in.) for Base and DEM only, 59.7 cm (23.5 in.) for AEM Rear: 81 cm (32 in.) for Base and DEM only Side: 5 cm (2 in.) for cooling, 45.7 cm (18.0 in.) for install
Side cover	7.4 cm (2.9 in.) width 18.5 kg (41 lb) each

Shipping Weights and Measures

The SL3000 library modules and other components are shipped on pallets. The table below lists each module and its shipping specifications. If equipment on a pallet must be transported on elevators, the elevator cars must be capable of safely handling the weight.

Table 2–6 Module and Tape Drive Shipping Information

Type	Height	Width	Depth	Weight
Base	216 cm (85 in.)	97 cm (38.3 in.)	134 cm (53 in.)	410 kg (905 lb)
DEM	216 cm (85 in.)	97 cm (38.3 in.)	134 cm (53 in.)	321 kg (708 lb)
CEM	216 cm (85 in.)	97 cm (38.3 in.)	96 cm (38 in.)	213 kg (469 lb)
PEM	216 cm (85 in.)	97 cm (38.3 in.)	96 cm (38 in.)	213 kg (469 lb)
AEM	216 cm (85 in.)	97 cm (38.3 in.)	148 cm (58 in.)	260 kg (570 lb)
LTO	32 cm (12.6 in.)	31 cm (12.2 in.)	66 cm (26 in.)	9.5 kg (20.9 lbs)
T10000	34 cm (13.4 in.)	31 cm (12.2 in.)	66 cm (26 in.)	10.5 kg (23.1 lbs)

Either a split-pallet or pallet-ramp design is used to ship and provide safe removal of the module at the customer site. SL3000 library modules are shipped with wheels (casters) already attached to allow for easy positioning within the data center. Once positioned, the modules must be raised from their wheel-base to rest upon load plates for stability and leveling purposes.

The suggested library adjustment height is 200 cm (77.6 in.). Ensure the top of the library does not interfere with ceiling fixtures at the installation site.

Installation Site Requirements

- [Physical Space Requirements](#)
- [Transporting the Library](#)
- [Floor Requirements](#)
- [Environmental Requirements](#)
- [Waste Disposal](#)

Physical Space Requirements

The SL3000 library requires adequate physical space. For dimensions of the library modules, see "[Physical Dimensions and Weights](#)" on page 2-1. If modules will be added in the future, ensure there is enough room to expand the library.

The minimum working area (not including the space required for the pallets) is approximately 19 m² (200 ft²).

Transporting the Library

If the equipment must be transported on elevators, the elevator cars must be capable of safely handling the weight. Additionally, ensure that the components can pass through doorways and fit in elevators. For more information, see "[Shipping Weights and Measures](#)" on page 2-5.

Pallet Double Stacking

WARNING: *Possible Physical Injury.* Only use a forklift operated by a qualified operator to remove a stacked second pallet. Do not attempt to tilt or slide the pallet off by hand.

In the event that a forklift is unavailable to safely remove the module, notify the installation coordinator. Inform them that the library may need to be picked up from the site by the delivery company, taken off the second pallet, and re-delivered. Delivery personnel are not authorized to remove the modules from the second pallet without proper equipment.

Floor Requirements

You can install the SL3000 library on a raised, solid, or carpeted floor with a smooth surface, as long as there is adequate airflow. If the floor is raised, ensure there are no ventilation panels directly below the library. If the floor is solid, you should route cables from the ceiling to avoid creating a tripping hazard. If the floor is carpeted, ensure the carpet is approved for computer-room equipment and provides protection from electrostatic discharge (ESD).

Weight

Verify the site floor can support the weight of the library. It must support 454 kg (1,000 lb) per weight distribution pad. There are four distribution pads per module, and each measures 4 by 8 inches.

If the equipment must be transported on elevators, the elevator cars must be capable of safely handling the weight. Depending on the library configuration, the weight of the library can vary (see ["Physical Dimensions and Weights"](#) on page 2-1).

Floor Slope

Robots must travel along a level plane throughout the library. Any excessive out-of-plane conditions could cause binding, premature wear, and damage to the robots. Use the height of the weight pads to adjust the library on a sloped floor.

Environmental Requirements

For optimal reliability, maintain the environment between the recommended ranges. Although this equipment is designed to operate in environmental conditions of 20% to 80% humidity, a recommended industry best practice is to maintain a relative humidity of 40% to 50%.

Table 2-7 Environmental Specifications

Description	Temperature	Relative Humidity (non-condensing)	Wet Bulb Maximum	Maximum Altitude
Operating	15 to 32°C (60 to 90°F) dry bulb	20% to 80%	29.2°C (84.5°F)	3.05 km (10,000 ft)
Storage	10 to 40°C (50 to 104°F)	10% to 95%	35.0°C (95.0°F)	3.05 km (10,000 ft)
Shipping	-40 to 60°C (-40 to 140°F)	10% to 95%	35.0°C (95.0°F)	15.24 km (50,000 ft)

Airborne Contaminants

Airborne particulates can damage tape libraries, drives, and tapes. The operating environment for the tape library must meet to the following requirements:

- ISO 14644-1 Class 8 Environment
- Total mass of airborne particulates must be less than or equal to 200 micrograms per cubic meter
- Severity level G1 per ANSI/ISA 71.04-1985

Particles ten microns or smaller are particularly harmful to most data processing hardware. Gasses that are particularly dangerous to electronic components include chlorine compounds, ammonia and its derivatives, oxides of sulfur, and petrol hydrocarbons. In the absence of appropriate hardware exposure limits, health exposure limits must be used.

Humidification with chlorinated water is a common source of airborne chlorine. Appropriately-designed carbon filters must be used to ensure safe levels of airborne chlorine when chlorinated water is used for humidification.

Table 2–8 Gas Limit Recommendations

Chemical	ASHRAE	OSHA (PEL)	ACGIH	NIOSH
Acetic Acid (CH ₃ COOH)	Not defined	10 ppm	Not defined	Not defined
Ammonia (NH ₃)	3500 µg/m ³	350 ppm	25 ppm	Not defined
Chlorine (Cl ₂)	2100 µg/m ³	31 ppm (c)	Not defined	0.5 ppm (c)
Hydrogen Chloride (HCl)	Not defined	5 ppm (c)	Not defined	Not defined
Hydrogen Sulfide (H ₂ S)	50 µg/m ³	320 ppm (c)	10 ppm	10 ppm
Ozone (O ₃)	235 µg/m ³	30.1 ppm	Not defined	Not defined
Petrol-hydrocarbons (C _n H _n)	Not defined	500 ppm	75 ppm	300 ppm
Sulfur Dioxide (SO ₂)	80 µg/m ³	35 ppm	2 ppm	0.5 ppm (c)
Sulfuric Acid (H ₂ SO ₄)	Not defined	1 ppm	Not defined	1 ppm (c)

Some basic precautions to follow:

- Do not allow food or drink into the data center.
- Do not store cardboard, wood, or packing materials in the data center clean area.
- Identify a separate area for unpacking new equipment from crates and boxes.
- Do not allow construction or drilling in the data center without first isolating sensitive equipment. Dry wall and gypsum are especially damaging to equipment.

Seismic or Earthquake Ratings

The requirements for seismic compatibility vary dramatically throughout the world. Therefore, Oracle does not offer a standard "seismic" feature for the SL3000 library. If you have seismic concerns, Oracle recommends that you work with local experts who are familiar with the local code and requirements. Professional Services can also help coordinate this activity.

Caution: *Bodily injury and equipment damage:* You must consult a qualified seismic engineer to verify seismic zone exposures and adequate site preparation.

For sites in areas of seismic activity, you might want to permanently fix the library position for added stability. The SL3000 library provides mounting holes in the floor of each module where half-inch carriage bolts (mounting studs) can be used to permanently fix the library's position.

Power Requirements

For power requirements, heat output, and power consumption, see "[Power Configurations](#)" on page 1-9.

Waste Disposal

Plan for the disposal of all packing material. Determine if waste bins or recycling containers will be provided on site or whether an independent company will handle the disposal at additional cost.

Fire Suppression Planning

The library does not ship with a fire suppression system, but each module has a 5 cm (2 inch) diameter nozzle opening (see [Figure 2-2](#)). Plates, 7 cm (2.75 inch) square and 1.2 mm (0.048 inch) thick, cover the openings and can be drilled to custom fit nozzles. Nozzles must be clear of robotic operations and cannot protrude more than 1.9 cm (0.75 inches) into the library. Professional Services can assist with fire suppression planning (contact your Oracle sales representative).

Networking

If possible, use a dedicated and secure private network for communication between the library and host management software. A secure private network connection using an Ethernet hub or switch is required for maximum throughput and minimum resource contention.

If a shared network must be used:

- Place the library on its own subnet.
- Directly connect the library to a switch and use a managed switch that can:
 - Set priorities on ports to give the host and library higher priority.
 - Provide dedicated bandwidth and create a VLAN between the host and the library.
- Use a virtual private network (VPN) to insulate host and library traffic.

Cable Routing

The SL3000 library has rear door cut-outs on both the top and bottom of the door to allow for cable routing. The cut-out is a 2.5 cm (1 inch) opening that runs 73 cm (29 inches) along the length of the door with cable routing hardware and reliefs available.

Note: The Base module and DEM have square holes on the face of rear door. These are for access to the PDUs, not for cable routing.

When routing cables, make sure to include locations for power, drive interface, library control, and Ethernet cables. As a best practice, route power cables through one cut-out and signal cables through another cut-out.

Figure 2-3 Door Cable Routing Cutouts

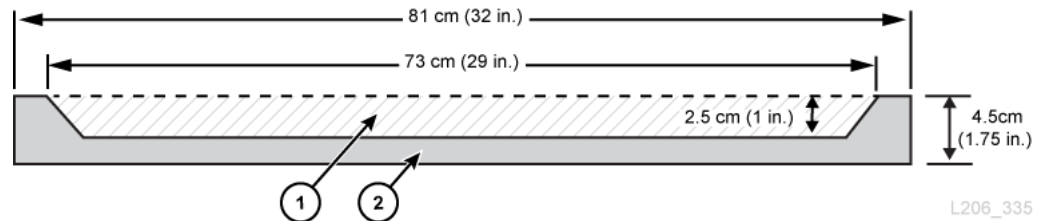


Figure Legend:

1. Cable routing area
2. Top/bottom view of rear door

AC Power Cables

SL3000 libraries require that you select one of the following single phase AC power options for the Base module and DEM:

- 110 VAC, 50/60 Hz, at 20 Amps (range: 100–127 VAC, 50–60 Hz, 16 Amps)
- 240 VAC, 50/60 Hz, at 30 Amps (range: 200–240 VAC, 50–60 Hz, 24 Amps)

Make sure to plan for the locations of power cables and list the locations for their associated circuit breakers. Cables must be ordered for the appropriate power configuration. Order one power cord per PDU installed:

- N+1 — one power cord for the Base module and an additional power cord for the DEM (if installed).
- 2N or 2N+1 — two power cords for the Base module and two additional power cords for the DEM (if installed).

Library Network and Tape Drive Cables

The library can be used in a 62.5-micron-cable Storage Area Network (SAN). However, the cable that connects the library to the network must be a 50-micron cable. The maximum distances supported on a Fibre Channel link are determined by the link speed, the type of fiber (50 or 62.5 micron), and the device to which the library is attached. Refer to your switch vendor to determine what is supported in your storage area network.

The typical support distances for the cables are:

- 4 Gbps = up to 70 m (230 ft) for 62.5-micron, 150 m (492 ft) for 50-micron
- 2 Gbps = up to 150 m (492 ft) for 62.5-micron, 300 m (984 ft) for 50-micron
- 1 Gbps = up to 175 m (574 ft) for 62.5-micron, 500 m (1640 ft) for 50-micron

If your library attaches to a host bus adapter (HBA), refer to the documentation for the HBA for the supported cable distances. For a list of cables, see ["Cables"](#) on page 1-30.

If your library will support encryption, refer to the *Oracle Key Manager Overview and Planning Guide* on OTN.

Approximate Installation Time

The table below shows the estimated times for the installation of modules and components. At least two qualified service representatives should install the library. The times listed below do not include library initialization, testing, audits, and feature upgrades. Installation services are required with the purchase of the SL3000 library. Contact an Oracle sales representative for more information.

Table 2–9 Installation Time Estimates

Module/Component	Time Estimate (hours)	Personnel Required	Total Person Hours
Base with 8 drives (standard)	3	2	6
Base and DEM	5	2	10
Base and CEM	4	2	8
Each additional CEM	2	2	4
Two PEMs	2	2	4
AEMs (each)	2	2	4
CAPs	1	2	2
Tape drive (each drive)	0.5	1	0.5
Operator panel or window	0.75	1	0.75
Firmware	0.2	1	0.2
Integration (cables, hubs, switches, connections)	8	1	8
Media install (each)	0.02	1	variable

Installation Tools

The tables below list the installation tools required for the SL3000 library. Oracle service personnel should obtain the standard tools locally or from the SL8500 installation kit if available.

Table 2–10 Standard Installation Tools

Standard Tools	Use
Torx screwdriver with T8, T10, T15, T25 bits	T8: Removal and replacement of the PUK card. T10: PUO, PUW, PUN, PUF, PUZ cards. Track stops. T15: Operator panel, window, blank plate, arrays T25: Shipping brace, rails, and CAP screws.
3/8-in. drive ratchet wrench ¹	Module height adjustment, joining modules
5/16-in. hex Allen on 3/8-in. drive ¹	Module height adjustment, joining modules
9/16-in. socket on 3/8-in.-drive ¹	Module removal from pallet
Adjustable wrench (must accept 7/8-in. nut)	Lock weight distribution pads
Phillips and flat blade screwdrivers	General assembly
Power drill (optional)	General assembly. Adjust the torque settings to 2.8 Nm (25 in.-lb) for T-25 screws and 0.6 Nm (5 in.-lb) for T-10 screws.
Wire side cutters	Cutting shipping straps
Multimeter	Electrical testing
Flashlight, step stool	General assembly
Pallet jack	Moving equipment

¹ Can be obtained from the SL8500 tool kit.

Table 2-11 Special Installation Tools

Special Tools	Part Number	Use
Copper rail connector extraction tool	313921001	Track terminator removal (obtain from Base installation kit)
Rail separator/joiner	4199410xx	Release or join extrusions (obtain from Base installation kit)
Serial cable for laptop	24100134	CLI access to library (obtain from iProcurement/Zones)
Crossover cable for laptop	24100163	Ethernet access to library (obtain from iProcurement/Zones)
Drive tray power-on tool	314831204	See " Drive Tray Power-on Tool " on page 2-11 below (obtain from iProcurement/Zones)

Drive Tray Power-on Tool

A tool is available to assist in removing a stuck tape within a library tape drive. This tool turns on a drive outside the library. The drive tray toolkit (part number 314831204) contains instructions and a drive power cable (part 419632401).

Note: An AC power cord is required to use this tool. You must obtain a cord that is appropriate for your region.

The tool is available from iProcurement under the Zones online tool crib.

Installation Kits

Installation kits are supplied with each module, and contain the hardware required to install each module. Kit part numbers are:

- 419838301 — Base module
- 419844301 — DEM and CEM

Installing StorageTek Library Console

Oracle's StorageTek Library Console (SLC) is a GUI application for configuring, monitoring, and managing the SL3000 tape library.

Note: Customer data on tape cartridges is never available to SLC or the library. The external data interface of the tape drives is separate from the library infrastructure.

- [Selecting an SLC Version](#)
- [Downloading the SLC Media Pack](#)
- [Installing Standalone SLC](#)
- [Installing Web-launched SLC](#)

Selecting an SLC Version

You can perform the procedures in this document using any of these three SLC versions, unless otherwise noted:

- **Standalone** — SLC runs remotely from any system that has a network connection to the library.
- **Web-launched** — SLC is installed on a web server (or server running a web service application like Tomcat, Apache, or GlassFish), allowing individual clients to use a browser to access SLC.
- **Local Operator Panel** — SLC is pre-installed on the library, enabling library operators to access most SLC functions directly at the library.

Downloading the SLC Media Pack

The media pack includes the web-launched SLC server, web-launched SLC client, and standalone SLC.

1. Go to the Oracle Software Delivery Cloud at:
<http://edelivery.oracle.com/>
2. Click **Sign In/Register**.
3. Search for **SLC**, and then select the Oracle StorageTek Library Console version. Click **Select Platform**.
4. Verify the correct version is listed in the queue. Click **Continue**.

5. Review and accept the terms and restrictions. Click **Continue**.
6. Verify the SLC version is correct. Click **Download**.
7. Save the file. Extract the media pack to the desired location.

Installing Standalone SLC

1. Uninstall all previous version of SLC before updating.
2. Download and extract the standalone SLC media pack (see "[Downloading the SLC Media Pack](#)" on page 3-1).
3. Select the SLC installer file for your operating system (refer to the media pack readme).
4. Review the information. Click **Next**.
5. Specify where to install SLC. Click **Next**.
6. Specify where to create the SLC shortcut icons. Click **Next**.

Note: On Solaris, you cannot choose the default root directory. Oracle recommends `/u-sr/bin` or a similar location.

7. Verify the information is correct. Click **Install**.
8. Click **Done**.

Supported Platforms

- Solaris 10 SPARC, Solaris 10 x86
- Windows Server 2008 SP2: 64-bit, Windows 2012 Enterprise Server
- Windows 7 SP1: 64-bit, Windows 8 64-bit, Windows 8.1 64-bit
- Oracle Unbreakable Linux 5 (2.6.18) 32-bit
- SUSE Enterprise Linux 10.2 (2.6.16) 32-bit

Security

SLC interfaces with the primary library interface (PLI) over SSL, which provides a secure communication path between the library and the SLC session. This prevents an unauthorized network user from monitoring library activity.

Installing Web-launched SLC

You only need to install web-launched SLC updates on the server. You can update the web-launched SLC server while it is running. After the updates are installed, they are downloaded automatically to all clients whenever the application is started.

1. Download and extract the web-launched SLC server (.war) file (see "[Downloading the SLC Media Pack](#)" on page 3-1).
2. Deploy the .war file on the server (refer to the web server documentation).

Minimum Browser Requirements

- Internet Explorer 8 (on Windows 7: 64 bit)
- Firefox 17.0.2 ESR (on Windows 7: 64 bit)

Security

The web-launched SLC software is digitally signed, which guarantees that it has been issued by Oracle and has not been altered or corrupted since it was created. As a Java Web Start process, the web-launched SLC includes the security features provided by the Java 2 platform.

Important: You are responsible for implementing all appropriate security systems, including firewalls and user access.

Logging in to SLC

Note: After an RE failover, log in using the IP address or DNS alias of the newly active library controller (previously the standby controller).

- [Logging in for the First Time After Library Installation](#)
- [Logging in to Standalone SLC](#)
- [Logging in to Web-launched SLC](#)
- [Logging in to the Local Operator Panel](#)
- [Changing a User Password](#)

Logging in for the First Time After Library Installation

1. With the **admin** user ID, log in to SLC with the first eight characters of the activation password provided by Oracle.
2. Change the **admin** password.
 - a. Select **Tools > User Mgmt.**
 - b. Complete the password fields.
 - c. Click **Modify.**

Logging in to Standalone SLC

Multiple users can be logged in to the standalone SLC.

1. To start SLC on your system, either:
 - Double-click the **SLC** desktop icon.
 - Select **Start > RunSLConsole** or **Launch > RunSLConsole.**
2. Enter your login information. Click **Log on.**

Logging in to Web-launched SLC

To log in using a browser, download Mozilla Firefox from <http://www.mozilla.com>. On Solaris platforms, you can also log in to the web-launched SLC using the command line.

1. Obtain the DNS alias or IP address of the SLC server.

2. Choose a login method:
 - **Command line** — Available on Solaris only. In the terminal window, enter:
`javaws http://server_ID:port_ID/opel/slc.jnlp`
 - **Browser** — Available on Windows or Solaris. In a browser on the client system, go to the SLC Web Start application:
`http://server_ID:port_ID/opel`where:
 - *server_ID* — Either the IP address or DNS alias of the SLC server
 - *port_ID* — Port ID of the SLC application, typically 8080
 - **opel** — The name (context root) of the web-launched SLC application on the server.
3. Click **Launch Now**.
4. Specify the action to take with the slc.jnlp file. Select either:
 - **Open with Java(TM) Web Start Launcher** to start SLC directly.
 - **Save to Disk** to save the slc.jnlp file to your client and log in to the SLC later.
5. If this is your first time running the web-launched SLC, complete the digital signature warning dialog box (verify the publisher and click **Run**).
6. Enter your SLC login information. Click **Log on**.

Logging in to the Local Operator Panel

Only one user at a time can log in to the local operator panel.

1. If the screen is blank, touch the screen anywhere to activate the login screen.
2. Enter your login information.
3. Click **Log on**.

Changing a User Password

Each site has a fixed set of user IDs: admin (customer administrator), service (Oracle support representative), and oem (third-party field service technician). Each user ID is assigned a set of permissions that determines access to utilities within SLC.

1. Log in to SLC using the account you want to modify.
2. Select **Tools > User Mgmt**.
3. Complete the password fields.
4. Click **Modify**.

Activating Optional Features

Hardware activation files enable optional library features, such as capacity upgrades and redundant electronics. You must install one hardware activation file for each feature.

- [Downloading a New Hardware Activation File](#)
- [Installing a New Hardware Activation File](#)
- [Displaying Current Hardware Activation Files](#)
- [Deleting a Hardware Activation File](#)
- [Installing Legacy Hardware Activation Files](#)

Downloading a New Hardware Activation File

Only use this procedure for libraries with firmware FRS_3.0 and above. For libraries with lower firmware levels, see "[Installing Legacy Hardware Activation Files](#)" on page 5-2.

1. Go to the Oracle Software Delivery Cloud at:
<http://edelivery.oracle.com/>
2. Click **Sign In /Register**.
3. Read the terms and restrictions. Indicate your acceptance, and then click **Continue**.
4. On the Media Pack Search screen, select **Oracle StorageTek Products** and **Generic Platform**. Click **Go**.
5. Select the SL3000 hardware activation file. Click **Continue**.
6. Click **Download**.
7. Save the file.
8. Extract the file to a location accessible to your SLC session.

Installing a New Hardware Activation File

1. In SLC, select **Tools > Hardware Activation**.
2. Click the **Install Hardware Activation Keys** tab.
3. Browse to the hardware activation file.
4. Review the hardware activation file details. Click **Install**.

5. Click **Yes**, and then **OK**.
6. Verify that the activation file was installed successfully (see "[Displaying Current Hardware Activation Files](#)" on page 5-2).

You may need to perform additional tasks to use the new feature (see "[Configuring Capacity](#)" on page 6-1 and "[Partitioning the Library](#)" on page 7-1).

Displaying Current Hardware Activation Files

Note: To display a feature audit log showing all hardware activation activity, use the Reports utility (see "[Viewing Library and Device Reports with the Reports Utility](#)" on page 15-1).

1. In SLC, select **Tools > Hardware Activation**.
2. Click the **Current Hardware Activation Keys** tab.

Deleting a Hardware Activation File

Deleting a hardware activation file is rarely necessary and can impact library operations. Having extra hardware activation files installed on a library does not cause problems (for example, capacity activation files that exceed the physical capacity of the library).

1. In SLC, click **Tools > Hardware Activation**.
2. Click the **Delete Hardware Activation Files** tab.
3. Select the activation file to delete.
4. Verify the correct activation file is selected, and then click **Delete**.
5. Click **Yes**.

Depending on the feature of the hardware activation file, you may need to perform additional tasks after deleting the file (see "[Deleting a Partition](#)" on page 7-2).

Installing Legacy Hardware Activation Files

For SL3000 libraries with firmware below FRS_3.0, contact Oracle support. All purchased features are enabled with a single hardware activation file installed by an Oracle support representative.

If you upgrade to firmware version FRS_3.0 and above, use the process described in "[Installing a New Hardware Activation File](#)" on page 5-1.

Configuring Capacity

Note: Capacity is automatically applied in a partitioned library. You can only configure capacity in a non-partitioned library.

In a non-partitioned library, active capacity is automatically assigned after installing the hardware activation file. The automatic configuration activates storage slots in the order specified by the Default Capacity Policy. However, you can customize the configuration and select which slots will be activated.

- [Creating a Custom Capacity Configuration](#)
- [Resetting the Capacity Configuration](#)
- [Setting the Default Capacity Policy](#)
- [Displaying the Current Capacity Configuration](#)
- [Resolving Orphaned Cartridges Caused by Capacity Changes](#)

See Also

- ["Updating Hosts After Modifying Capacity"](#) on page 8-1

Creating a Custom Capacity Configuration

You cannot use the local operator panel to configure capacity.

Note: You can click **Refresh** to discard uncommitted changes and restore the last saved configuration. You must apply the configuration to save it to the library controller.

1. To prevent conflicts, coordinate with other library users before configuring the library.
2. In SLC, select **Tools > Select Active Cells**. Select the **Module Map** tab.
3. Select a module and click the **Select Active Cells** tab. To display an adjacent module, click **Move Left** or **Move Right**.

Note: If you are customizing capacity for the first time, you must deselect all storage slots:






1. In the **Select by** drop-down list, choose **Library**. Then, select the **Remove** option.
 2. Click any "Selected" slot on the module map to make all slots "Inactive".
-
-

4. In the **Select by** drop-down list, select a range. Then, select **Add** (to enable the area for activation) or **Remove** (to deactivate the area).
5. Using the library map, click the storage slots you want to activate or deactivate.
6. When you have completed the configuration, click **Apply User Design**.

Caution: If there are warnings, DO NOT commit the changes. Click **Details >>**, and then perform recovery moves on the orphaned cartridges (see "[Moving Cartridges \(Recovery Moves\)](#)" on page 11-1).

7. Reconfigure library host applications to recognize the changes (see your host software documentation and "[Updating Hosts After Modifying Capacity](#)" on page 8-1).

Capacity Icons

SLC Icon	Description
	Not Accessible — slot not available for activation (reserved for diagnostic cartridges, physically blocked, and so on).
	Inactive — slot not yet licensed for use
	Active — slot licensed for use
	Selected — slot designated for activation or deactivation
	No activation needed — resource is active by default

Resetting the Capacity Configuration

Caution: Resetting the configuration removes all custom capacity activation, partitioning, media validation pools, and resets all SCSI element IDs in a SCSI library.

Resetting the capacity applies the default capacity as defined by the default capacity policy (see "[Setting the Default Capacity Policy](#)" on page 6-3).

1. To prevent conflicts, coordinate with other library users before configuring the library.
2. In SLC, select **Tools > Select Active Cells**. Select the **Module Map** tab.
3. Select any module in the library. Click the **Select Active Cells** tab.
4. Click **Reset to Default**.

5. Reconfigure library host applications to recognize the changes (see your host software documentation and ["Updating Hosts After Modifying Capacity"](#) on page 8-1).

Setting the Default Capacity Policy

Note: This setting only defines the assignment order for new capacity added in a non-partitioned library. After changing the policy setting, you can follow ["Resetting the Capacity Configuration"](#) on page 6-2 to remove the existing capacity and re-assign it following the new setting.

1. In SLC, select **Tools > Configuration**.
2. Click the **Default Capacity Policy** tab.
3. Select the type of capacity assignment for the library:
 - **Left to Right** (default) — capacity assignment begins in upper left slot on the rear wall of the left-most module, moves right, then crosses over to the upper left slot on the front wall of the left-most module (see [Figure E-6](#)).
 - **Center Out** — capacity assignment begins nearest to the drives and is split evenly between the left/right and front/back.
4. Click **Apply**.

Displaying the Current Capacity Configuration

1. In SLC, select **Tools > Select Active Cells**. Select the **Module Map** tab.
2. Select the module you want to display.
3. Select the **Current Active Cells** tab. Hover over a slot or drive to display detailed information.

Resolving Orphaned Cartridges Caused by Capacity Changes

In a non-partitioned library, an orphaned cartridge is located in an inactive storage slot and is inaccessible to all hosts. A cartridge can become orphaned when you reduce active storage capacity or manually move a cartridge to an inaccessible slot.

To resolve orphaned cartridges, you can:

- Generate a report of orphaned cartridges (see ["Viewing Active Capacity Reports"](#) on page 15-2)
- Audit the library (see ["Auditing the Library"](#) on page 13-1)
- Perform a recovery move on a cartridge (see ["Moving Cartridges \(Recovery Moves\)"](#) on page 11-1)

For partitioned libraries, see ["Resolving Orphaned Cartridges Caused by Partitioning Changes"](#) on page 7-5.

Partitioning the Library

Library partitioning reserves library resources (drives, slots, and CAPs) for the exclusive use of specified HLI and FC-SCSI hosts. Partitioning is an optional feature enabled in SLC.

- [Partitioning Guidelines to Maximize Library Performance](#)
- [Partitioning the Library Using SLC](#)
- [Viewing Current Partition Allocations](#)
- [Partitioning CAPs](#)
- [Resolving Orphaned Cartridges Caused by Partitioning Changes](#)

See Also

- ["Updating Hosts After Modifying Partitioning"](#) on page 8-2

Partitioning Guidelines to Maximize Library Performance

- Partition storage slots in the largest blocks possible. Cluster cartridges and drives together based on workload. Ensure that each partition has an adequate number of data cartridges, scratch cartridges, and tape drives to support peak workload.
- Avoid partitioning individual drives and storage cells. Individually select and deselect resources only when you need to fine-tune a partition that has already been broadly defined in larger blocks.
- Install enough CAPs to provide at least one CAP for each partition. This allows each partition to contain a dedicated CAP.
- For quicker enter and ejects, partition storage cells close to the CAPs. For quicker access to stored data, partition storage cells close to the drives.

Partitioning the Library Using SLC

Note: No partitioning changes occur until you apply the changes with the **Commit** tab. To discard uncommitted changes, click **Refresh**.

- [Adding a Partition ID](#)
- [Deleting a Partition](#)
- [Changing the Partition Interface Type](#)

- [Changing FC-SCSI Host Connection Information](#)
- [Allocating Resources to a Partition](#)
- [Committing Partitioning Changes](#)

Adding a Partition ID

1. Stop any host operations.
2. Select the **Tools > Partitions > Summary (Step 2)** tab.
3. In the Partition Allocation Summary area, click **Add Partition**.
4. Select the partition ID, enter a name, and then select an interface type. Partition IDs do not need to be consecutive.
5. Click **OK**.
6. Repeat steps 3-5 to add up to eight partitions. For FC-SCSI connections, see "[Adding a FC-SCSI Host Connection](#)" on page 7-2.
7. Proceed to "[Allocating Resources to a Partition](#)" on page 7-3.

Adding a FC-SCSI Host Connection

For FC-SCSI partitions, you must add a host connection (HLI host-partition connections are configured through the host library management software).

1. Select the **Tools > Partitions > Summary (Step 2)** tab.
2. In the Partition Allocation Summary area, select the partition.
3. Click **Add Connection**.
4. Enter the Initiator (WWPN) and LUN. Each initiator connected to the library must have one library partition assigned to LUN 0.
5. Click **OK**.
6. Repeat until you have added all required FC-SCSI connections. Each partition can have up to nine host connections, and each host can connect to multiple partitions.

Deleting a Partition

When you delete a partition, all resources allocated to the partition are marked available, all host connections for the partition are deleted, and the partition ID is deleted.

1. Move valid data cartridges out of the partition that will be deleted (see "[Moving Cartridges \(Recovery Moves\)](#)" on page 11-1).
2. Select the **Tools > Partitions > Summary (Step 2)** tab.
3. In the Partition Allocation Summary area, click the partition to remove.
4. Click **Delete Partition**.

Note: If you deleted all the partitions, you must select a library interface type (HLI or FC-SCSI).

5. Proceed to "[Committing Partitioning Changes](#)" on page 7-4.

Changing the Partition Interface Type

Caution: Changing the interface type can result in loss of active host connections or existing shared CAP assignments.

1. Select the **Tools > Partitions > Summary (Step 2)** tab.
2. In the Partition Allocation Summary area, select the partition to modify.
3. Click **Modify Partition**.
4. Proceed to "[Committing Partitioning Changes](#)" on page 7-4.

Changing FC-SCSI Host Connection Information

1. Select the **Tools > Partitions > Summary (Step 2)** tab.
2. In the Connections section, select the host-partition connection to modify.
3. Click **Modify a Connection**.
4. Proceed to "[Committing Partitioning Changes](#)" on page 7-4.

Allocating Resources to a Partition

1. Select the **Tools > Partitions > Module Map (Step 3a)** tab.
2. Select a module, and then click the **Design (Step 3b)** tab.
3. Select a partition ID from the drop-down list.
4. In the **Select by** drop-down list, select a range. Then, select **Add** or **Remove**.
5. Use the library map to select the resources to add or remove. Partitions can be non-contiguous.



Note: To re-assign a resource from one partition to another, you must remove the resource from the initial partition before re-allocating it.




6. Repeat for each partition ID. When you complete the partition design, click **Verify**.

Caution: If there are warnings, click **Details >>** and perform recovery moves on the orphaned cartridges (see "[Moving Cartridges \(Recovery Moves\)](#)" on page 11-1). Then re-verify the design.

7. If there are no warnings, proceed to see "[Committing Partitioning Changes](#)" on page 7-4.

Partitioning Icons

SLC Icon	Description
 (rectangle with X)	Not Accessible — resources not available for host operations (reserved system slot, physically blocked, and so on).
 (white rectangle)	Unallocated — resource available for assignment

SLC Icon	Description
 (yellow rectangle)	Partition # — resources assigned to the current partition
 (red rectangle)	Other Partitions — resources assigned to another partition
 (gray rectangle)	Shared CAP — a CAP assigned to multiple partitions

Committing Partitioning Changes

You must complete these procedures to make changes to the library.

Note: To prevent configuration conflicts, you should make the library unavailable to other users and stop all host operations before committing partitioning changes.

1. Take the library offline to the host (see your host software documentation).
2. Click the **Commit (Step 4)** tab of the Partitions interface.
3. Click **Apply**.

Note: If the **Apply** button is grayed out, the library capacity is over-subscribed. Remove storage slots from a partition or purchase more capacity.

Caution: If there are warnings, click **Details >>** and perform recovery moves on the orphaned cartridges (see "[Moving Cartridges \(Recovery Moves\)](#)" on page 11-1).

4. Configure all affected library host applications (see the host software documentation and "[Updating Hosts After Modifying Partitioning](#)" on page 8-2).

Viewing Current Partition Allocations

See also "[Viewing Partitioning Reports](#)" on page 15-2.

1. Select the **Tools > Partitions > Module Map (Step 3a)** tab.
2. Click a module to display.
3. Click the **Current Partition Definitions** tab. Hover over a resource to display detailed information.

Partitioning CAPs

Note: AEM CAPs are subject to the same partitioning rules and restrictions as rotational CAPs. The term CAP refers to both types of CAPs, unless otherwise specified.

Each partition can have either dedicated CAPs or shared CAPs, but not both. Only partitions with the same host interface type (FC-SCSI or HLI) can share a CAP. Only one partition at a time can use a shared CAP.

For information about CAP states in a partitioned library, see ["CAP States"](#) on page 10-5.

Reserving a CAP in HLI Partitions

An HLI host can reserve a CAP if the CAP is empty, closed, locked, and not already reserved. Each HLI host reserves a CAP for exclusive use as needed, then releases the CAP when it is no longer required.

If the host does not release the CAP reservation and you cannot terminate the enter or eject operation in ACSLS or ELS, you can override the host partition reservation (see ["Overriding a Partition CAP Reservation"](#) on page 10-4).

Associating a CAP to an FC-SCSI Partition

Most FC-SCSI hosts typically assume sole ownership of a CAP. Therefore, when using a shared CAP to enter or eject cartridges, you must manually associate a CAP to the partition (see ["Assigning Ownership of a Shared CAP to an FC-SCSI Partition"](#) on page 10-5).

Resolving Orphaned Cartridges Caused by Partitioning Changes

In partitioned libraries, an orphaned cartridge is located in a slot not allocated to the original host. Orphaned cartridges can occur when you change the size of a partition, delete a partition, or move a cartridge to a slot or drive that is not allocated to a partition.

In a partitioned library, orphaned cartridges can cause data loss. A host that finds an orphaned cartridge in its partition may treat the cartridge as a scratch volume and overwrite the data.

To resolve orphaned cartridges, you can:

- Generate a report of orphaned cartridges (see ["Viewing Partitioning Reports"](#) on page 15-2)
- Audit the library (see ["Auditing the Library"](#) on page 13-1)
- Perform a recovery move on a cartridge (see ["Moving Cartridges \(Recovery Moves\)"](#) on page 11-1)

For non-partitioned libraries, see ["Resolving Orphaned Cartridges Caused by Capacity Changes"](#) on page 6-3.

Configuring Host Applications

- [Changing the Host Interface Type of a Non-Partitioned Library](#)
- [Updating Hosts After Modifying Capacity](#)
- [Updating Hosts After Modifying Partitioning](#)
- [Updating Hosts After Modifying the MV Pool](#)
- [Updating HLI Host Management Software for RE](#)
- [Configuring Dual TCP/IP](#)

See Also

- ["Enabling HLI Host Managed Drive Cleaning" on page 9-2](#)
- ["Configuring the Barcode Format for FC-SCSI Hosts" on page 11-4](#)

Changing the Host Interface Type of a Non-Partitioned Library

Note: For a partitioned library, see ["Changing the Partition Interface Type"](#) on page 7-3.

1. Select **Tools > Select Active Cells**.
2. Click the **Select Active Cells** tab.
3. Select the interface type.
4. Click **Apply**, and then **Yes** to update the library controller database.

The new interface type is active immediately. You do not need to start the library.

Updating Hosts After Modifying Capacity

- [Updating ACSLS and ELS After Modifying Capacity](#)
- [Updating SCSI Hosts After Modifying Capacity](#)
- See also: ["Configuring Capacity" on page 6-1](#) to modify capacity

Updating ACSLS and ELS After Modifying Capacity

Initiate an audit through ACSLS and ELS to update the host database (see the host software documentation).

Effect on HLI Hosts After Modifying Capacity

After modifying the capacity configuration, the library controller sends an asynchronous message to all hosts notifying them that the library configuration has changed.

After adding active storage slots, the library stays online. Host jobs and connectivity are not affected.

After deactivating a storage slot or removing an empty drive slot, the library goes offline temporarily. The library comes back online after updating the library controller database.

Updating SCSI Hosts After Modifying Capacity

Issue commands to update the host configuration information (see the host software documentation).

Effect on FC-SCSI Hosts After Modifying Capacity

After activating or deactivating resources or modifying a host LUN connection, the library goes offline temporarily with a "Unit Attention" condition.

After activating or deactivating drives, the library updates the SCSI element numbering (see ["Default SCSI Storage Element \(Cartridges\) Numbering Scheme"](#) on page E-11).

Updating Hosts After Modifying Partitioning

- [Updating ACSLS or ELS After Modifying Partitioning](#)
- [Updating SCSI Hosts After Modifying Partitioning](#)
- See also: ["Partitioning the Library"](#) on page 7-1 to modify partitioning

Updating ACSLS or ELS After Modifying Partitioning

- After creating an HLI partition, configure the host connection through ACSLS or ELS (see the host software documentation). An HLI partition can have up to 16 assigned hosts.
- After modifying the partitioning configuration, initiate an audit through ACSLS and ELS to update the host database.

Effect on Hosts of Modifying an HLI Partition

For HLI hosts, the partition remains online when you allocate resources to the partition. However, the partition will go offline temporarily when you remove resources from the partition. The affected partition automatically comes back online and the library notifies all hosts connected to the partition of the configuration change. Neighboring partitions are not disturbed.

After allocating or removing resources, hosts experience a brief interruption as library configuration information is updated. The host automatically continues to process jobs.

Updating SCSI Hosts After Modifying Partitioning

- After creating an FC-SCSI partition, configure the host-partition connection in SLC (see ["Changing FC-SCSI Host Connection Information"](#) on page 7-3).

An FC-SCSI partition can have more than one host-partition connection. The connection information consists of the world wide port name of the FC-SCSI host bus adapter and the logical unit number (LUN) of the host.

- After modifying the partitioning configuration, issue commands to update the host configuration information (see the host software documentation).

Effect on Hosts of Modifying an FC-SCSI Partition

After adding or deleting a host-partition connection or changing the LUN, the affected partition goes offline with a "LUNS Data Has Changed Unit Attention" condition. If a host has unique ITL nexus connection mappings for each partition connection, then only the partition experiencing the connection change is affected.

After allocating or removing a resource, the affected partition goes offline with a condition of "Mode Parameters Have Changed Unit Attention". Neighboring partitions are not disturbed.

Updating Hosts After Modifying the MV Pool

- [Updating ACSLS and ELS After Modifying the MV Pool](#)
- [Updating SCSI Hosts After Modifying the MV Pool](#)
- See also: "[Defining the Media Validation Pool](#)" on page 12-1 modify the MV pool

Updating ACSLS and ELS After Modifying the MV Pool

- For ACSLS, you must initiate reconfiguration after modifying the MV pool. Use the `config drives <panel_id>` utility. For more information, see the *ACSLs Administrator's Guide*.
- For ELS, no action is required after modifying the MV pool. ELS hosts automatically reconfigure. However, the reconfiguration can cause a disruption in mount/dismount requests when trying to set a lock on control data sets (see the host management documentation).

Effect on HLI Hosts of Modifying the MV Pool

After adding drives to the MV pool, the library (or affected partition) will go offline. The affected hosts receive "Configuration Changed", "LSM Ready", and then "Not Ready" messages from the library. ELS automatically removes drives moved to the MV pool from its configuration. ACSLS automatically updates drives moved to the MV pool to an offline state, but ACSLS requires you to initiate reconfiguration.

After removing drives from the MV pool, the library and partitions remain online. For a non-partitioned library, the drive slots are available to hosts immediately. ELS hosts begin reconfiguration, but ACSLS hosts require you to initiate reconfiguration. For a partitioned library, you must allocate the drive slot removed from the MV pool to a partition (see "[Partitioning the Library](#)" on page 7-1).

Updating SCSI Hosts After Modifying the MV Pool

Initiate a reconfiguration to update the host configuration information (see the host software documentation).

Effect on SCSI Hosts of Modifying the MV Pool

After adding drives to the MV pool, the library (or affected partition) will go offline. The library renumbers element IDs and sends two Unit Attention: "Not Ready to Ready Transition" and "Mode Parameters Changed". You should initiate a reconfiguration of the host.

When removing drives from the MV pool, the library and partitions remain online. The library logically assigns the drive the last element ID regardless of the drive's physical location. When the library comes back online, SCSI hosts receive two Unit Attention: "Not Ready to Ready Transition" and "Mode Parameters Changed". You should initiate a reconfiguration. For a partitioned library, you must allocate the drive slot removed from the MV pool to a partition (see "[Partitioning the Library](#)" on page 7-1).

Effect on SCSI Element IDs of Modifying the MV Pool

Modifying the MV pool can renumber the SCSI element IDs. If renumbering occurs, you may need to reconfigure the host.

When you add a drive to the MV pool, the library automatically re-assigns element IDs to all drives. The drive slot of the MV drive is treated as "empty" and the library does not assign it an element ID (see "[Default SCSI Storage Element \(Cartridges\) Numbering Scheme](#)" on page E-11).

When you remove a drive from the MV pool, the library logically assigns it the last element ID regardless of the drive's physical location.

To avoid renumbering, select the drive that is both physically and logically the last element ID (verify the drive is a T10000C or D).

Updating HLI Host Management Software for RE

For more information about RE, see "[Redundant Electronics Overview](#)" on page B-1.

ACSLs

ACSLs 7.3 or higher is required for RE and you may need to add port connections to the libraries. There are two methods:

- Stop ACSLS. Run `acsss_config`, specifying the existing ACSs and port connections (with the ACSs in the same sequence) and add the new port connections. Start ACSLS.
- Run the `config_ports` utility while ACSLS is running, specifying the existing ports in the same sequence and adding new ports at the end. You cannot change or delete port connections with `config_ports`.

ELS

Oracle highly recommends PTFs L1H15S0(VM)/L1H15S1(MVS) for 6.2 and L1H15S2 for 7.0.

Table 8–1 HSC/ELS PTF HLI Compatibility Level Support for FRS_4.00 and above

HSC/ELS Level	Level 20 or Below	Level 21	Level 22	Level 23 Minimum RE Support ¹	Level 23 Enhanced RE Support ²	Level 23 Multi-RE Support ³
6.1	Level 21 PTF	L1H14UU (VM) L1H14UV (MVS)	Unsupported	Unsupported	Unsupported	Unsupported
6.2	Level 21 PTF	L1HA4UW (VM) L1H14UX (MVS)	L1H15DH (VM) L1H15DI (MVS)	L1H15H9 (VM) L1H15HA (MVS)	L1H15MF (VM) L1H15ME (MVS)	L1H168F (VM) L1H168G (MVS)
7.0 (MVS)	Level 21 PTF	L1H14UY	L1H15DJ	L1H15HB	L1H15MH	L1H168H
7.1 (MVS)	Included	Included	Included	Included	Included	L1H168I

¹ Can connect to one SL3000 RE library in an ACS string. Only the connected library can be switched through HSC switch command.

² Can connect to one SL3000 RE library in an ACS string. All RE libraries can be switched through the HSC switch command. Supports 32 TCP/IP connections. Includes dual TCP/IP support, display of acs-id, auto CAP recovery, and support for 64 read in-transit cartridges during cartridge recovery.

³ Can connect to multiple SL3000 RE libraries in an ACS string. Includes same functionality as the enhanced RE support.

Configuring Dual TCP/IP

Note: Before configuring dual TCP/IP, gather information regarding the network, routing, and IP addresses from the administrator or use the appropriate `network ip` command.

- [Configuring the Library for Dual TCP/IP](#)
- [Configuring an ACSLS Host for Dual TCP/IP](#)
- [Configure an ELS Host for Dual TCP/IP](#)
- See also: "[Dual TCP/IP Overview](#)" on page C-1

Configuring the Library for Dual TCP/IP

Use the `route` command to manage the routing tables. Define routes for the 2A and 2B ports to the hosts.

1. Using the CLI, take both ports offline:

```
SL3000> network ip link set dev 2A down
SL3000> network ip link set dev 2B down
```

2. Add the new IP addresses and subnet masks for both ports:

```
SL3000> network ip address add IP_address/netmask dev 2A
SL3000> network ip address add IP_address/netmask dev 2B
```

3. To make the change active, bring both ports online:

```
SL3000> network ip link set dev 2A up
SL3000> network ip link set dev 2B up
```

4. Enter the network routing configuration for each port:

- For multiple hosts, add the IP address and netmask for each host:

```
SL3000> network ip route add IP_address/netmask dev 2A
SL3000> network ip route add IP_address/netmask dev 2B
```

- For a single host, no netmask value is required:

```
SL3000> network ip policy route add host_IP_address dev 2A
SL3000> network ip policy route add host_IP_address via gateway_IP_address
dev 2A
SL3000> network ip policy enable 2A |2B
SL3000> network ip policy status
```

5. Verify the configuration.

```
SL3000> network ip address show
SL3000> network ip route show
SL3000> network ip policy route show dev 2A |2B
```

6. Check the date and time for accuracy.

```
SL3000> time
time print
time HH: MM
time HH:MM:SS
```

7. Test the configuration to ensure you can access the library through both ports.

Configuring an ACSLS Host for Dual TCP/IP

For the ACSLS server, you should use the `acsss_config` command or the Dynamic Configuration `config` utility to configure two network interfaces on two separate subnets. Use the `route` command to define the two routes on the ACSLS server. A second physical connection improves reliability.

1. Update the routing tables of the ACSLS server by following the ACSLS documentation. If there is a single network interface on the ACSLS server, no special routing is required on the host.
2. Using the UNIX command prompt at the ACSLS server, use the Dynamic Config command to add a port connection to the SL3000.
 - a. Ensure the ACS is in online or diagnostic mode to ACSLS.
 - b. Use `config port acs_id` to add a port.
 - c. If not already online, bring the ACS online to ACSLS.
3. To remove or replace an existing IP address with a different port:
 - a. Shut down ACSLS by issuing `kill.acsss` (for 7.3 and below) or `acsss disable` (for 8.0 and above).
 - b. Configure the new ports by issuing `acsss_config`.
 - c. Bring ACSLS back online by issuing `rc.acsss` (for 7.3 and below) or `acsss enable` (for 8.0 and above)

For more information, see the *ACSLs Administrator's Guide*.

Configure an ELS Host for Dual TCP/IP

1. Update the routing tables of the IBM mainframe by following the ELS documentation. If there is a single network interface on the IBM mainframe, no special routing is required on the host.
2. At the IBM mainframe console or PARMLIB, use the `LMUPATH` control statement to define network LMU attachments.

3. Specify a second `LMUADDR` parameter to define the dual TCP/IPs. ELS automatically determines whether the connection is dual TCP/IP or dual LMU.
4. Take the ACS offline, issue the `LMUPDEF` command, and bring the ACS back online to pick up the revised `LMUPATH` statement that includes the second connection.

For more information, see the ELS documentation.

Configuring Drives

- [Enabling Drive Auto Cleaning](#)
- [Enabling HLI Host Managed Drive Cleaning](#)
- [Enabling/Disabling the SCSI FastLoad Feature](#)
- [Adding or Modifying the Drive Tray Serial Numbers](#)
- [Using the Dynamic World Wide Name \(WWN\) Feature](#)
- [Drive Tray Indicators](#)

See Also

- ["Defining Cleaning Cartridge Usage Count Warning Thresholds"](#) on page 11-4
- ["Viewing Device Status and Properties"](#) on page 14-2
- ["Viewing Library and Device Reports with the Reports Utility"](#) on page 15-1

Enabling Drive Auto Cleaning

Tape drives require periodic cleaning with a cleaning cartridge to prevent read/write errors. Drive cleaning can be managed by the library (known as auto cleaning) or managed by HLI hosts.

Note: Library auto clean is enabled by default. If you disable library auto cleaning, the host management software must manage drive cleaning (see ["Enabling HLI Host Managed Drive Cleaning"](#) on page 9-2).

1. Select **Tools > Configuration**.
2. Select **Enable Auto Clean**, and then click **Apply**.

Note: If the library is partitioned, you can enable or disable library auto clean for each partition.

3. Verify there are enough compatible cleaning cartridges in the library (see ["Viewing Cleaning Cartridge Status"](#) on page 11-5).

If necessary, enter or eject cleaning cartridges (see ["Importing/Exporting Diagnostic and Cleaning Cartridges"](#) on page 11-3).

4. Set the cleaning cartridge threshold (see "[Defining Cleaning Cartridge Usage Count Warning Thresholds](#)" on page 11-4).

Enabling HLI Host Managed Drive Cleaning

Tape drives require periodic cleaning with cleaning cartridges to prevent read/write errors. Drive cleaning can be managed by either HLI hosts or the library (see "[Enabling Drive Auto Cleaning](#)" on page 9-1).

1. In SLC, select **Tools > Configuration**.
2. Deselect Enable Auto Clean, and then click **Apply**.

Note: If the library is partitioned, you can enable or disable library auto clean for each partition.

3. Enable drive cleaning on the host (see the host software documentation).
4. Import cleaning cartridges using the host software. DO NOT use the SLC import/export feature.

Enabling/Disabling the SCSI FastLoad Feature

Enabling SCSI FastLoad can improve the speed of mount and dismount operations for an FC-SCSI library or partition.

Note: If you enable SCSI FastLoad and a cartridge fails to mount the drive, the FC-SCSI host must move the cartridge from the drive back to the source location.

The SCSI FastLoad feature requires minimum SL3000 firmware FRS_2.33 and SLC 4.47.

You can enable or disable SCSI FastLoad separately for each FC-SCSI partition.

1. Select **Tools > Configuration**.
2. For each partition, set the Enable FastLoad Feature option:
 - **Select** to turn SCSI FastLoad on.
 - **Unselect** to turn SCSI FastLoad off (default).
3. Click **Apply**, and then click **OK**.

How SCSI FastLoad Improves Speed

After a robot mounts a cartridge to a drive, the robot is immediately available for the next request and does not wait until the drive reports that the cartridge was loaded. The library controller waits to return the mount request response until it detects that the tape drive has successfully loaded the cartridge.

Adding or Modifying the Drive Tray Serial Numbers

1. Select **Tools > Configuration**.
2. Click the **Drive Tray S/N** tab.

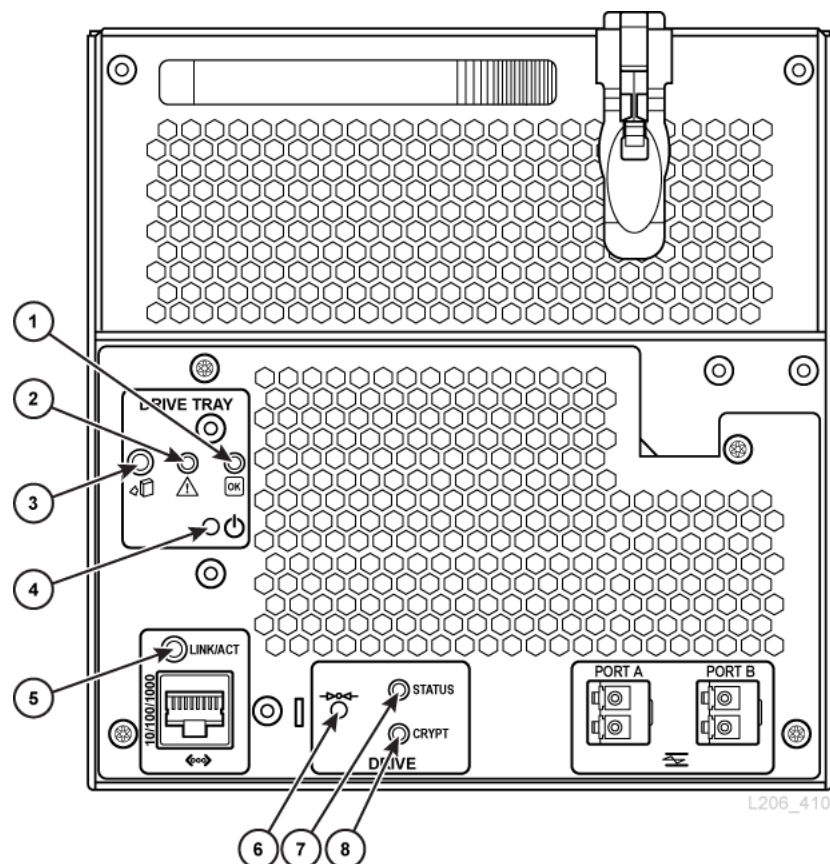
3. Click **Refresh** to display current configuration data.
4. To edit an individual drive tray serial number:
 - a. Double-click the Drive Tray S/N field.
 - b. Enter the drive tray serial number. Proceed to step 6.
5. To edit multiple drive tray serial numbers at once, you can edit a comma-separated value (csv) file:
 - a. Click **Export**, and then save the file to a desired location.
 - b. Open the file and edit only the drive tray serial numbers. Do not alter any other values. Save the changes.
 - c. In SLC, click **Import**. Locate the updated .csv file, and then click **Open**.
6. Click **Apply**.

Using the Dynamic World Wide Name (WWN) Feature

The dynamic World Wide Name (dWWN) feature assigns world wide names to drive slots rather than the drives themselves. This allows you to swap or replace drives without bringing down the entire operating system. Additionally, the WWN remains the same even when you partition the library.

Drive Tray Indicators

Figure 9-1 Rear View of the SL3000 LTO Drive Tray



1. Power to drive (solid green). Power to tray only (blinking green).
2. Maintenance mode (yellow)
3. Okay to remove drive (blue)
4. Power to tray on/off (push button)
5. Ethernet link (green). For HP LTO5/6 drives, this port is for encryption. For IBM drives, this port is the maintenance port.
6. Encryption reset to default IP address (push button)
7. Drive status
8. Encryption link (green)

Operating a CAP

Use cartridge access ports (CAPs) to enter or eject cartridges from the library.

Note: There are two CAP types: rotational CAPs and AEMs. The term CAP refers to both types, unless otherwise noted.

- [Guidelines for Using CAPs](#)
- [Entering Cartridges Using a CAP](#)
- [Ejecting Cartridges Using a CAP](#)
- [Locking and Unlocking an HLI CAP](#)
- [Overriding a Partition CAP Reservation](#)
- [Changing the CAP Assignment Mode in a Non-Partitioned FC-SCSI Library](#)
- [Assigning Ownership of a Shared CAP to an FC-SCSI Partition](#)
- [CAP States](#)
- [CAP Modes](#)
- [CAP Usage Order when Ejecting Cartridges with FC-SCSI Hosts](#)

See Also

- ["Partitioning CAPs" on page 7-4](#)

Guidelines for Using CAPs

- Insert cartridges with the correct orientation (hub gear facing down and label facing you). You can skip slots in the CAP when loading cartridges.
- Verify all cartridges are properly labeled before placing them into a CAP. Do not enter unlabeled cartridges
- To enter cartridges more efficiently, load the CAP magazines prior to issuing the enter command.
- If only one CAP is required to do the job, do not use multiple CAPs. Opening multiple CAPs will increase the audit time.

Entering Cartridges Using a CAP

If entering cartridges through a shared CAP of an FC-SCSI partition, see "[Assigning Ownership of a Shared CAP to an FC-SCSI Partition](#)" on page 10-5.

CAP magazines are removable. You can place cartridges in any magazine slot and in any order. After entering cartridges through the CAP, the library moves the cartridge from the CAP to a storage slot, records the cartridge's location, and sends the location to the host. When the CAP is empty, the library returns the CAP to its default state.

Caution: To avoid equipment damage, do not force the CAP to open or close. Do not enter unlabeled cartridges or place cartridges upside-down.

Entering Cartridges Using Rotational CAPs

1. If the CAP is in auto enter mode (see "[CAP Modes](#)" on page 10-6), proceed to the next step. If it is in manual mode, initiate the enter operation at the host (see the tape management software documentation).
2. Press the **CAP** button.
The button light turns ON and the door opens.
3. Place the cartridges in the CAP with the hub gear face down and barcode toward you.
4. Press the **CAP** button.

The CAP closes and locks automatically, and the CAP button light turns OFF.

Entering Cartridges Using AEMs

1. If the CAP is in auto enter mode (see "[CAP Modes](#)" on page 10-6), proceed to the next step. If it is in manual mode, initiate the enter operation at the host (see tape management software documentation).
2. Once the "Unlocked" indicator lights, push the **AEM CAP** button.
The "Wait" indicator blinks until the safety door is completely down. Depending on the level of activity in the library, this may take several minutes.
3. When the "Enter" indicator light is solid, lift the latch and open the door. Place the cartridges in the CAP with the hub gear face down and barcode toward you.
4. Close and latch the AEM access door.
5. Push the **AEM CAP** button.

The "Enter" light turns off and the "Wait" light starts blinking. The safety door moves up.

Ejecting Cartridges Using a CAP

If ejecting cartridges through a shared CAP of an FC-SCSI partition, see "[Assigning Ownership of a Shared CAP to an FC-SCSI Partition](#)" on page 10-5.

Once the library ejects all cartridges, the robot audits the CAP to verify it is empty (the robot does not read cartridge labels during export operations). Then, the library erases the location of the cartridge from the library controller database and the host database. The CAP returns to its default state.

Caution: To prevent equipment damage, do not force the CAP to open or close.

Ejecting Cartridges Using Rotational CAPs

1. Initiate the eject operation at the host. Specify the vol-ids of the cartridges to eject (see the tape management software documentation).

Note: For HLI hosts, you can select a CAP for the eject operation. For FC-SCSI hosts, the library uses CAPs in a pre-defined order (see "[CAP Usage Order when Ejecting Cartridges with FC-SCSI Hosts](#)" on page 10-6).

2. Press the **CAP** button. The CAP door opens, and the CAP button light turns ON.
3. Remove the cartridges from the CAP.

Caution: To prevent data loss, do not leave expired cleaning cartridges in the CAP. The library will treat expired cleaning cartridges as new.

4. Push the **CAP** button to close the CAP.
The CAP closes and locks, and the CAP button light turns OFF.
5. The robot continues filling the CAP until all selected cartridges are ejected. Wait until the CAP door is unlocked, and then repeat step 2 through step 4.

Ejecting Cartridges Using AEMs

1. Initiate the eject operation at the host. Specify the vol-ids of the cartridges to eject (see the tape management software documentation).
2. Push the **AEM CAP** button.
The "Wait" indicator blinks until the safety door is in place, and then the "Enter" light is solid. Depending on the level of activity in the library, this process may take several minutes.
3. Lift the latch and open the door. Remove the cartridges from the AEM CAP. Close and latch the AEM access door.
4. Push the **AEM CAP** button. The "Enter" light turns off and the "Wait" light begins blinking. The safety door moves up. If more cartridges need to be exported, the robot continues filling the necessary AEMs.
5. The robot continues filling the AEM until all selected cartridges are ejected. Wait until the door is unlocked, and then repeat step 2 through step 4.

Locking and Unlocking an HLI CAP

An unlocked CAP is reserved by the library and unavailable to all hosts until it is locked. Always attempt to unlock the CAP or AEM access door using the host software before using SLC.

Note: If the CAP is reserved by a host, the host must release the CAP reservation before you can unlock the CAP.

1. In SLC, select **Tools > Diagnostics**.
2. Expand the **CAP** folder in the device tree, and then select the CAP to modify (the left AEM CAP is column -31 and the right is column 31).
3. Click the **Access** tab.
4. In the Locked drop-down list select:
 - **True** to lock
 - **False** to unlock
5. Click **Apply**.

Overriding a Partition CAP Reservation

If a CAP reservation is not released by a partition and cannot be terminated on the ACSLS or HSC host, use this procedure to override the CAP reservation.

Note: You must follow all steps in this procedure or the CAP could be left unavailable to all partitions.

1. In SLC, select **Tools > Shared CAP Assignment**.
2. Expand the **CAP** folder, and then select the CAP to override (the left AEM CAP is column -31 and the right is column 31).
3. Click the **Unreserve** tab.
4. Click **Apply** to override the reservation.
5. Click **OK** to continue with the override operation.
6. If the CAP is locked, unlock it using SLC (see "[Locking and Unlocking an HLI CAP](#)" on page 10-3).
7. Open the CAP. Remove any cartridges and label them with the partition ID.
8. Close the CAP. The CAP status changes to "unreserved".
9. Determine if the cartridges from the CAP should be re-entered into the library and then enter the cartridges into the correct partition.

Changing the CAP Assignment Mode in a Non-Partitioned FC-SCSI Library

Changing the CAP assignment mode changes the mode for all CAPs in the library. The CAP assignment mode controls whether library CAPs can be used for normal host operations or for diagnostic moves.

1. Verify that all library CAPs are unreserved, empty, closed, and locked.
2. If you are changing the CAPs to diagnostics mode, stop all host operations (see the tape management software documentation).
3. Select **Tools > CAP Assignment**.

4. Using the Mode drop-down list, select either:
 - **Host Operations** — causes all CAPs to be available for normal host operations. Select this to return the library to normal tape mount or dismount operations.
 - **Diagnostics** — causes all CAPs to be available for diagnostic operations. Select this to perform manual cartridge moves, such as moving cleaning or diagnostic cartridges from the CAPs to system slots.
5. Click **Apply**.

Assigning Ownership of a Shared CAP to an FC-SCSI Partition

You must assign a shared CAP to an FC-SCSI partition to enter or eject cartridges.

- You can associate only one partition at a time to a shared CAP.
- If there are multiple shared CAPs, all of them become associated.
- A CAP association remains active until you remove it, the library restarts, the CAP is reallocated, or the CAP initializes.

Note: If you remove the CAP association while the CAP is open or contains cartridges, the library controller assumes ownership of the CAP and the CAP becomes unavailable to all partitions. Empty and close the CAP before re-associating it.

1. In SLC, select **Tools > Shared CAP Assignment**.
2. Select the partition.
3. Click **Apply**.
4. Perform the enter or eject operation (see "[Entering Cartridges Using a CAP](#)" on page 10-2 and "[Ejecting Cartridges Using a CAP](#)" on page 10-2).
5. Once the enter/eject completes, remove the CAP association by deselecting the partition.
6. Click **Apply**.

CAP States

Table 10-1 CAP States in Non-partitioned Library

Type of CAP	Default State	CAP Indicator
HLI in Manual mode	Locked	Off
HLI in Auto Enter mode	Unlocked	On
FC-SCSI	Unlocked	On

Table 10–2 Default States of FC-SCSI CAPs in Partitioned Library

Type of CAP	Default State	CAP Indicator	Comment
Dedicated	Unlocked	On	None
Shared	Locked	Off	Partition-CAP association unlocks the CAP and turns the light on.

Table 10–3 Default States of HLI CAPs in Partitioned Library

Type of CAP	Default State	CAP Indicator	Comment
Dedicated or shared	Locked	Off	Host reservation unlocks the CAP and turns the light on.
Auto enter mode	Unlocked	On	None

CAP Modes

Auto Enter Mode

Only HLI libraries support CAP auto enter mode (see the tape management software documentation).

CAP auto enter mode enables a library operator to open a CAP and initiate an enter operation without issuing an explicit enter request. CAPs in auto enter mode are left unlocked and do not require a host reservation. In a partitioned library, CAPs must be dedicated to use auto enter mode.

Manual Mode

Manual mode is the most secure CAP mode. When in manual mode, the system locks a CAP by default. To initiate an enter or eject operation using manual mode, enter an explicit enter or eject request before pressing the **CAP Open** button.

Assignment Mode

Only non-partitioned FC-SCSI host connections support assignment mode. The CAP assignment mode controls whether CAPs can be used for normal host operations or for diagnostic operations (see ["Changing the CAP Assignment Mode in a Non-Partitioned FC-SCSI Library"](#) on page 10-4).

CAP Usage Order when Ejecting Cartridges with FC-SCSI Hosts

In a non-partitioned library, the SCSI interface treats all CAPs as one. When you initiate an eject operation from an FC-SCSI host, the robot loads cartridges into the left-most rotational CAP, then moves right, and then moves to AEMs. For partitioned libraries, the CAP priority depends on how CAPs are allocated to partitions.

For the following example, assume an FC-SCSI library with a base module, two CEMs (one on each side of the base), and two AEMs (one on each end of the library). For an eject operation of 350 cartridges, the robots fills CAP slots in the following order:

Order	Module	Number of Cartridges Ejected	Total Cartridges Ejected
1st	Left CEM	26	26
2nd	Base Module	26	52

Order	Module	Number of Cartridges Ejected	Total Cartridges Ejected
3rd	Right CEM	26	78
4th	Left AEM	234	312
5th	Right AEM	38	350

Managing Cartridges

- [Moving Cartridges \(Recovery Moves\)](#)
- [Locating a Cartridge](#)
- [Importing/Exporting Diagnostic and Cleaning Cartridges](#)
- [Defining Cleaning Cartridge Usage Count Warning Thresholds](#)
- [Configuring the Barcode Format for FC-SCSI Hosts](#)
- [Viewing Cartridge Information](#)
- [Viewing Cleaning Cartridge Status](#)
- [Using Reserved System Slots](#)
- [Cartridge Types](#)
- [Cartridge Handling](#)

See Also

- ["Entering Cartridges Using a CAP"](#) on page 10-2
- ["Ejecting Cartridges Using a CAP"](#) on page 10-2
- ["Resolving Orphaned Cartridges Caused by Capacity Changes"](#) on page 6-3
- ["Resolving Orphaned Cartridges Caused by Partitioning Changes"](#) on page 7-5

Moving Cartridges (Recovery Moves)

Moving a cartridge using SLC only updates the cartridge's location in the library controller database. You must perform an audit from the host software to update the host database to prevent mount failures.

To view a table of all cartridges in the library, see ["Viewing Cartridge Information"](#) on page 11-4.

Caution: To avoid data loss, use caution when moving cartridges in partitioned libraries. Accidentally moving a cartridge from one partition to another will orphan the cartridge and the new partition may treat it as a scratch cartridge.

1. Select **Tools > Diagnostics**. Click the **Library** in the device tree.

2. Click the **RcvrMove** tab.
3. Select the Source Location Mode:
 - For **VOLID**, enter the vol-id of the cartridge to move.
 - For **Location**, select the cartridge's current location (**CAP**, **Slot**, **Drive**, **Reserved Slots**).
4. Select the Destination Location type (**CAP**, **Storage Slots**, **Drive**, and **Reserved Slots**) and select the destination address.

Note: Only select Drive if the source is a CAP or reserved slot.

Do not move data cartridges into reserved slots. Reserved slots should only contain diagnostic or cleaning cartridges.

5. Click **Start**.
6. Initiate a library audit from the host software to update the host database (see the tape management software documentation).

Locating a Cartridge

You can search for cartridges by volume ID, internal library address, or host address.

To view a table of all cartridges in the library, see "[Viewing Cartridge Information](#)" on page 11-4.

Locating a Cartridge by Volume ID

1. Select **Tools > Diagnostics**, and then click the **Library** in the device tree.
2. Click the **Search** tab.
3. Select **VOLID**.
4. Enter the volume ID (use * as a wildcard).
5. From the Requester drop-down list, select the format for the search results:
 - **default** to display in library internal address format.
 - **hli0** or **hli1** to display in HLI-PRC address format.
6. Select the Cartridge Type.
7. Click **Search**.

Locating a Cartridge by Address

1. Select **Tools > Diagnostics**, and then click the **Library** in the device tree.
2. Click the **Search** tab.
3. Select **Location**.
4. Select the search criteria from the drop-down list, and enter the address (wildcards are invalid).
5. From the Requester drop-down list, select the type of address you entered in the Location field.
6. Click **Search**.

7. Click . . . to see details about the cartridge.

Importing/Exporting Diagnostic and Cleaning Cartridges

The library can perform only one diagnostic or cleaning cartridge import or export operation at a time. The library controller reserves the CAP for the entire operation.

Before importing, verify the cartridge has the proper label. Diagnostic cartridges must have DG as the first two characters of the eight character volume ID. Cleaning cartridges must have CLN as the first three characters.

Importing Diagnostic and Cleaning Cartridges

Caution: The library will consider a used cleaning cartridge to be new, and set the usage counter to zero.

Note: Only import cleaning cartridges using SLC if Auto Clean is enabled (see "[Enabling Drive Auto Cleaning](#)" on page 9-1). For host managed drive cleaning, import the cleaning cartridges using the host software.

1. Verify that the library has enough empty reserved system slots. There must be at least one empty system slot in the base and DEM for robot recovery or library initialization (see "[Using Reserved System Slots](#)" on page 11-5).
2. Verify the CAP is empty, not reserved by a host, closed, and locked (see "[Viewing Device Status and Properties](#)" on page 14-2).
3. In SLC, select **Tools > Diagnostics**.
4. Expand the **CAP** folder in the device tree, and then click a **CAP** to use.
5. Click the **Import/Export** tab.
6. In the Operation section, select **Import Cleaning/Diagnostic cartridges**.
7. Click **Start**.
8. Load the cartridges into the CAP (follow "[Entering Cartridges Using a CAP](#)" on page 10-2 starting with step 2).

Exporting Diagnostic and Cleaning Cartridges

1. Verify the CAP is empty, not reserved by a host, closed, and locked (see "[Viewing Device Status and Properties](#)" on page 14-2).
2. In SLC, select **Tools > Diagnostics**.
3. Expand the **CAP** folder in the device tree, and then click a **CAP** to use.
4. Click the **Import/Export** tab.
5. Select a type of export operation. If exporting specific cartridges, select the cartridges to export in the "Select Cartridges(s) to export" list.
6. Click **Start**.

7. When the unload notification appears, unload the CAP (follow "[Ejecting Cartridges Using a CAP](#)" on page 10-2 starting with step 2).

Defining Cleaning Cartridge Usage Count Warning Thresholds

The warning threshold should be lower than the cartridge's recommended maximum usage to allow time to replace the cartridge (see the drive manufacturers' documentation for recommended usage).

When you import a cleaning cartridge into the library, the library controller sets the usage count to zero. To display the current usage count, see "[Viewing Cleaning Cartridge Status](#)" on page 11-5.

1. In SLC, select **Tools > System Detail**. Select the **Library** in the device tree.
2. Select **Auto Clean**, and then the **Warning Threshold** tab.
3. Select the index number of the cleaning cartridge type to configure.
4. Enter the new warning threshold for the cartridge type. To disable the warning, set the threshold to 0.

Note: The warning threshold for all cleaning cartridges of that type will be modified.

5. Click **Apply**.

Configuring the Barcode Format for FC-SCSI Hosts

The barcode format specifies which part of a cartridge barcode the library passes to FC-SCSI hosts.

1. In SLC, select **Tools > Configuration**.
2. From the drop-down list, select the presentation format to use for each partition:
 - **all** — passes all eight barcode characters to the host.
 - **left6** (default) — passes only the six VOLID characters to the host. It does not pass the domain and type characters, which are the two characters on the right of the barcode.
3. Click **Apply**.

Viewing Cartridge Information

1. In SLC, select **Tools > Reports**.
2. Expand the **Status Summary** folder in the navigation tree.
3. Select the **Cartridge Table**.

See Also

- "[Viewing Cleaning Cartridge Status](#)" on page 11-5
- "[Viewing Library and Device Reports with the Reports Utility](#)" on page 15-1

Viewing Cleaning Cartridge Status

Important: If a drive cannot use a cleaning cartridge, it notifies the library that the cartridge has expired. Replace expired cleaning cartridges as soon as possible (see ["Importing/Exporting Diagnostic and Cleaning Cartridges"](#) on page 11-3).

1. In SLC, select **Tools > System Details**.
2. Select the **Library** in the device tree
3. Click the **Auto Clean** tab, and then the **Cleaning Cartridges** tab.

Note: A cleaning cartridge may not appear in the list if it is in use, in transit, or was entered into the library with host software.

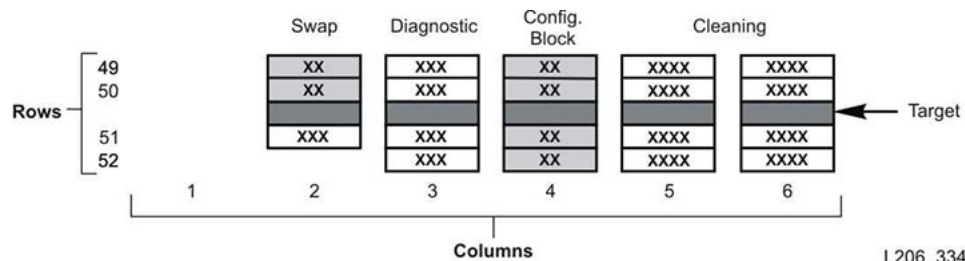
Cleaning cartridge statuses

- *OK* — cartridge is usable for cleaning.
- *warning* — usage count has reached or exceeded the warning threshold defined for this cartridge type.
- *expired* — cartridge has expired based on information from the drives.

Using Reserved System Slots

Both the base module and the DEM have reserved system slots on the lower rear wall. Reserved slots store diagnostic and cleaning cartridges imported using SLC and the module configuration block. Do not store data cartridges in the reserved system slots.

Figure 11-1 Location of Reserved System Cells



Viewing Cartridges Currently in the System Slots

1. In SLC, select **Tools > Reports**.
2. Expand **Status Summary** in the navigation tree.
3. Select the **Cartridge Table** report.
4. Click the **Location Type** column heading to sort the table. All system slots have a Location Type of "sysCell".

Module Configuration Block

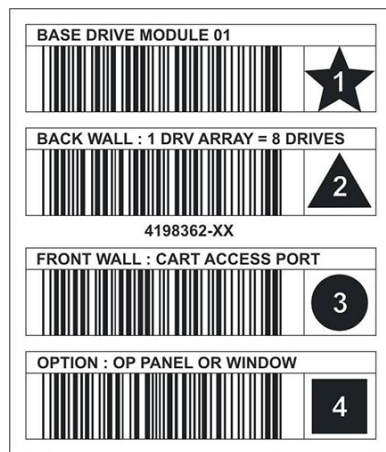
Each module has an identification block with labels that identify the module configuration. This block is on the lower rear wall in the fourth column from the left, rows 49, 50, 51, and 52.

During an initialization or after an upgrade, the robotic assembly visits the module identification block to determine the module configuration.

The block identifies the:

- *Type of module* — Base Module, Drive Expansion Module, Cartridge Expansion Module, Parking Expansion Module, or Access Expansion Module.
- *Back wall configuration* — 1 drive array, 2 drive arrays, 3 drive arrays, 4 drive arrays, arrays, bulk load magazines, or empty.
- *Front wall configuration* — Arrays, cartridge access port, CAP window, empty, or bulk load magazines.
- *Options* — Arrays, op panel or window, empty, or service bay.

Figure 11–2 Module Identification Block Base Module Example



L206_268

Special Labels

The CAPID/ label and NOMAG/ label are special labels that do not include an icon.

- CAPID/ is mounted only at the top of all CAPs as a generic identifier for the library if the CAP does not have any magazines installed on which to target.
- NOMAG/ is mounted behind the removable magazines in the bulk load AEM.

Table 11–1 Special Labels

Function	Label Text	Barcode	Icon
Cartridge Access Port ID	SPECIAL: CAP IDENTIFICATION	CAPID/	None
No Magazines	SPECIAL: NO MAGAZINES	NOMAG/	None

Cartridge Types

- Data cartridges — used to store customer data

- Diagnostic cartridges — used by service representatives to run read/write tests on drives (see ["Importing/Exporting Diagnostic and Cleaning Cartridges"](#) on page 11-3)
- Cleaning cartridges — used to clean the tape path and read/write heads of the tape drives (see ["Importing/Exporting Diagnostic and Cleaning Cartridges"](#) on page 11-3)

Cartridge Labels

For information about cartridge label standards, see the *Barcode Label Technical Brief* on OTN. All library cartridges must have a readable external label. The robot reports an error when it encounters an unreadable label.

Non-labeled cartridges are not supported. The library exports any non-labeled cartridges it finds through the CAP. A non-labeled or unknown type cartridge will not mount to a drive.

Cartridge Handling

Caution: When cartridges are improperly handled, loss of data or damage to a library component can occur.

- Keep cartridges clean and inspect for damage before each use.
- Never open a cartridge.
- Do not handle tape that is outside the cartridge; the tape edge might be damaged.
- Do not expose the tape or cartridge to direct sunlight, moisture, or magnetic fields.

Inspecting a Cartridge

Always inspect a cartridge before you insert it into a tape drive or a library. A defective or dirty cartridge can damage a tape drive. Never use a damaged cartridge. Look for:

- Dirt or debris
- Cracked or broken housing
- Damaged write-protect switch
- Liquid in the cartridge
- Labels not firmly attached, or that extend over the cartridge edge

Cleaning the Cartridge Exterior

Wipe all dust, dirt, and moisture from the cartridge with a lint-free cloth. Use Oracle StorageTek Tape Cleaner Wipes to clean the cartridges. These wipes are saturated with isopropyl alcohol. Do not let any solution touch the tape or get inside the cartridge.

Caution: To avoid damage to cartridges, do not use acetone, trichloroethane, toluene, xylene, benzene, ketone, methylethyl ketone, methylene chloride, ethyldichloride, esters, ethyl acetate, or similar chemicals to remove labels or clean cartridges.

Storing Cartridges

Store cartridges in a clean environment. Do not take a cartridge out of its protective wrapping until you are ready to use it. Use the tear string, not a sharp instrument, to remove the wrapping. Before using a cartridge, ensure that it has been in its operating environment for at least 24 hours.

Validating a Cartridge

To validate the integrity of T10000 cartridges using the media validation (MV) feature, you must define a pool of T10000C or D drives. The pool is not considered a partition, does not contain cartridges, and hosts cannot access the drives in the pool. The library automatically cleans MV drives.

Note: MV drive cleaning occurs regardless of the auto clean status for the entire library or partitions. Ensure there are cleaning cartridges in the library (see ["Importing/Exporting Diagnostic and Cleaning Cartridges"](#) on page 11-3).

- [Media Validation Requirements](#)
- [Defining the Media Validation Pool](#)
- [Starting or Resuming Media Validation](#)
- [Stopping a Validation](#)

See Also

- ["Updating Hosts After Modifying the MV Pool"](#) on page 8-3

Media Validation Requirements

- Minimum SL3000 firmware FRS_4.30 and SLC FRS_6.50
- A designated pool of T10000C or D drives at TTI level 5.40 or above
- High-memory HBT card
- Minimum STA 2.0 to automate media validation (optional)

Defining the Media Validation Pool

Important: Hosts cannot access drives in the MV pool.

Before defining the pool in a SCSI library, review the ["Effect on SCSI Element IDs of Modifying the MV Pool"](#) on page 8-4.






1. Verify that hosts are not using the drives that you want to add to the pool (see the host management software documentation). Adding a drive to the MV pool will trigger a reconfiguration in all ELS hosts attached to the library.

2. In SLC, select **Tools > Media Validation**. Click the **Slot Selection** tab.
3. Click **Refresh** to display the latest configuration.
4. Place a maximum of 10 drives into the pool. Select the drive slots, and then click **Add** or **Remove**.

Note: When adding drives to the MV pool, the library (or affected partition) will go offline.

5. Click **Apply**.
6. If using a partitioned library, assign any drive slots removed from the MV pool to a partition (see "[Partitioning the Library](#)" on page 7-1)
7. Reconfigure host applications (see "[Updating Hosts After Modifying the MV Pool](#)" on page 8-3).

Media Validation Icons

SLC Drive Icon	Meaning
	Empty drive slot
	Slot contains either an invalid drive type or a correct drive type in an invalid state
	Correct drive type (T10000C or D) in a valid state
	Partition number of the drive slot
	Drive slot is in media validation pool

Starting or Resuming Media Validation

You can only validate one cartridge at a time per each SLC session. To automate the process, use StorageTek Tape Analytics 2.0 or above (refer to the STA documentation).

1. In SLC, Select **Tools > Media Validation**. Click the **Media Validation** tab.
2. Select a drive. If there are no drives, see "[Defining the Media Validation Pool](#)" on page 12-1.

Note: If you cannot select a drive, it might be the wrong type or in an invalid state.

3. Select a cartridge from the list or enter a VOLSER in the cartridge label field.
4. Select a validation type (see below for a description).

Note: Select **Complete Resume** or **Complete Plus Resume** to resume a complete validation where it left off.

5. Click **Start**. Validation begins if the cartridge loads successfully.

After validation completes, the cartridge is returned to its source location. If the source location is unavailable, the library moves the cartridge to a system slot for host recovery.

Validation Types

Validation Type	Description	Starts at	Approximate Duration per Cartridge
Basic Verify	Mount and dismount to determine if MIR is unreadable or out of sync	NA	2 minutes
Standard Verify	Reads: <ul style="list-style-type: none"> - 1000 records from the beginning of tape - The wrap that contains EOD, then into the EOD - Outermost wraps on top and bottom bands to verify edges 	Beginning of tape	Maximum of 30 minutes
Rebuild MIR	Reads data at tape speed	Invalid position in the MIR	T10000C — 5 hours T10000D — 9 hours
Complete BOT	Reads data at tape speed	Beginning of tape	T10000C — 6 hours T10000D — 9 hours max
Complete Plus BOT ¹	Checks Data Integrity Validation CRC to determine if it exists	Beginning of tape	T10000C — 6 hours for compression ratios less than 2.5:1. T10000D — 9 hours for compression ratios less than 3:1

¹ Requires decompression and Oracle Key Manager.

Stopping a Validation

If a host requests a cartridge currently being validated, the validation stops. You can also stop the validation using SLC.

1. Log in as the user who initiated the validation.
2. In SLC, select **Tools > Media Validation**.
3. Select the **Media Validation** tab.
4. Click **Stop**.

Once validation stops, the library returns the cartridge to its source location. If the source location is unavailable, the library moves the cartridge to a system slot for host recovery.

Auditing the Library

An audit verifies cartridge locations and updates the library database, which contains the volume ID, current location, and verified status for each cartridge.

The library automatically performs an audit after an access door closes or after the library initializes.

Note: Initiating an audit from SLC only updates the library database. To update the host database, you must initiate an audit from the host.

- [Performing a Physical Audit of the Entire Library](#)
- [Performing a Physical Audit of a Range of Cells](#)
- [Performing a Verified Audit of a Range of Cells](#)
- [Meaning of the Audit Indicator](#)

See Also

- ["Viewing Cartridge Information"](#) on page 11-4

Performing a Physical Audit of the Entire Library

Note: You cannot stop a physical audit after it begins.

For an entire library audit, the robot visits all slots (storage, CAP, drive, reserved), updates the cartridge database, and changes the "verified" status of a cartridge to true.

Although the audit is a background process, it does require sharing of robot resources. Do not run this audit during peak activity periods. The audit takes approximately 0.5 seconds per cartridge slot.

1. In SLC, select **Tools > Diagnostics**.
2. Select the **Library** on the device tree.
3. Click the **Audit** tab.
4. Select **Yes** for Entire Library (select **No** for Physical Audit and Verified Audit).
5. Click **Audit**.

Performing a Physical Audit of a Range of Cells

Note: You cannot stop a physical audit after it begins.

1. In SLC, select **Tools > Diagnostics**.
2. Select the **Library** in the device tree.
3. Click the **Audit** tab.
4. Select **Yes** for Physical Audit (select **No** for Entire Library and Verified Audit).
5. From the drop-down lists, select the internal address for the starting and ending locations of the audit.
6. Click **Audit**.

Performing a Verified Audit of a Range of Cells

A verified audit validates the status of a cartridge location in the cartridge database. If a cartridge address has a verified status of `false`, the library does a physical audit of that location and updates the cartridge database.

1. In SLC, select **Tools > Diagnostics**.
2. Select the **Library** in the device tree.
3. Click the **Audit** tab.
4. Select **Yes** for Verified Audit (select **No** for Entire Library and Physical Audit).
5. From the drop-down lists, select the internal address for the starting and ending locations of the audit.
6. Click **Audit**.

Meaning of the Audit Indicator

To indicate an audit is in progress, SLC displays a spinning indicator and the message "Audit in progress". When you see this indicator, do not open the library access door. This will cause the audit to restart.

The audit indicator only displays when an audit is initiated automatically (library access door has been opened and closed, library power up, or restart). The indicator does not display for audits initiated from SLC or the host.

Viewing Library and Device Information

SLC only displays the latest library and device information saved to the library controller database. Click **Refresh** to update SLC with the latest configuration data.

- [Viewing Library Operational Status](#)
- [Viewing Library Properties and Configuration](#)
- [Viewing Device Status and Properties](#)
- [Viewing the Local Operator Panel Type](#)
- [Meaning of SLC Library and Device Status Indicators](#)

See Also

- ["Generating Reports and Logs"](#) on page 15-1
- ["Viewing Cartridge Information"](#) on page 11-4
- ["Viewing Cleaning Cartridge Status"](#) on page 11-5

Viewing Library Operational Status

1. In SLC, select **Tools** > **System Detail**, and then select the **Library** in the device tree.
2. Click the **Status** tab.
3. Select a secondary tab:
 - **General** — displays the current operational state of the library. These values update whenever there is host activity, background operations, or operator activity. You can place the library online or offline with this tab (see ["Taking the Library Offline"](#) on page 16-1 and ["Bringing the Library Online"](#) on page 16-2).
 - **Status Module** — displays library status alerts and highlights significant messages. This feature is available only if service is active on the library. See also ["Clearing Library Status Alerts"](#) on page 17-6.
 - **HLI** — displays the current status of all HLI interface ports on the library. Information includes the local TCP/IP socket, local IP, connection status, port status, and transmission sent and received from the time of connection.
 - **FC-SCSI** — displays the current status of all host FC-SCSI interface ports on the library. Detailed information is shown by port number. If the Multi Port Fibre feature has been activated on the library, detail is shown for all ports.

Viewing Library Properties and Configuration

1. In SLC, select **Tools > System Detail**, and then select the **Library** in the device tree.
2. Click the **Properties** tab.
3. Select a secondary tab:
 - **General** — displays the physical, mechanical, logical, and network configuration of the library.
 - **Library Controller** — displays details of the library controller, including the serial number and firmware versions.
 - **Drive Controller** — displays details of the drive controller, including the serial number and current firmware versions.

Viewing Device Status and Properties

You can view information about CAPs, drives, robots, redundant electronics, power supplies, and the safety door. You can also view device information using the SLC Reports utility (see "[Viewing Library and Device Reports with the Reports Utility](#)" on page 15-1).

1. In SLC, select **Tools > System Detail**.
2. Select the device folder in the device tree.
3. For more detailed information, expand the device folder. Select a device.
4. Select a tab. Depending on the device you select, refer to the corresponding information below.

Device Status and Properties Information

All devices have the following system detail tabs.

- **Status Tab** — displays the current operational state of the device. You can place a device online or offline with this tab (see "[Taking a Device Offline](#)" on page 16-2 and "[Bringing a Device Online](#)" on page 16-2).

Note: For AEMs, a "closed" door position indicates the safety door is completely down and it is safe for you to open the AEM access door.

- **Properties Tab** — displays device configuration information, including the serial number and current firmware levels

Drive Information

Only drives have the following system details tabs.

- **Display Tab** — displays network data, the Virtual Operator Panel (VOP) for T10000 and T9840D drives, and drive LED status
- **Drive Tray Tab** — displays the current status of a drive tray

Drive Status	Meaning
Empty	No cartridge is mounted to the drive.
Unloaded	Cartridge is ready for dismount.

Drive Status	Meaning
Ready	Cartridge is loaded.
NotCommunicating	Controller card cannot communicate with the drive.
rewindUnload	Drive is busy rewinding and unloading.

Redundant Electronics Card Status

- **hbca** — Library controller, A (bottom) slot
- **hbcB** — Library controller, B (top) slot
- **hbta** — Drive controller, A (bottom) slot
- **hbtb** — Drive controller, B (top) slot




Card Status	Meaning
Duplex: Software ready, switch possible	Active library controller is functioning normally.
Not installed	Card is not installed in the library.
Ok	Active or standby drive controller card is functioning normally.
Pre-standby: software not ready	Standby library controller card is loading standby code and is not ready to be used in an automatic failover or manual switch.
Standby: software ready	Standby library controller card is functioning normally and can be used for an automatic failover or manual switch.

Viewing the Local Operator Panel Type

1. In SLC, select **Tools > Diagnostics**.
2. Select the **Library** in the device tree, and then click the **OpPanel** tab.

The type is listed at the bottom of the screen. A W indicates Windows-based and a DL or OL indicates Linux-based.

Meaning of SLC Library and Device Status Indicators

SLC Icon	Definition
	Normal
	Warning
	Error

Health Status of a Device

This information is found in the device tree of the System Details and Diagnostics page.

- Normal — library device is functioning normally
- Warning — device is offline or operating in a degraded state
- Error — device has experienced a failure

Communication Status

This information is found in lower left of all SLC screens. Indicates the communication status between SLC and the library controller.

- Normal — SLC is communicating normally with the library controller
- Warning — server is taking longer than 10 seconds to respond
- Error — server is taking longer than 30 seconds to respond

After about 30–60 seconds of lost communication, the heartbeat monitor turns gray, then red, and the following error message appears:

Heartbeat message not received from the library controller.

Log off SLC, and then log on again to restore communication.

Health Status of the Library

This information is found in lower right of all SLC screens.

- Normal — all library devices are functioning normally
- Warning — one or more library devices is offline or operating in a degraded state
- Error — one or more library devices has experienced a failure

After a device error is fixed, the library health indicator changes to "Warning". The indicator will not change to "Normal" until the library is taken offline. If there are multiple problems with a device or status alert condition, the health indicator displays the most severe condition.

Generating Reports and Logs

- [Viewing Library and Device Reports with the Reports Utility](#)
- [Viewing Active Capacity Reports](#)
- [Viewing Partitioning Reports](#)
- [Generating Diagnostic Files for Oracle Support](#)
- [Monitoring Library Events](#)

See Also

- ["Viewing Library and Device Information" on page 14-1](#)
- ["Viewing Cartridge Information" on page 11-4](#)
- ["Viewing Cleaning Cartridge Status" on page 11-5](#)

Viewing Library and Device Reports with the Reports Utility

All report output is a static display of information at the time the report is generated. Click **Update** in the upper right corner to refresh the information.

Note: Running multiple instances of SLC on the same workstation can cause inconsistent report data. Only one user at a time should produce SLC reports.

1. In SLC, select **Tools > Reports**.
2. In the navigation tree, expand a report folder. Select a report.

Folder	Report	Description
Statistics	Drive Events	Displays drive events and errors. The report can display up to 70 entries.
	Drive Media Events	Displays cartridge error events that have occurred with a drive. The report can display up to 500 entries.
	General Events	Displays a summary of library operational events.
	Media Events	Displays cartridge errors. The report can display up to 2000 entries.
Log	EventLog	Displays a log of events based on severity (see "Severity" on page 15-5).

Folder	Report	Description
Status Summary	Cartridge Table	Lists cartridge location, media type, label, and status information.
	Device Reserve Table	Lists elevator, robot, and PTP reservation information.
	Drive Table	Lists drive location, type, and serial number information.
	CAP Summary	Lists the location of the CAPs.
	Cartridge Summary	Lists the location, media type, and label information for all cartridges in the library.
	Drive Summary	Lists drive location, type, serial number, code information, and device details.
	Library Information	Lists the library physical configuration, code version, and state of the library.
	Robot Summary	Lists robot address and state.
Status Detail	CAP/Drive/Robot Details	Lists identifying information, code version, and status of the devices.
	Library Details	Lists the library physical configuration, code version, and state of the library.
Versions	Hardware Versions	Lists the FRU serial number for controller cards, CAPs, robots, and PTPs.
	Software Versions	Lists the code version for controller cards, CAPs, elevators, robots, and PTPs.
Audit Log	Feature Audit Log	Lists all feature activation activity for the life of the library. To view only the current hardware activation files, see " Displaying Current Hardware Activation Files " on page 5-2.

Viewing Active Capacity Reports

The active slot reports only display data saved to the library controller database.

1. Click **Tools > Select Active Cells**, and then click the **View Reports** tab.
2. Select a report:
 - **Cartridge Cell and Media Summary** — displays a detailed list of all library resources and their status (active or inactive).
 - **Orphaned Cartridge Report** — displays a detailed list of all orphaned cartridges.
3. To save the report as a comma-separated value (csv) file, click **Save to File**.

Viewing Partitioning Reports

You can generate reports to assist in partitioning management and design.

1. Select the **Tools > Partitions > Reports** tab.
2. Select a report from the menu:
 - **Cartridge Cell and Media Summary** — displays a list of all resource partition assignments.
 - **Host Connections Summary** — displays host-partition connection information.
 - **Orphaned Cartridge Report** — displays a list of all orphaned cartridges.
 - **Partition Details** — displays information for a selected partition.
 - **Partition Summary** — displays summary information for all partitions.

Generating Diagnostic Files for Oracle Support

Your Oracle support representative might request that you capture and transfer the Management Information Base (MIB) or Log Snapshot file.

Transferring the Library MIB File

1. In SLC, select **Tools > Diagnostics**.
2. Select the **Library** in the device tree.
3. Click the **TransferFile** tab.
4. Select **SNMP MIB**. Click **Transfer File**.
5. Save the file using a **.txt** suffix.
6. E-mail the file to your Oracle support representative.

Transferring the Library Log Snapshot File

You must save the log within 15 minutes of generation. The file is encrypted.

1. In SLC, select **Tools > Diagnostics**.
2. Select the **Library** folder in the device tree.
3. Click the **Transfer File** tab.
4. Select **Log Snapshot**.
5. Select either **All Devices** or **Selected Device**. If you choose Selected Device, select the device.
6. Click **Generate Log Snapshot on Library**.
7. Click **Yes**, and then **OK**.
8. Click **Transfer Log Snapshot To Your Computer**.
9. Save the file using the automatically generated name.
10. E-mail the file to your Oracle support representative.

Monitoring Library Events

The library controller continually monitors library operations and logs all events. Using the Monitors utility of SLC, you can open an event monitor to display event data or spool it to a file. Event monitors are useful tools for root cause analysis.

- [Starting an Event Monitor](#)
- [Saving Event Monitor Data to a File](#)
- [Displaying Result Code Definitions](#)
- [Event Monitor Types](#)

Starting an Event Monitor

1. In SLC, select **Tools > Monitors**.
2. Expand the **Permanent Monitors** folder in the navigation tree.
3. Click an event monitor type, and then click **Open**.

4. Use the **Monitor** menu to pause, resume, stop, or clear the event monitor. Use the **Spool File** menu to save the event monitor to a file (see ["Saving Event Monitor Data to a File"](#) on page 15-4).

Note: To arrange multiple event monitors on one screen, use the **Window** menu in the upper right corner.

Saving Event Monitor Data to a File

You may need to send the file to your Oracle support representative to assist in diagnosing problems.

1. Open an event monitor (see ["Starting an Event Monitor"](#) on page 15-3).
2. In the event monitor window, select **Spool File > Start Spooling**.
3. Select a directory and file name. Click **Save**.
4. To stop spooling, select **Monitor > Stop Spooling**.

Displaying Result Code Definitions

Result codes identify the library event type (result codes are the same as library EventIds).

1. In SLC, select **Tools > Diagnostics**. Select the **Library** in the device tree.
2. Click the **Search** tab.
3. In the Search Type list, select **Result Code**.
4. To search for a specific result code, enter the complete code (wildcards or partial codes are invalid)
To list all result codes, select **List All**.
5. Click **Search**.

Event Monitor Types

There are four types of event monitors: All, Error Warn Info, Error and Warnings, and Errors. Each monitor type logs events based on the severity of the event. For example, the Errors monitor only logs error events (see [Severity](#) for a description of the event types).

Each event logged in the event monitor contains the following information:

Time

Identifies when the event occurred.

Device ID

Identifies the library address of the device corresponding to the event.

User

Identifies the user that originated the event. This is "root" for HLI or SCSI host activities.

I/F

Identifies the interface type of the requester. The interface can be hli, scsi, or default (for SLC or CLI requests).

Activity

Identifies the command that was issued, such as "load drive".

Request Identifier

Identifies all host interface requests. Helps track the sequence of log activity resulting from each host request.

Severity

Identifies the significance of the event. Some event data is non-volatile, meaning it persists across system power cycles.

Error — non-volatile data indicating a fault that prevented a request (host or diagnostic) from completing successfully.

Warning — non-volatile data indicating a fault that has not stopped the library's ability to complete requests (host or diagnostic). A warning can identify a loss of performance or a condition that may indicate future irrecoverable errors.

Information — volatile data indicating general device or library information (such as the device state, device added, listener registered, tray serial number updated, and so on). This information may be important to establish a history of activity for the warning or error event.

Trace — volatile data indicating diagnostic activity tracing.

Result Code

Identifies the library event type (result codes are the same as library EventIds). To search for the meaning of the Result Code using SLC, see "[Displaying Result Code Definitions](#)" on page 15-4 or refer to the SL3000_FRSxxx_JavaErrorCodes.html file included in the library firmware code package.

Result Text

Provides information about the results of the request or event.

Changing Online/Offline Status and Rebooting

- [Taking the Library Offline](#)
- [Bringing the Library Online](#)
- [Taking a Device Offline](#)
- [Bringing a Device Online](#)
- [Rebooting the Local Operator Panel](#)
- [Rebooting an AEM Safety Door](#)
- [Rebooting the Library](#)

Taking the Library Offline

Note: Always attempt to take the library offline with ACSLS or ELS tape management software before using SLC.

1. Take all library drives offline (see "[Taking a Device Offline](#)" on page 16-2).
2. In SLC, select **Tools > System Detail**.
3. Select the **Library** folder in the device tree.
4. Click the **Status** tab, and then the **General** tab.
5. In the Transition Request field, click **Take offline**.
6. Click **Apply**. Before the library goes offline, all outstanding library jobs complete.
7. Wait for the offline confirmation message. If the library does not go offline, check the status of the library (see "[Viewing Library Operational Status](#)" on page 14-1).

When to place the library offline:

- Before powering down the library
- Before opening a library access door
- When the library is inoperative and requires maintenance

Bringing the Library Online

Note: Always attempt to bring the library online with ACSLS or ELS tape management software before using SLC.

1. In SLC, select **Tools > System Detail**.
2. Select the **Library** in the device tree.
3. Click the **Status** tab, and then the **General** tab.
4. In the Transition Request field, click **Bring online**.
5. Click **Apply**.
6. If applicable, bring the library online to the hosts (see the host software documentation).

Taking a Device Offline

Note: Always attempt to take a device offline with ACSLS or ELS tape management software before using SLC.

1. In SLC, select **Tools > System Detail**.
2. Expand the device folder (CAP, robot, or drive). Select the device to modify.
3. Click the **Status** tab.
4. In the Transition Request list, select **Take Offline**. The system completes all outstanding jobs for the device before taking the device offline.

When a robot goes offline, it moves to the end of the rail and becomes unusable by the library. If the library is using the redundant robotics feature, the second robot will take all requests.

5. Click **Apply**.

Bringing a Device Online

Note: Library devices that are offline and in an error state cannot go online. You must correct the error first.

1. In SLC, select **Tools > System Detail**.
2. Expand the device folder (CAP, robot, or drive). Select the device to modify.
3. Click the **Status** tab.
4. In the Transition Request list, select **Bring Online**.
5. Click **Apply**.

Rebooting the Local Operator Panel

You may need to reboot the local operator panel if it hangs or the help content is not visible. You can reboot at the local operator panel or from a remote SLC session.

1. In SLC, select **Tools > Diagnostics**.
2. Select the **Library** in the device tree, and then click the **OpPanel** tab.
3. Click the **Reboot Operator Panel** button.
4. If rebooting from the local operator panel, the screen will go blank. The reboot is complete when the operator panel comes back online.

If rebooting from a remote SLC session, "Reboot Complete" indicates the reboot of the local operator panel has finished.

Rebooting an AEM Safety Door

Use the **Tools > Diagnostics** utility to reboot an AEM safety door. You may need to reboot the door to clear errors when the AEM safety door is in an abnormal condition.

1. In SLC, select **Tools > Diagnostics**.
2. Expand the **Safety Door** folder, and then select the AEM safety door.
3. Click **Reboot**.
4. If the safety door is online, click **OK** to take the safety door offline.
5. Click **OK** to confirm the reboot. The library controller reboots the safety door. The safety door re-initializes, and the robot audits the AEM.

Rebooting the Library

Rebooting the library involves reloading the firmware from flash memory and restarting the library controller.

1. In SLC, select **Tools > Diagnostics**.
2. Select the **Library** in the device tree.
3. Click **Reboot**.
4. All other users must log off. Click **OK**.
5. If the library is online, click **OK** to take the library offline.
6. Click **OK** to reboot the library.
7. Click **OK** to terminate this SLC session. Do not log back in to the SLC until the library has fully initialized.

Troubleshooting

- [Basic Troubleshooting](#)
- [Running a Library Self-Test](#)
- [Running a Device Self-test](#)
- [Diagnosing Robotic Issues](#)
- [Determining the Status of an RE Controller Card](#)
- [Initiating a Manual RE Switch Using SLC](#)
- [Clearing Library Status Alerts](#)
- [Calibrating the Touch Screen](#)
- [Troubleshooting Host Connectivity](#)

See Also

- ["Changing Online/Offline Status and Rebooting"](#) on page 16-1
- ["Generating Diagnostic Files for Oracle Support"](#) on page 15-3
- ["Monitoring Library Events"](#) on page 15-3
- ["Servicing the Library"](#) on page 18-1

Basic Troubleshooting

Before you run diagnostic tests or contact Oracle support, review the following troubleshooting tips.

Service Required (amber) LED is constantly on

Use SLC to check the health of the library and the devices (see [Chapter 14, "Viewing Library and Device Information"](#)).

To perform a health check:

1. Log in to SLC.
2. Access the System Detail module, **Tools > System Detail**.
3. Check the device in the device tree for the following indicators: Device Healthy or Device Error

Additional checks:

1. Check the Status (for example, online/offline) and Statistics (for example, uptime, downtime, errors and warnings) tabs for more information on the health of the library and devices.

2. Make sure the cartridges are fully seated and properly oriented in their storage slots.
3. Inspect for any foreign objects or debris and remove them if found.

Library does not turn on and SLC does not display any messages

1. Check that the library power switch is in the ON position.
2. Check all power cord connections.
3. Make sure that there is power to the outlet.
4. Replace the power cord.

CAP Open LED is on and blinking

Open the CAP and make sure the cartridges in the CAP slots are properly seated. Close the CAP.

SLC does not display modified data or information remains static

Check the SLC Heartbeat icon.

Robot Fault or Library Fault Amber LED is constantly on

1. Check SLC for any displayed error messages.
2. Open the front door. Observe the state of the cartridges, robot hand, and tape drives.
3. Make sure cartridges are fully seated and properly oriented in their storage slots.
4. Make sure packing materials have been removed.
5. Remove any objects or debris from the library floor.
6. Check the status of the tape drives.
7. Close the front door.
8. Make sure the tape drives are fully seated and locked forward by pushing and pulling on the rear of the drive tray. Any motion of the tray indicates that it requires re-seating and locking down.

Client computer cannot communicate with the library or tape drives

Make sure cables are securely attached to their connectors on the rear of the library, the tape drives, and the client computer.

Library cannot communicate with the drives and drive status on SLC displays "Not communicating"

Make sure cables are securely attached to their connectors on the rear of the library, the drives, and the client computer.

Repeated or excessive drive cleaning or cleaning messages

1. Replace the cleaning cartridge with a new one.
2. Run the Library Self-Test and note if errors are reported for the drive.
3. Run any client computer-based drive diagnostic tests.

Running a Library Self-Test

Use library self-tests to help diagnose issues. Library self tests can be non-disruptive (cartridges are returned to their original locations) or disruptive (cartridges may be placed in new locations).

Note: Before performing a disruptive test, the library must be taken offline (see ["Taking the Library Offline"](#) on page 16-1).

1. Make sure the proper drive diagnostic cartridges are in the library (see ["Importing/Exporting Diagnostic and Cleaning Cartridges"](#) on page 11-3).
2. In SLC, select **Tools > Diagnostics**, and click the **Library** folder.
3. Click the **SelfTest** tab.
4. In the Mode list, select the type of self-test:
 - **Non-Disruptive** — all cartridges used in the test are returned to their original locations
 - **Disruptive** — cartridges may be returned to new locations. The library must be taken offline to all hosts before running this test.
5. Click **Run**. Test results display when the test completes.
6. For disruptive tests, bring the library online to resume normal operations.

What the library checks during a self-test:

- Verifies the communication path between the library controller, drives, elevators, and robots.
- Performs get and put operations to check the health of the robots, elevators, and CAPs. This includes get and put operations from a reserved system slot to a random empty storage slot or CAP slot.
- Audits the entire library.
- Performs mounts and dismounts of diagnostic cartridges for all the drives installed in the library. The self-test does not begin unless a diagnostic cartridge is found in the system slots. If the system finds a compatible diagnostic cartridge, the self-test repeats for each drive type. If the system does not find a diagnostic cartridge for a drive type, the system skips the mount/dismount operation for the drive.

Running a Device Self-test

Use device self-tests to help diagnose issues. A self-test can be performed on a CAP, robot, or drive.

Note: To perform a drive or robot self-test, diagnostic cartridges must be available in the library (["Importing/Exporting Diagnostic and Cleaning Cartridges"](#) on page 11-3).

1. In SLC, select **Tools > Diagnostics**.
2. Expand the device folder (CAP, Robot, or Drive). Select the device to test.
3. Click the **SelfTest** tab.
4. In the Mode list, select **Non-Disruptive**.
5. Click **Run**. A message appears when the test finishes.

Diagnosing Robotic Issues

Diagnostic moves can help monitor or diagnose robotic problems by issuing a series of "get" and "put" operations. The system chooses a robot for the diagnostic move based on the minimum and maximum ranges set for the target and pool addresses. Multiple robots may be selected if the address range requires it.

Successful diagnostic moves do not rearrange the cartridges in the library — the system returns cartridges to their original locations. However, some diagnostic move failures can cause cartridges to be left in new locations.

- [Defining a Diagnostic Move](#)
- [Starting a Diagnostic Move](#)
- [Saving a Diagnostic Move](#)
- [Monitoring and Controlling Open Diagnostic Moves](#)

Defining a Diagnostic Move

Note: Diagnostic moves require sharing of robot resources. You should not run a diagnostic move during peak activity periods.

You can set up and run multiple diagnostic move routines simultaneously if the target and pool ranges for each diagnostic move do not overlap.

1. Select **Tools > Diagnostics**. Select the **Library** in the device tree.
2. Click the **DiagMove** tab, and then the **Manage** tab.
3. In the Defined Sequence section, click **Add**.
4. Define the target address range (the area used for "get" operations).
 - a. Select a slot type.
 - b. Select the starting and ending locations for the range.
5. Click **Next**.
6. Define the source address range (the area used to supply cartridges or empty slots if a target address does not contain a cartridge or no empty slots are available.)
 - a. Select a slot type.
 - b. Select the starting and ending locations.
7. Click **Next**.
8. Name the move and specify a move count (between 1 and 5000).
9. Select an access order, move type, and enable/disable the pre-move compatibility check (see below for details).
10. Click **Finish**. The new diagnostic sequence is listed in the Defined Sequences section. See "[Starting a Diagnostic Move](#)" on page 17-5.

A diagnostic move is defined by:

- **Target Address Range** — defines the area used to perform the "get" operation in a diagnostic move. Valid target address types are storage slots, CAP, drive and storage slots, system slots, or all.

Note: All resources within the target address range are reserved. However, only the location currently being accessed by the robot for a get/put operation is unavailable to the host.

- **Pool Address Range** — defines the area used to supply cartridges or empty slots if a target address does not contain a cartridge or no empty slots are available. The pool and target address can overlap.
- **Access Order** — determines how the robot performs get operations within the target address range. There are two options:
 - *Sequential* — robot performs a get operation starting with the first location in the target address range. The robot continues visiting the locations sequentially through the range until it completes the requested number of moves.
 - *Random* — robot randomly picks a location in the target address range to get a cartridge. The robot can also visit the same location in the target address range multiple times to get a cartridge; however, if you specify enough move requests, the robot is guaranteed to visit all slots. The random access routine ends after the requested number of moves is complete.

Starting a Diagnostic Move

Note: You can run multiple moves simultaneously if the target and pool address ranges for the moves do not overlap.

Before starting a diagnostic move, you must define the move (see "[Defining a Diagnostic Move](#)" on page 17-4).

1. Select **Tools > Diagnostics**. Select the **Library** in the device tree.
2. Click the **DiagMove** tab, and then the **Manage** tab.
3. In the Defined Sequences section, select a diagnostic move. Click **Open**.
4. Select **File > Start Sequence**.

Saving a Diagnostic Move

You can save a defined diagnostic move to a file and use it to restore a move that has been deleted from the library or copy it to a different library.

1. Select **Tools > Diagnostics**. Select the **Library** in the device tree.
2. Click the **DiagMove** tab, and then the **Manage** tab.
3. In the Defined Sequence section, select a diagnostic move, and then click **Save** at the top of the SLC screen.

Monitoring and Controlling Open Diagnostic Moves

To start a diagnostic move, see "[Starting a Diagnostic Move](#)" on page 17-5.

1. Select **Tools > Diagnostics**. Select the **Library** in the device tree.
2. Click the **DiagMove** tab, and then the **Monitor** tab.

- Each monitor window indicates the status of the move:

Status Indicators	Valid Values
Spooling Status — whether the move output is being saved to a file	True, False
State — execution state of the move	Running, pausing, paused, stopping, stopped
Health — health state of the move	OK, warning, error
Completed moves — number of moves completed	Count

- Use the **File** menu in each Monitor window to start/stop/pause the sequence, clear the output window, or start/stop spooling.

Determining the Status of an RE Controller Card

Controller card status is indicated by LEDs on the card and displayed in SLC (see "[Viewing Device Status and Properties](#)" on page 14-2). You can use the status of the card to troubleshoot issues with the library.

The LEDs and meanings are the same on both card types (HBC and HBT).

Controller Card LED	Definition
ACTIVE - Green	Card is functioning as the active and is running active code.
STANDBY - Amber	Card is functioning as the standby and is running standby code.
FAULT - Red	Card has experienced a serious error.
EJECT OK - Blue	Support representative can safely initiate a card eject.

Initiating a Manual RE Switch Using SLC

You can also initiate a switching using host software or CLI (see "[Ways to Initiate a Manual Failover](#)" on page B-3).

This procedure is not available at the local operator panel.

- Verify the device state of the card indicates "switch is possible" (see "[Viewing Device Status and Properties](#)" on page 14-2).
- In SLC, select **Tools > Diagnostics**.
- Select the **Redundant Electronics** folder.
- Click **Apply** to begin the switch process. If there is a problem with the standby library and drive controller cards, you are not allowed to continue with the switch.
- If there are no errors, click **Yes**.
- Click **OK** to log off the SLC.
- Wait until the switch is complete before logging back into the library. You must specify the IP address or DNS alias of the new active controller.

Clearing Library Status Alerts

You can only clear alerts marked as "Clearable" and only if service is active on the library.

Clearing an alert only removes it from the Status Module display; it does not resolve the underlying cause. The library health indicator returns to "Normal" if there are no other device or status alerts. If the alert is subject to periodic updates, it will reappear at the next update cycle.

1. Select **Tools > System Detail**, and click the **Library** folder.
2. Click the **Status** tab, and then the **Status Module** tab.
3. On the Clear Alert Number list, select the alert number to clear, and then click **Apply**.

Calibrating the Touch Screen

Alignment of the touch screen is calibrated at the factory. If the touch screen becomes mis-aligned, you can re-calibrate or reset it. The method of calibration depends on the operator panel type (see "[Viewing the Local Operator Panel Type](#)" on page 14-3).

- If you have a Linux-based local operator panel (DL or OL), you can re-calibrate it yourself or reset it to the factory setting with the procedures below.
- If you have a Windows-based local operator panel (W), contact your Oracle support representative.

Re-calibrating the Local Operator Panel

For an accurate calibration, make sure there is no debris on the touch screen.

1. Log in to the local operator panel.
2. Select **Tools > Calibrate**.
3. Tap **Calibrate**.
4. A series of targets will display. Gently tap in the center of each target with your finger or a pointing stylus.
5. To save the new settings:
 - a. Tap the **Click Me** buttons within the indicated time period.
If the buttons do not depress, the touch screen is not properly aligned. Discard the new settings and see Step 6.
 - b. Click **OK** to save the new settings.
6. To discard the new settings:
 - a. Let the timer run out without tapping the **Click Me** button.
 - b. Return to Step 4 and re-calibrate.

The local operator panel reboots automatically after an unsuccessful second calibration and restores the previously saved alignment.

Resetting the Local Operator Panel Calibration to the Factory Setting

1. Log in to the local operator panel.
2. Select **Tools > Calibrate**.
3. Click **Reset Calibration**. The local operator panel reboots.

Troubleshooting Host Connectivity

- Use a sniffer (a device or program that traces the network traffic for the library).
- Display the port statistics on the switch or router to which the library is connected. Search for any errors that were encountered.
- Run a trace with the library management software that displays host-to-library packets and transmissions.
- Make sure that two separate hosts are not competing to manage one library or one partition.

Servicing the Library

- [Turning Off the Library](#)
- [Turning On the Library](#)
- [Entering the Library](#)
- [Opening the AEM Access Door](#)
- [Manually Cleaning a Drive](#)
- [Manually Mounting and Dismounting a Cartridge](#)

See Also

- ["Troubleshooting"](#) on page 17-1

Turning Off the Library

Caution: If you shut off power to the library without performing the following procedure, you risk possible equipment damage, cartridge damage, and loss of data.

1. Ensure all library requests have completed.
2. Take all library drives offline (see ["Taking a Device Offline"](#) on page 16-2).
3. Take the library offline (see ["Taking the Library Offline"](#) on page 16-1).
4. Open the rear doors of the Base Module (and DEM if present).
5. Turn off the power enable switches.
6. If necessary, turn off the circuit breakers on the PDUs.

Turning On the Library

1. Open the rear doors of the Base Module (and DEM if present).
2. If necessary, turn on the circuit breakers on the PDUs.
3. Turn on the power enable switches.

The library goes through the initialization sequence. If someone opened the access doors while the library was off, the library performs a full audit.

Entering the Library

Note: Opening the library main door will trigger a full audit when the library comes back online.

1. Observe all safety precautions (see "[Safety Precautions when Entering the Library](#)" on page 18-2).
2. Take all drives offline (see "[Taking a Device Offline](#)" on page 16-2).
3. Take the library offline (see "[Taking the Library Offline](#)" on page 16-1).
4. Unlock the door.
5. Pull up on the door latch and open the door.
6. Before you exit the library, verify that there are no loose items in the library.
7. Close the door and latch it.
8. Lock the door and retain the key.
9. Bring the library online (see "[Turning On the Library](#)" on page 18-1 and "[Bringing the Library Online](#)" on page 16-2).

Safety Precautions when Entering the Library

WARNING: To prevent injury while inside the library, lock the access door open and retain the key.

- Verify the library is offline. Do not enter the library or move any of the robot mechanisms if you suspect the robots are on.
- Always leave the access door open while inside the library.
- Locate the mechanical door releases (yellow handles on the inside of the access doors). If the doors close while inside the library, push the mechanical release to unlock and open the door.
- Know the physical restrictions. Be careful not to bump your body or snag clothing on the arrays (there is only 0.4 m [18 in.] of aisle clearance).
- Avoid damaging the robot's mechanical or electronic components when manually moving a robot.

Opening the AEM Access Door

Caution: Opening the AEM door has the same effects on the library as opening the main library door. It causes an abrupt interruption of library activity and the library will audit the entire library when you shut the AEM door.

This procedure does not lower the internal AEM safety door.

1. Insert the library access door key in the Deadbolt Override lock and unlock the door. The key cannot be removed from the lock while it is in the unlocked position.
2. Lift the AEM access door latch and open the door. DO NOT force the AEM access door to open or close.

Power is cut to the robots, all in-process jobs stop, and the library takes the robots and AEM offline.

3. To close the AEM door, close and latch it. DO NOT force the AEM access door to open or close.
4. Lock the door and retain the key.

Once the door shuts, the library re-initializes, the robots initialize, the library does a full audit, and the library brings the AEMs online.

Manually Cleaning a Drive

Normally, either the library auto clean feature or the host tape management software manages drive cleaning. However, there may be occasions when you need to perform a manual clean. Refer to the drive manufacturer's documentation for information on whether manual cleaning is allowed.

Caution: Cleaning a drive before it is due is not recommended. Excessive drive cleaning can wear out a drive head prematurely.

1. Verify that the drive needs cleaning (see "[Viewing Device Status and Properties](#)" on page 14-2).
2. Display a list of cleaning cartridges (see "[Viewing Cleaning Cartridge Status](#)" on page 11-5). Verify there is a compatible cleaning cartridge for the drive.
3. Move a compatible cleaning cartridge from a system slot to the drive that needs cleaning (see "[Moving Cartridges \(Recovery Moves\)](#)" on page 11-1).
4. When the cleaning operation is complete, move the cleaning cartridge from the drive back to a system slot.

Manually Mounting and Dismounting a Cartridge

Refer to the drive documentation before manually mounting a cartridge.

Caution: Keep your hands clear of the drive's mechanical and electronic load components.

1. Record the vol-id, cartridge location, and the drive slot location provided by the library management software.
2. Locate the drive (see "[Viewing Library and Device Reports with the Reports Utility](#)" on page 15-1).
3. Locate the cartridge (see "[Locating a Cartridge](#)" on page 11-2).
4. Enter the library (see "[Entering the Library](#)" on page 18-2).

5. Orient the cartridge so that the hub gear is facing down and the vol-id label is facing you.
6. Push the cartridge into the drive. Do not force the cartridge into the tape drive. If you feel some resistance as you insert the cartridge, verify you are inserting the correct cartridge type for the drive.
7. To dismount the drive, press the **UNLOAD** switch on the front of the drive.
If the cartridge does not eject, refer to the drive documentation.

Command Line Interface Reference

The CLI is firmware-based. Therefore, some CLI commands listed below may be unavailable if you are running older versions of the library firmware.

Admin accessible CLI commands include:

- [audit](#)
- [capCommand](#)
- [cleaning](#)
- [config](#)
- [date](#)
- [drive](#)
- [hwActivation](#)
- [FibreConfig](#)
- [mediaValidation](#)
- [network](#)
- [partition](#)
- [reControl](#)
- [snmp](#)
- [ssh](#)
- [time](#)
- [traceRoute](#)
- [version](#)
- [whereAmi](#)

audit

This command performs a physical audit on all or part of the library.

audit

Displays help for the audit command, the same as "help audit".

audit *

Initiates a physical audit of the entire library. This command returns immediately and displays no results.

Example:

```
SL3000> audit *
requestId
requestId 9
Done
Failure Count 0
Success Count 1
COMPLETED
```

audit <device address> <address>

Performs a physical audit of a single address and displays the results.

- *<device address>* - specifies the robot to use in library, rail, column, side, row format.
- *<address>* - specifies the slot location to audit in library, rail, column, side, row format.

Example:

```
SL3000> audit 1,1,0,1,0 1,1,-10,1,1
requestId
requestId 9
Attributes Media Label #EMPTY..
Object Location 1,1,-10,1,1
Done
Failure Count 0
Success Count 1
COMPLETED
```

audit <device address> <start address> <end address>

Performs a physical audits of a range of addresses and displays the results.

- *<device address>* - specifies the robot to use in library, rail, column, side, row format.
- *<start address> <end address>* - specifies the starting and ending slot location to audit in library, rail, column, side, row format. Only the row is variable between the start and end addresses.

Example:

```
SL3000> audit 1,1,0,1,0 1,1,-10,1,1 1,1,-10,1,5
requestId
requestId 10
Attributes Media Label #EMPTY..
Object Location 1,1,-10,1,1

Attributes Media Label EN34410R
Object Location 1,1,-10,1,5
...
Done
Failure Count 0
Success Count 5
COMPLETED
```

audit multiRowScan {enable | disable | print} <device address>

Enables or disables multiple row scan audit capability to speed up audit time.

- **print** - prints the multi-row scan audit state.
- *<device address>* - specifies the robot to use in library, rail, column, side, row format.

Example:

```
SL3000> audit multiRowScan print 1,1,0,1,0
requestId
requestId 8401
Attributes Multi Row Scan enabled
Object      Robot      1,1,0,1,0
Done
Failure Count 0
Success Count 1
COMPLETED
```

capCommand

This command is for managing CAPs.

capCommand

Displays help for the capCommand command, the same as "help capCommand".

capCommand forceUnreserve <device address>

Forces the release of a CAP. If cartridges are in the CAP, the reservation changes to "default". If there are no cartridges in the CAP, the reservation changes to "none".

- *<device address>* - specifies the CAP to release in library, rail, column, side, row format.

capCommand {lock | unlock} <device address>

Locks or unlocks a CAP specified by the device address.

- *<device address>* - specifies the CAP to lock/unlock in library, rail, column, side, row format.

capCommand resetCap {left | right | both}

This command forces the reset of a cap string or strings based on the provided side argument.

Example:

```
SL3000> capCommand resetCap right
requestId
requestId 17002
Done
Failure Count 0
Success Count 1
COMPLETED
```

cleaning

This family of commands displays and controls cleaning and diagnostic cartridge-related functions within the library. Only customers with the media validation feature should use these commands.

cleaning

Displays help for the cleaning command, the same as "help cleaning".

cleaning list {cleaning | diagnostic}

Lists all cleaning or diagnostic cartridges in the system slots.

Example:

```

SL3000> cleaning list cleaning
requestId
requestId 9001
Attributes Expired false
Label CLN0080U
Location 1,1,-12,1,13
Max Usage Count 100
Media Type 9840_Cleaning
Status ok
Usage Count 0
Object Cartridge cleaning

```

cleaning import <cap device address>

Imports cleaning and diagnostic cartridges to system slots. Only one import/export operation is allowed at a time. There must be a minimum 2 empty system slots for SL3000 libraries to allow imports.

- *<cap device address>* - specifies the CAP to use for the import operation, in library, rail, column, side, row format.

Example:

```

SL3000> cleaning import 1,1,5,2,0
requestId
requestId 10101
Message CAP open(ing). Place cartridges to import in CAP, then close CAP.Use
CONTINUE cmd to proceed...
Done
Failure Count 0
Success Count 0
COMPLETED

```

cleaning export <cap device address> cleaning [select expired]

Exports cleaning cartridges. Only one import/export operation is allowed at a time.

- *<cap device address>* - specifies the CAP to use for the export operation, in library, rail, column, side, row format.

Example:

```

SL3000> cleaning export 1,1,5,2,0 cleaning
requestId
requestId 9601
Address 1.1.-12.1.12
Success Cartridge Exported
Volume Label CLN002CU
Message CAP open(ing). Remove cartridges, then close CAP.Use CONTINUE cmd to
proceed...
Done
Failure Count 0
Success Count 1
COMPLETED

```

cleaning export <cap device address> <cartridge address>

Exports a specific cleaning or diagnostic cartridge to the specified cap. Only one import/export operation is allowed at a time.

- *<cap device address>* - specifies the CAP to use for the export operation, in library, rail, column, side, row format.

- *<cartridge address>* - specifies the location of the cartridge to export in library, rail, column, side, row format. The specified cartridge must be in a system slot and must be either a cleaning or diagnostic cartridge.

Example:

```
SL3000> cleaning export 1,1,5,2,0 1,4,-12,1,12
requestId
requestId 9601
Address      1.4.-12.1.12
Success      Cartridge Exported
Volume Label CLN002CU
Message CAP open(ing). Remove cartridges, then close CAP.Use CONTINUE cmd to
proceed...
Done
Failure Count 0
Success Count 1
COMPLETED
```

cleaning threshold list

Displays a list of cleaning cartridge types and their warning thresholds. Each cleaning cartridge type has 4 attributes:

- Index - cleaning cartridge type used by the "cleaning threshold set" command
- Media type - the type of cleaning cartridge used
- Maximum usage count - recommended max usage by tape manufacturer
- Warning threshold value - user-defined threshold that determines when a warning status is set for a cleaning cartridge once its usage count reaches that threshold.

Example:

```
SL3000> cleaning threshold list
requestId
requestId 15001
Attributes
Object      Index          1
             Media Type      SgtUltrium1_Cleaning
             Recommend Max Usage 100
             Warning Threshold 0
Attributes
Object      Index          3
             Media Type      T10000_Cleaning
             Recommend Max Usage 50
             Warning Threshold 0
```

cleaning threshold set <warning threshold value> <list index number>

Sets a warning threshold value for a particular cleaning cartridge type.

- *<warning threshold value>* - can be any positive integer up to 1000. A value of 0 indicates no warning threshold.
- *<list index number>* - cleaning cartridge type as specified by the index number from the table listing of the "cleaning threshold list" command.

Example:

```
SL3000> cleaning threshold set 55 11
requestId
requestId 15101
Attributes
```

```
Object      Success true
Done
COMPLETED
```

cleaning driveWarning set { on | off }

Sets the drive cleaning warning flag to either on or off.

- **on** - the drive health status will be set to warn if it needs cleaning
- **off** - the drive health status is not affected if the drive needs cleaning

config

This command will either display the current physical library configuration or set library configuration parameters.

config

Displays help for the config command, the same as "help config".

config print

Displays the current physical library configuration.

config ilc print

Display the ilc status.

config ilc {enable | disable}

Enables or disables the Inter-Library Communications (ILC) LAN. If a disable is requested, the library must first be taken offline using the "accessState offline <device address>" command.

config print

Displays the current physical library configuration.

config serviceInfo print

Displays the library service information.

config serviceInfo set

Sets service information: contact 'contactName' phone 'phoneNumber' streetAddr 'streetAddress' city 'city' state 'state' country 'country' zip 'zipCode' description 'description data'.

The maximum string length is 31 characters. Each string must be delimited by '' (single quotes) to provide the ability to use spaces and other characters.

Example:

```
SL3000> config serviceInfo set city 'Denver' contact 'Andy' country 'USA'
description 'Manager' phone '303 222-4444' state 'CO' streetAddr '1 tape drive'
zip '80027'
```

```
requestId
requestId 1512402
Device serviceInfo
Success true
Done
Failure Count 0
Success Count 1
COMPLETED
```

date

This command sets the library date in Greenwich Mean Time (GMT).

date

Displays help for the date command, the same as "help date".

date print

Displays the current system date.

date <MM> / <DD> / <YYYY>

Sets the system date. In a library complex, the library with libraryId = 1 is the master. Change the date on the master library.

- <MM> - two digit month
- <DD> - two digit day
- <YYYY> - four digit year

drive

This command displays information about the drives or executes the drive utilities such as adiEnable, fastLoad, power, and rewindUnload.

drive

Displays help for the drive command, the same as "help drive".

drive adiEnable {on | off | print}

Turns on or off or prints status of drive discovery with ADI. Once enabled, any subsequently added drives will attempt ADI drive discovery. To enable ADI for all ADI capable drives in the library, the library must be rebooted.

drive fastLoad {on | off | print}

Turns on or off or prints the status of the fastLoad feature. FastLoad changes the behavior of drive mounts (move commands). With fastLoad on, the robot will not wait for a complete load of a PUT to a drive, but will go immediately to the next operation. Also changes the behavior of the rewindUnload command to return immediately, not waiting for the drive to unload. The state of the fastLoad applies to all drives.

Note: This command only affects commands issued in the same CLI session where this command was issued.

drive print { <drive address> | * }

Displays summary drive information: location, state, status, type, firmware version, interface type, in use, serial number, state (online/offline), status (ok, warning, or error), and drive vendor.

- <drive address> - specifies the drive in library, rail, column, side, row format.
- * - displays drive information for all drives in the library

drive search {on | off} <drive address>

Causes the green LED on the drive tray to blink. Blinking continues until the search off command issued. Used to locate a drive within the library.

- <drive address> - specifies the drive in library, rail, column, side, row format.

hwActivation

This command activating certain library features after purchasing a hardware activation permit.

Note: The library must be rebooted when disabling openVolser, dualRobot, or redundant electronics.

hwActivation

Displays help for the hwActivation command, same as "help hwActivation".

hwActivation addLicenseFile

Adds a license file. The license file must be named *SL3000_license_config.dsf*. The full path name being */usr/local/SL3000_license_config.dsf*.

hwActivation deleteFile <index>

Deletes the specified installed feature file.

- *<index>* - specifies file number to delete as specified in the library controller hwActivation module database. See "[hwActivation listFiles](#)".

hwActivation listFiles

Lists the installed feature files in the library controller hwActivation module database.

hwActivation print

Lists all of the enabled features in the library controller hwActivation module database.

FibreConfig

This command obtains and sets multi-port fibre channel configurations for the library controller. The Fibre Channels controls and displays by this command are not to be confused with the fibre channel configurations to tape drives. This command is only available on the SL3000.

fibreConfig print

Displays the status of the library fibre channel connections.

fibreConfig ports print

Displays the number of multi fibre port channels enabled.

fibreConfig config <hard|soft> <loopId> <portNum>

Sets either hard or soft addressing, and sets the fibre loop ID if hard addressing is enabled to the provided value. The loop ID is set to 126 if hard addressing is disabled. This configuration is on a per port basis.

fibreConfig ports set <number to enable>

Sets the number of multi fibre port channels to enable. The MultiFibrePort license limitation and the physical hardware determine the maximum number of ports to enable.

mediaValidation

This command manages the media validation feature.

mediaValidation

Displays help for the mediaValidation command, same as "help mediaValidation"

mediaValidation print { all | poolOnly } { * | @ }

Displays drive locations of the media validation pool.

- **all** - lists all drive slots
- **poolOnly** - lists only drive slots in the media validation pool
- ***** - displays only information for the target library
- **@** - displays information for the entire complex

mediaValidation reservation clear <drive address>

Clears media validation reservation for specified drive.

- *<drive address>* - specifies the drive in library, rail, column, side, row format.

mediaValidation stopValidation <drive address>

Stops a validation currently in progress. Cartridge is returned to source storage slot.

- *<drive address>* - specifies the drive in library, rail, column, side, row format.

network

This command configures and displays network configuration for the controller card.

network clone [Port 2B IP address] [Port 2A IP address]

Used for redundant electronics configuration. Copies all port, routing, and IP policy configurations to side B HBC. IP addresses are replaced with the ones specified in the command for side B. If no port IP address is specified, then they are not set on side B.

network config print

Displays the target library side (A or B) that is set for network commands.

network config side {a | b}

Sets the target library side for network commands.

network config clear

Clears the network configuration. This command stops network connectivity. Reconfiguration requires access to the serial port on the HBC card.

network export

Exports library network configuration file (.lnc) and generates a network configuration script (.scr). It can only be used in cases where no prior network configurations have been set.

network gateway <IP address>

Sets the external network default gateway.

network gateway clear

Clears the external network default gateway.

network import

Imports a library network configuration file (.lnc).

network ip <IP address>

Sets the IP address of port 2B.

network ip address add <IP address> dev {2A | 2B}

Sets the IP address of a particular port.

network ip address del <IP address> dev {2A | 2B}

Removes the IP address of a port.

network ip address show [dev {2A | 2B}]

Displays the current address information for a particular port or both ports if dev is not specified.

network ip link set dev {2A | 2B} {up | down}

Sets the operation status of a port, which controls whether a port can send and receive Ethernet traffic.

- **up** - sets port online
- **down** - sets port offline

network ip policy {enable | disable} dev {2A | 2B}

Enables or disables policy routing for device 2A or 2B.

network ip policy status

Displays policy routing status for devices 2A and 2B.

network ip policy route {add | del} <IP address> dev {2A | 2B}

Adds or deletes a static route to policy for device 2A or 2B.

network ip policy route {add | del} <IP address> via <Gateway IP address> dev {2A | 2B}

Adds or deletes a static route to policy for device 2A or 2B via gateway.

network ip policy route show [dev {2A | 2B}]

Displays policy route information for device 2A or 2B.

network ip route add default via <IP address>

Sets the default gateway routing IP address.

network ip route delete default

Deletes the default gateway routing IP address.

network ip route {add | del} <IP address [/netmask] > dev {1A | 1B | 2A | 2B}

Adds or deletes a static IP (Internet Protocol) routing address for a specified host. This command also enables a user to set the netmask for a particular port.

Example:

```
SL3000>network ip route add 129.80.81.59/24 dev 1B  
COMPLETED
```

network ip route {add | del} <IP address [/netmask] > via <Gateway IP address>

Adds or deletes a static route to a destination network IP gateway address.

network ip route show [dev {2A | 2B}]

Displays the current routing table information or routing table information for a particular port.

network name <host name string>

Sets the host name.

network netmask <netmask>

Sets the external network netmask in xxx.xxx.xxx.xxx form.

network print

Displays the current network configuration for the external Ethernet ports (2A and 2B).

partition

This command displays the current status or disables the partition feature.

partition

Displays help for the partition command, same as "help partition".

partition autoClean set { * | <Partition Id> }

Set auto clean in a specified partition (0, for a non-partitioned library).

partition attribute status { * | <Partition Id> }

Displays the status attributes of a single specified partition or all partitions.

partition fastLoad set '<partitionId-mode, partitionId-mode, ...>'

Sets the fastLoad mode for a one or more specified partitions. Currently the only valid modes are true or false. This command is only available on the SL3000.

Example:

```
SL3000> partition fastload set '1-true,3-false'
requestId
requestId 40901
Attributes Success true
Object
Done
Failure Count 0
Success Count 2
COMPLETED
```

partition getCapacity

Displays the capacity values for library or any defined partitions.

partition get state <Partition Id>

Displays the current state of the specified partition(s). This command is available on SL3000 libraries only

partition predefined file <partition file number>

Uses a predefined partition text file to set the library partition configuration. Each file name consists of the word "partition" and a numeric value ie "2" and a ".txt" extension. The predefined files are below.

- partition1.txt – Non-partitioned Base with a HLI interface.
- partition2.txt – Non-partitioned Base with a SCSI interface.
- partition3.txt – One partitioned Base with a HLI interface.
- partition4.txt – One partitioned Base with a SCSI interface.
- partition5.txt – Two partitioned Base with a HLI interface.
- partition6.txt – Two partitioned Base with a SCSI interface.
- partition7.txt – Two partition Base w/DEM HLI and SCSI partitions.
- partition8.txt – Two partition Base w/DEM SCSI interface.
- partition9.txt – Multiple partitions (stripes) HLI interface.
- partition10.txt – Multiple partitions (stripes) SCSI interface.

partition11.txt – Multiple partitions (random) HLI interface.
partition12.txt – Multiple partitions (random) SCSI interface.

Example:

```
SL3000> partition predefined file 5
requestId
requestId 7601
Done
Failure Count 0
Success Count 1
COMPLETED
```

partition setCapacity { <Partition Id> , <Capacity> }

Sets the capacity for the designated partition. Existing partitions not listed in the command will have their capacity set to zero.

Example:

```
SL3000> partition setCapacity 1,200 2,50 3,600
requestId 7601
Done
Failure Count 0
Success Count 1
COMPLETED
```

partition setNonPartitionedHLI

Sets the partition to hli0. If there are any drives in the media validation pool, they must be removed beforehand. If in complex, it sets all the libraries to hli0.

partition set state {online | offline} <Partition Id>

Sets the current state (offline/online) of a specified partition.

partition set {hli | scsi}

Sets the interface type for the entire library. Available on SL3000 only.

partition status

Displays the current partitioning status.

reControl

This command controls/switches the redundant electronics and retrieves the library controller redundant electronics statuses.

reControl

Displays help for the reControl command, same as "help reControl".

reControl status [<library address> | *]

Retrieves the redundant electronics status.

- <library address> - specifies the library in library, rail, column, side, row format. For example: 2, 0, 0, 0, 0.
- * - retrieves status from all libraries in a complex

snmp

This command configures the Simple Network Management Protocol (SNMP). For detailed information, see the *SNMP Reference Guide* on OTN.

ssh

This command controls configuration for the ssh daemon/server which resides on the HBC. This is the protocol utility which SLC and other various applications use to connect to the library controller.

ssh print

Prints the current ssh daemon protocol settings.

ssh set version1and2

Sets the ssh daemon protocol restriction to v1 and v2. (this is the default). The ssh server is restarted.

ssh set version2

Sets the ssh daemon protocol restriction to v2 only.

time

This command sets the library time in military time notation.

time

Displays help for the time command, same as "help time".

time print

Displays the current system time.

time <HH> : <MM>

Sets the system time. Resolution is within one minute. In a library complex, the library with libraryId = 1 is the master. Change the time on the master library.

- <HH> - two digit hour
- <MM> - two digit minute

time <HH> : <MM> : <SS>

Sets the system time. Resolution is within one second. In a library complex, the library with libraryId = 1 is the master. Change the time on the master library.

- <HH> - two digit hour
- <MM> - two digit minute
- <SS> - two digit second

traceRoute

This command traces the network route to a specified IP address.

traceRoute <IP Address>

Executes a traceRoute to the IP address specified.

version

This command displays the customer version and the versions of the software for the device(s) requested.

version print [<device address> | *]

Displays the software version of code for a device or all devices.

- *<device address>* - specifies the device in library, rail, column, side, row format.

whereAmi

This command displays the system and logic card information relative to the library and card related to the redundant electronics command being executed.

whereAmi

Displays the information relating to where the command is being issued.

Example:

```
SL3000> whereAmi
Host Name: gulibtst02b
Port 2B IP Address: 172.20.151.24
Library Type: SL3000
HBC side: B
Active side: B
COMPLETED
```

Redundant Electronics Overview

The optional redundant electronics (RE) feature provides failover protection for the library controller. If the library controller or drive controller experiences errors, operations can switch to the standby controller. The library controller and drive controller installed on the same side of the card cage are always switched as a pair.

RE allows an Oracle support representative to replace a faulty card while the library is online and provides minimal disruption during firmware upgrades.

Note: Any reference to the HBC card also refers to the HBCR card.

- [Requirements for Redundant Electronics](#)
- [Redundant Electronics Configuration Examples](#)
- [What Occurs During a Failover](#)
- [Factors that Prevent an RE Switch](#)
- [Factors that Initiate an Automatic Failover](#)
- [Ways to Initiate a Manual Failover](#)
- [Firmware Upgrades when Using RE](#)

See Also

- ["Updating HLI Host Management Software for RE" on page 8-4](#)
- ["Determining the Status of an RE Controller Card" on page 17-6](#)
- ["Initiating a Manual RE Switch Using SLC" on page 17-6](#)

Requirements for Redundant Electronics

- Two library controller (HBC) cards
- Two drive controller (HBT) cards

Note: To enable ADI mode, both cards must be high-memory HBTs.

If using Media Validation, Oracle recommends both HBT cards are high-memory.

- Minimum SL3000 firmware version FRS_3.0 and SLC version 5.00

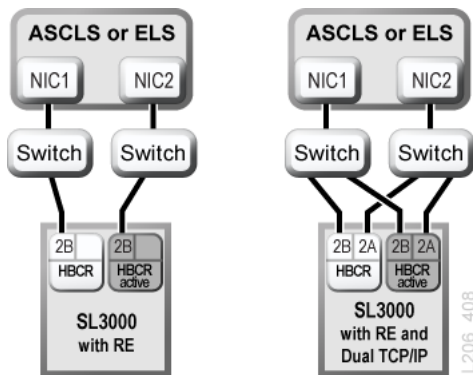
- Hardware activation file (see ["Activating Optional Features"](#) on page 5-1)
- HLI host with TCP/IP or FC-SCSI host using ACSLS (see ["Updating HLI Host Management Software for RE"](#) on page 8-4). RE is not available to hosts using a native FC-SCSI interface.

Redundant Electronics Configuration Examples

Each library controller card requires its own unique IP address. If the dual TCP/IP feature is active on the library, each card requires two unique IP addresses: one for the primary port 2B and one for the secondary port 2A. Therefore, a library with RE and dual TCP/IP requires four unique IP addresses.

On each controller card, port 2B and 2A must be on different broadcast domains. However, port 2B on the active card and port 2B on the standby card can be on the same broadcast domain. The same is true for the 2A ports.

Figure B-1 Redundant Electronics Configuration Examples



For more information about dual TCP/IP, see ["Dual TCP/IP Overview"](#) on page C-1.

What Occurs During a Failover

In a failover, the active library controller attempts to complete all in-process jobs and copies the cartridge database to the standby controller card. If the database cannot be copied (usually only in a sudden failure), you must perform an audit after failover (see ["Auditing the Library"](#) on page 13-1). The library returns any in-transit cartridges to their home slots. The library places any cartridges it cannot return to a home slot in a system slot for host recovery (see the host software documentation).

After all in-process jobs complete or time out, the cards switch roles. The standby controller becomes active and the previously active controller becomes the standby. If the previously active controller cannot bring up the standby software, the controller enters a fault state.

Effect of a Failover on Users

- Users of tape management software (Symantec or Virtual Storage Manager) do not see an interruption.
- HLI host applications queue requests during the failover process for completion after the failover switch. For ACSLS, only mount and dismount requests are affected (see the host software documentation).

- SLC and CLI connections are terminated. You must re-establish connections to the library using the IP address or DNS alias of the new active library controller (the former standby controller).

Factors that Prevent an RE Switch

- The standby library or drive controller is in a fault or eject state.
- The standby code is not running on the standby library or drive controller cards.
- A firmware download or card initialization is in progress.

Factors that Initiate an Automatic Failover

An automatic failover can be initiated by either the active or standby library controller.

The active library controller initiates an automatic failover when:

- Its partner drive controller card is not installed or it is not communicating.
- It detects a catastrophic internal software error.

The standby library controller initiates an automatic failover if the active controller is not functioning normally.

Ways to Initiate a Manual Failover

Note: Before initiating a manual switch, you should verify that the standby library and drive controllers are running normally (see ["Viewing Device Status and Properties"](#) on page 14-2).

- **Host tape management** (ACSLS or ELS) — Failover can be initiated from either the active or standby library controller. The standby library controller accepts only `set host path group` and `force switchover` HLI requests.
- **SLC** — Failover is initiated from the active library controller only (see ["Initiating a Manual RE Switch Using SLC"](#) on page 17-6).
- **CLI** — Failover can be initiated from either the active or standby library controller. This function is only available to Oracle support representatives.

You may want to perform a manual switch after initial installation of the standby cards, after a firmware upgrade, or periodically to check that the failover function is working properly. It is not possible to manually switch the library controllers without the drive controllers — the controllers are always switched as a pair.

Firmware Upgrades when Using RE

Firmware upgrades for libraries with RE are minimally disruptive to library operations. You can load and unpack new code simultaneously on the active and standby controller cards and on all devices. The code is then activated, and the active and standby controllers and most devices are re-initialized. Under most circumstances, robot initialization is bypassed.

The loading, unpacking, and activation of code are not disruptive to library operations until the library is rebooted. During the reboot process (which takes approximately 10 minutes), the HLI host applications (ACSLS and ELS) queue all mount and dismount

requests. After the reboot is complete, the queued requests are submitted to the library controller.

See "[Upgrading Library Firmware](#)" on page D-1 for firmware download and activation information.

Dual TCP/IP Overview

Dual TCP/IP provides two separate connections between the library host (ACSLs or ELS) and the HBC/HBCR controller card using primary port 2B and secondary port 2A. Dual TCP/IP prevents a loss of connection between the library and host by automatically avoiding a failing communication path.

- [Minimum Requirements for Dual TCP/IP](#)
- [Using a Shared Network](#)
- [Dual TCP/IP Configuration Examples](#)

See Also

- ["Configuring Dual TCP/IP"](#) on page 8-5
- ACSLS or ELS documentation.

Minimum Requirements for Dual TCP/IP

- ACSLS 7.1 with PUT0701 for Solaris or AIX. Oracle recommends ACSLS 8.1 or above.
- NCS 6.2 with the following PTFs for HSC/MVS/VM: SOS620 L1H168G, SMS620 L1H168F, and MSP: MSP PTF LF620DL.
- The switch or router ports must be configured to auto negotiate. The SL3000 ports are configured to auto negotiate by default and support 10/100 Mbps speeds.

Using a Shared Network

Note: Oracle recommends a private network for maximum throughput, minimum resource contention, and higher security.

If you must use a shared network:

- Directly connect the library to a switch or router that filters out undirected (broadcast) traffic.
- Place the library on its own subnet. This may protect the library from receiving broadcast messages.
- Use a managed switch or router to:
 - Set priorities on ports to supply the host and library with higher priority.

- Provide dedicated bandwidth between the host and library.
- Create a virtual local area network (VLAN) between the host and library.
- Use a virtual private network (VPN) to insulate host-to-library traffic from other interference, such as irrelevant broadcasts.

Network Broadcast Issues on a Shared Network

Broadcasts sent to all network nodes may be directed to the library. The library cannot efficiently process requests while it is receiving these irrelevant broadcasts. As a result, the host may determine the connection to the library is lost.

Heavy network traffic can also overwhelm the Ethernet controller on the HBC/HBCR card. As a result, the controller continuously resets.

ARP Floods on a Shared Network

The SL3000's processor can be overwhelmed by floods of address resolution protocol (ARP) broadcasts. You should connect the library behind a switch or router.

Dual TCP/IP Configuration Examples

- [ACSLs Dual TCP/IP and Shared Subnets Example](#)
- [ACSLs Dual TCP/IP Through a Public Network Example](#)
- [ACSLs High Availability Dual TCP/IP Example](#)
- See also "[Redundant Electronics Configuration Examples](#)" on page B-2 for an example of RE and dual TCP/IP

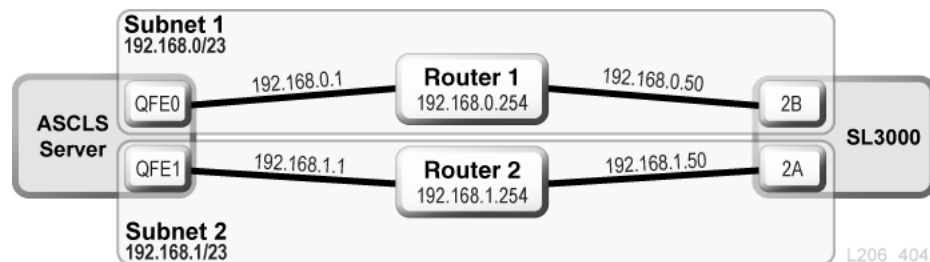
ACSLs Dual TCP/IP and Shared Subnets Example

In this example, the ACSLS server and the library share two separate subnets. The SL3000 uses a one-to-one relationship with the network interfaces on the ACSLS server. The network interface card on subnet 192.168.0/23 connects to port 2B and the network interface card on subnet 192.168.1/23 connects to port 2A.

Routing

Force a relationship by using the UNIX `route` commands. For more information, see the *ACSLs Administrator's Guide* and *SL3000 Installation Manual*.

Figure C-1 ACSLS Dual TCP/IP with Shared Subnets

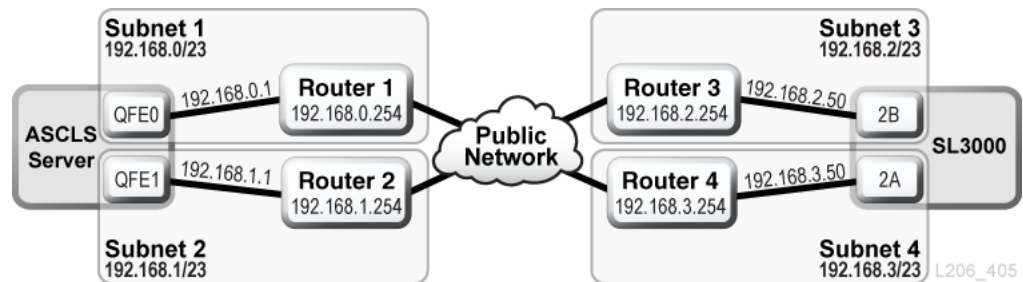


ACSLs Dual TCP/IP Through a Public Network Example

In this example, the ACSLS server contains two network interfaces that reside on two separate subnets. Both interfaces pass through a public network and into two different

subnets before connecting to the SL3000 library. This configuration uses the same commands as in the first example.

Figure C-2 ACSLS Dual TCP/IP



ACSLs High Availability Dual TCP/IP Example

The following example is an ACSLS High Availability (HA) environment that requires dual TCP/IP. The purpose of the HA environment is to have two ACSLS servers, one active and one standby. In this configuration, two ACSLS servers connect six network interfaces (three on each server) to two separate subnets. A third subnet connects the two ACSLS servers through a public network.

For more information on ACSLS HA and dual TCP/IP, see the *ACSLs Administrator's Guide*.

Routing

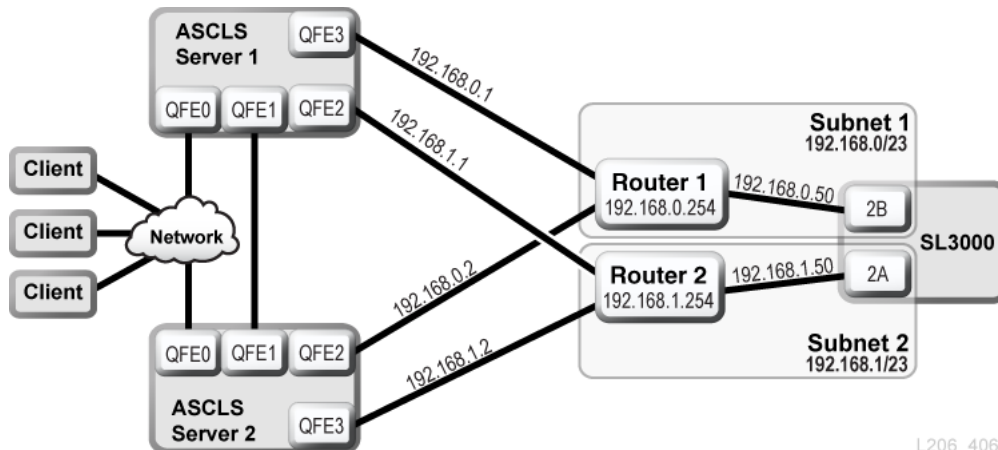
You should separate the SL3000 network interfaces over two different subnets when using ACSLS HA. The two different ACSLS servers use different network interfaces; therefore, you should add custom route entries to both ACSLS HA servers. Add the IP addresses for both servers to the SL3000 configuration.

Routing Tables

Add custom entries to the routing tables on the ACSLS server; however, any customized routing table entries will be lost after a restart of the ACSLS server. To maintain custom routing table entries, create scripts to add custom routes. Place the scripts in the rc directory structure for automatic execution at boot time.

For more information, refer to the *ACSLs Administrator's Guide*.

Figure C-3 ACSLS High Availability Dual TCP/IP



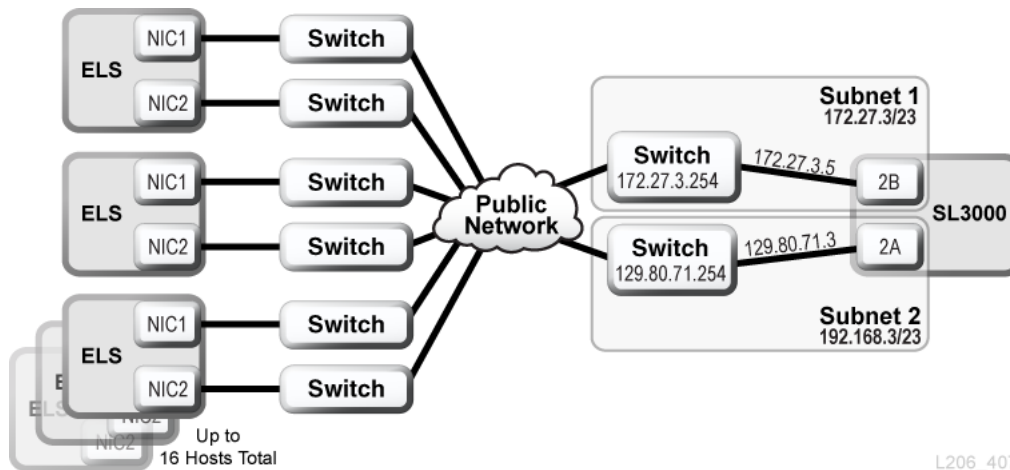
L206_406

ELS/HSC and Dual TCP/IP Example

The following example shows a preferred configuration for mainframe systems using dual TCP/IP. The mainframe host contains two network interfaces residing on two separate subnets. Each connection travels through a public network, then connects to two different subnets before reaching the SL3000 library.

For more information, refer to the ELS documentation.

Figure C-4 ELS/HSC Dual TCP/IP



L206_407

Upgrading Library Firmware

The library controller stores up to two versions of firmware. This allows the library to continue normal operations, running one version of firmware, while you load and unpack an upgraded version. Since activating firmware requires a reboot, this allows you to upgrade firmware at a convenient time for library users.

After activating the upgraded code, the library retains the previous version of code, so that you can revert without having to download and unpack it again. However, reverting to a previous version of code is not recommended, you should only do so when instructed to by Oracle support.

- [Downloading Firmware from My Oracle Support](#)
- [Loading Firmware](#)
- [Activating Firmware](#)
- [Downgrading Firmware](#)

Note: Library firmware does not contain drive code upgrades (see the drive-specific documentation for drive code information).

Downloading Firmware from My Oracle Support

1. Go to My Oracle Support (MOS): <https://support.oracle.com/>
2. Sign in to your MOS account.
3. Click the **Patches & Updates** tab.
4. In the Patch Search tab, click **Product or Family (Advanced)**.
5. In the Product field, enter **SL3000** and then select **Sun StorageTek SL3000 Modular Library System** from the drop-down list.
6. In the Release field, select the firmware version.
7. Click **Search**.
8. Click the link under Patch Name.
9. Click **Download** and save the file to a location on your system. Extract the ZIP archive to a folder on your system.

Loading Firmware

Note: This procedure is for upgrading to firmware FRS_4.50 or above. The current firmware must be a minimum of FRS_4.40 and SLC 6.65. To install an older version, to downgrade firmware, or if your current firmware version is below FRS_4.40 contact Oracle support.

Note: Code load is not available at the local operator panel.

1. Download the code to the system you will use to run SLC (see "[Downloading Firmware from My Oracle Support](#)" on page D-1).
2. Review the pre-requisites and code load instructions provided with the download.
3. Log in to SLC.
4. Select **Tools > Diagnostics**, and then select the **Library** in the device tree.
5. Click the **Load Code** tab.
6. Click **Browse**, and then locate the firmware package on your system. Within the firmware package, select the SL3000_FRS<X.XX>_firmware.jar file.
7. In the File Load Console Window, verify the file contents contain the FRS version of code you intend to load.

```

File Load Console Window
---- FILE CONTENTS ----
FRS_X.XX (Y.YY.YY)
library kernel.plmage 6.86.11 kernel.plmage
library disk.hbc.plmage 7.86.28 disk.hbc.plmage
  
```

8. Click the **Load** button. The process could take up to 10 minutes as the library loads and then unpacks the code.
9. Verify the package unpacked successfully (Failed 0). If there are any failures, contact Oracle support.

```

File Load Console Window
Successful v27.01.10_simp.tar.gz - unpacked:ILC1
Successful v21.15.00_u-boot.bin - unpacked:ILC1
Unpack completed
---- FINAL UNPACK STATUS ----
Successful 48
Failed 0
  
```

Activating Firmware

Note: To activate code, the library must reboot. Schedule the activation accordingly.

1. If you have not already downloaded and unpacked the code, see "[Loading Firmware](#)" on page D-2.

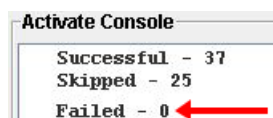
2. Take the library and all drives offline before activating new code (see "[Taking the Library Offline](#)" on page 16-1).
3. In SLC, select **Tools > Diagnostics**, and then select the **Library** in the device tree.
4. Click the **Activate Code** tab.
5. From the Target drop down list, select the code package to activate (in this case **SL3000 Code**). In the Available Versions section, select the code version to activate (usually the highest FRS version listed).



6. Click the **Activate** button. Read the caution, and then click **OK**. Approximate activation time is 45 minutes.

Caution: Do not open the door or power cycle the SL3000 or robots during this phase. Potential damage can be done to controller cards. Do not reboot any devices in the library or execute any operations on the library while activating code.

7. Once the Overall Progress bar reaches 100%, verify that the code activated successfully (Failed - 0). Skipped means that the version is already on the device, so activation is not necessary. If something failed, contact Oracle support.



8. Once the activation process finishes and there are no failures, click **Reboot** to reboot the library.
9. Click **OK** to terminate the SLC session. After library initialization completes, you can log back in to SLC.

Approximate time is 3 to 5 minutes for SLC reconnect and 5 to 8 minutes for all devices to become green on SLC (if the front access doors have not been opened, otherwise, an audit is automatically triggered, which can take 20-120 minutes depending on the size of the library).

Note: If you encounter errors while updating firmware, contact Oracle support.

Downgrading Firmware

Contact Oracle support if you wish to downgrade code or install a version of code below FRS_4.40.

Library Addressing Reference

Note: "Left" and "right" are in reference to viewing the library from the CAP-side (front) unless otherwise specified.

- [Comparison of Addressing Schemes](#)
- [Understanding the Center Line](#)
- [Internal Firmware Addressing Scheme](#)
- [HLI-PRC Addressing Scheme](#)
- [FC-SCSI Element Numbering](#)
- [Tape Drive Hardware Numbering](#)
- [Wall Diagrams](#)

See Also

- ["Using Reserved System Slots"](#) on page 11-5

Comparison of Addressing Schemes

- **Internal Firmware Addressing Scheme** (Library, Rail, Column, Side, Row) — used by the firmware and internal communications to represent all devices and locations within the library.
 - Begins at 1 and uses negative numbers.
 - Side indicates the front or rear wall of the library.
 - Drive bays have column values 1 to 4 (BM) and -1 to -4 (DEM).
- **HLI-PRC Addressing Scheme** (LSM, Panel, Row, and Column) — used by HLI clients, such as ACSLS and ELS, to represent library locations and components.
 - Begins at 0 with no negative numbers.
 - Panel indicates the front or rear wall of a specific module.
 - Drive bays always have column value of 0.
- **FC-SCSI Element Numbering** — used by hosts with FC-SCSI connections to the library.
 - Uses single positive number for the element ID.
 - Cartridge slots begin at 2000, tape drives begin at 1000, CAPs begin at 10.

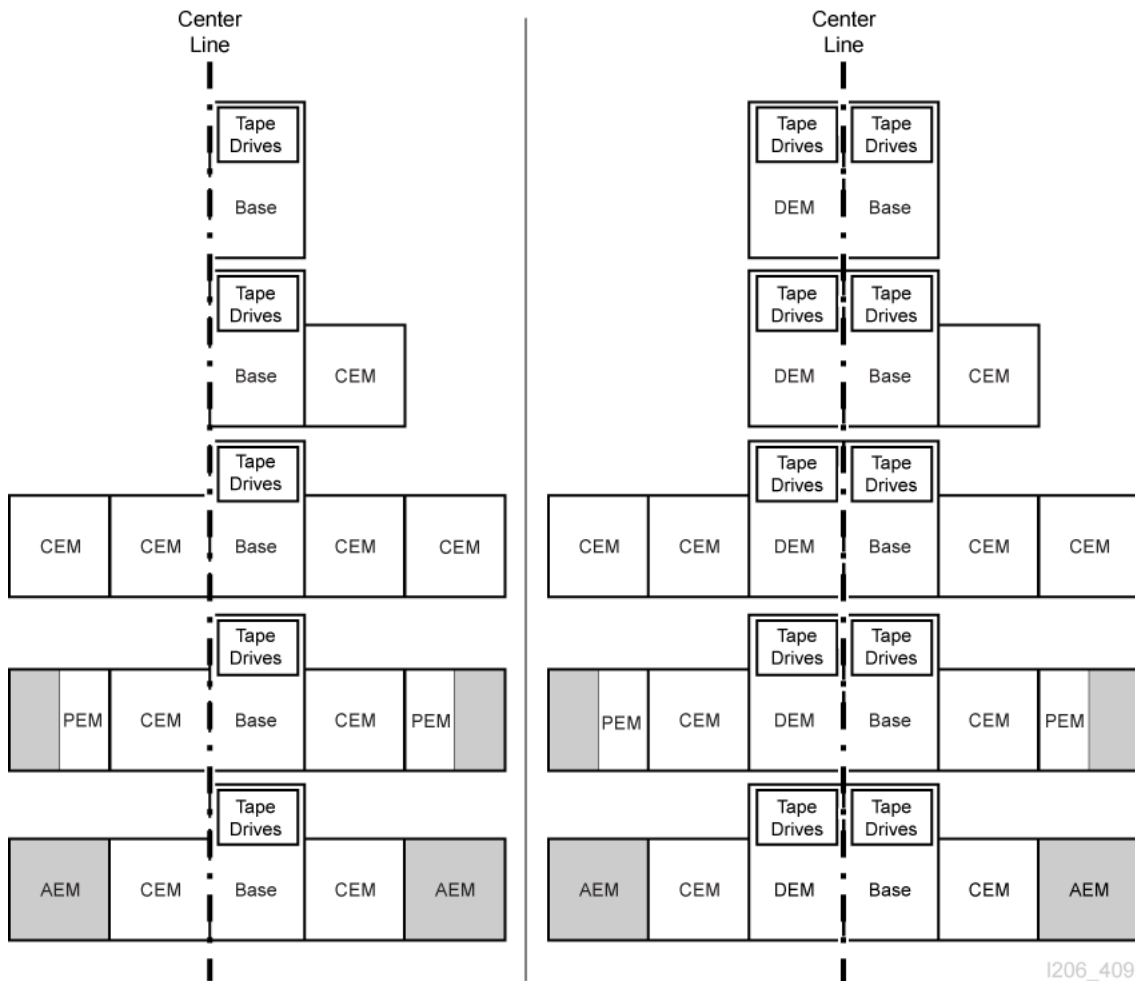
- Inactive slots and empty drive bays are skipped when element numbers are assigned.
- Default element numbering is reassigned with any library configuration change.
- Element numbering depends on active capacity.
- **Tape Drive Hardware Numbering** — drive slot locations assigned by the HBC card.

Understanding the Center Line

Internal firmware and HLI addressing use the center line of the library as a reference point. When you add modules to either end of the library, the existing components do not change address number.

Figure E-1 shows the location of the centerline for various library configurations.

Figure E-1 Center Line Location in Sample Libraries



Internal Firmware Addressing Scheme

- [Internal Firmware Addressing Overview](#)

- [Internal Firmware Addressing of Tape Drives](#)
- [Internal Firmware Addressing of Robots](#)
- [Internal Firmware Addressing of CAPs](#)

Internal Firmware Addressing Overview

Internal firmware addressing designates physical location using Library, Rail, Column, Side, Row (L,R,C,S,W).

Library

Always equal to 1.

Rail

Always equal to 1.

Column

Indicates the horizontal location of a cartridge or drive referenced from the center line (see "[Understanding the Center Line](#)" on page E-2).

- Positive (+) value indicates right of center line
- Negative (-) value indicates left of center line

Base Module

- Contains columns 1 to 6 for data cartridges and 1 to 4 for tape drives.

DEM

- Contains columns -1 to -6 for data cartridges and -1 to -4 for tape drives.

CEM

- Contains six columns for data cartridges.
- Column numbering continues consecutively from the adjacent module. However, if there is no DEM, a CEM placed directly to the left of a Base contains columns -7 to -12 (columns -1 to -6 are skipped).

PEM

- Contains only three columns for data cartridges. The outer most three columns are inactive.

AEM

- AEM columns are numbered as if a DEM and four CEMs are installed to the left of the Base Module and four CEMs are installed to the right.
- Left AEM columns are always numbered -33 to -31.
- Right AEM columns are always 31 to 33.

Side

Indicates the front wall (CAP side) or rear wall (drive side) of the library.

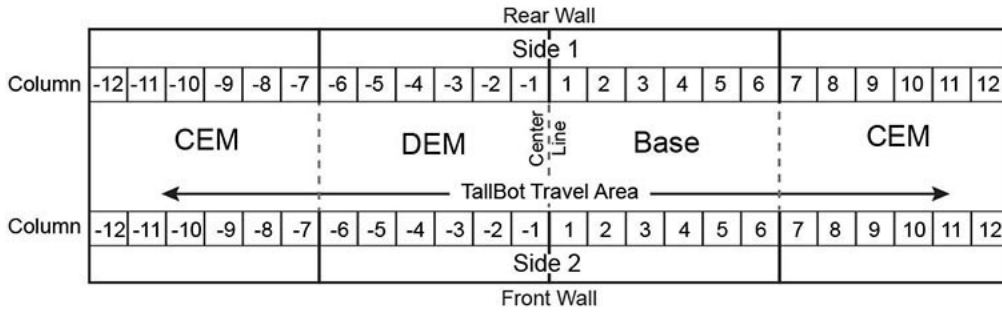
- Rear wall = 1
- Front wall = 2

Row

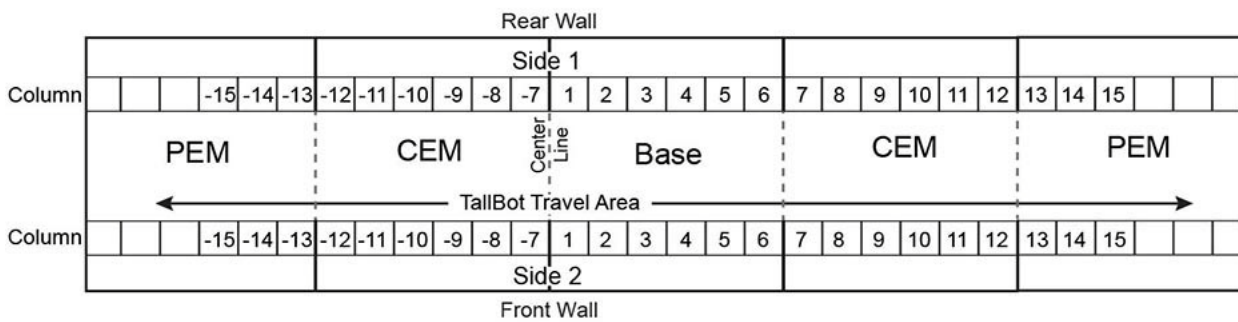
The vertical location of a tape cartridge, consecutively numbered from the top (1) down (52).

Figure E-2 Internal Firmware Side and Column Addressing Examples (viewed from top of library)

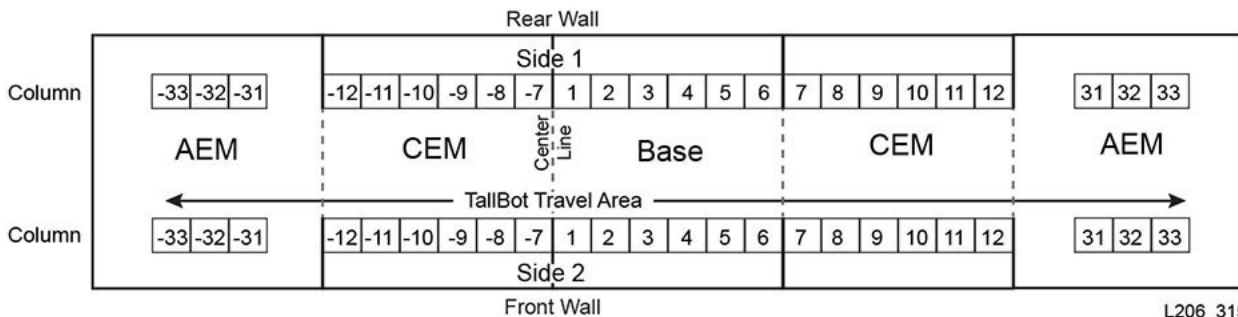
Example 1



Example 2



Example 3



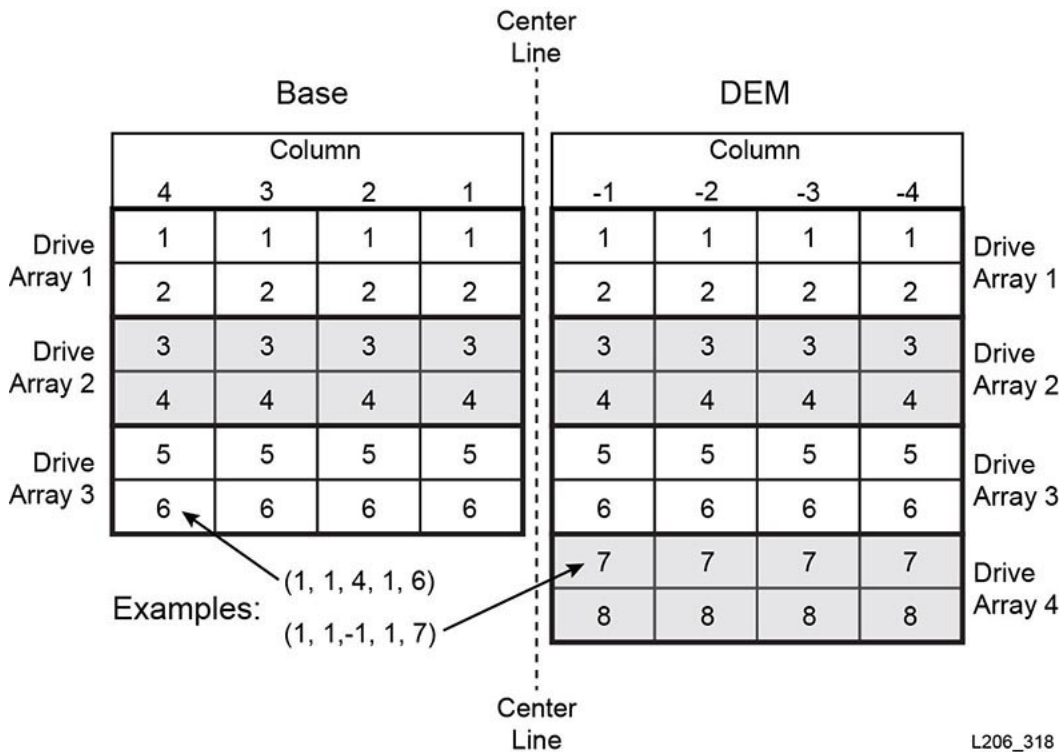
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Internal Firmware Addressing of Tape Drives

The firmware addressing (library, rail, column, side, row) distinguishes a drive based on column and row. The library, rail, and side values are always equal to 1.

Note: The perspective in [Figure E-3](#) is from the drive-side (rear) of the library.

Figure E-3 Tape Drive Internal Firmware Addressing (viewed from rear of library)



Internal Firmware Addressing of Robots

Column

The column value is always 0.

Side

If there is only one robot: the side value is always 1.

For redundant robot configurations:

- Left robot = 1
- Right robot = 2

Row

When addressing the device: the row is 0.

When addressing the specific slot: the row is the slot value (1).

Example - Robot Firmware Addressing

For this example, the address is referring to the right robot in a redundant robotics library.

The firmware address is: (1, 1, 0, 2, 0)

Internal Firmware Addressing of CAPs

- [Rotational CAP Addressing](#)
- [AEM CAP Addressing](#)

Rotational CAP Addressing

Column

The column value depends on the size of the library and the location of the module that contains the CAP.

For modules to the left of centerline, the CAP column value corresponds to the second column from the right of the module. For example, in a DEM, the column value for the CAP would be -2 and a CEM to the left of the DEM would have a CAP column value of -8.

For modules to the right of centerline, the CAP column value corresponds to the fifth column from the left of the module. For example, a CAP in the Base has a column value of 5 and a CEM to the right of the Base would have a CAP column value of 11.

Side

The side value is always 2, since the CAPs are only located on the front of the module.

Row

When addressing the device: the row value is 0.

When addressing a specific slot: the row value is the slot in the CAP magazine (values 1 to 26).

Example - Rotational Firmware Addressing

For this example, the library has a Base, DEM, and four CEMs (two on each side). The address refers to the sixth slot down in the CAP in the CEM on the far left.

The firmware address is: (1, 1, -14, 2, 6)

AEM CAP Addressing

Column

The column value when referencing the CAP is:

- -31 for left AEM
- 31 for right AEM

The column value when referencing a slot in the CAP:

- -31 to -33 for left AEM
- 31 to 33 for right AEM

Side

Indicates the front or rear CAP doors on the library.

- Rear wall = 1
- Front wall = 2

Row

When addressing the device: the row value is 0.

When addressing a specific slot: the row value is the slot in the CAP (values 1 to 26).

Example - AEM CAP Firmware Addressing

For this example, the address is referencing a cartridge slot in the right AEM. The slot is the 37th down in the far right column in the rear CAP door.

The firmware address is: (1, 1, 33, 1, 37)

HLI-PRC Addressing Scheme

- [HLI Addressing Overview](#)
- [HLI Addressing of CAPs](#)
- [HLI Addressing of Tape Drives](#)

HLI Addressing Overview

HLI-PRC addressing designates physical location using: LSM, Panel, Row, and Column.

LSM

Always equal to 0.

Panel

Indicates the front wall (CAP side) or rear wall (drive side) of a module. The panel number can range from 0 to 23 depending on the configuration of the library.

- Rear wall = even numbers
- Front wall = odd numbers

The panel location is defined relative to the Base Module (panels 12 and 13). Panel values less than 12 indicate the module is to the left of the Base Module, while values greater than 13 indicate the module is to the right of the Base Module.

Base Module

- Panels 12 and 13

DEM

- Panels 10 and 11

CEM

- Panels are numbered consecutively from the adjacent module. However, if there is no DEM, a CEM placed directly to the left of a Base Module contains panels -8 and -9 (panels -10 and -11 are skipped).

AEM

- AEMs are considered CAPs by HLI addressing. Therefore, AEMs have a CAP ID instead of a panel number (see "[HLI Addressing of CAPs](#)" on page E-8)
- Left AEM CAP ID is always numbered 0
- Right AEM CAP ID is always numbered 11

Row

The vertical location of a slot, consecutively numbered from the top down (0 to 51). However, drive bays have row numbering from 0 to 23 for the Base Module, and 0 to 31 in the DEM.

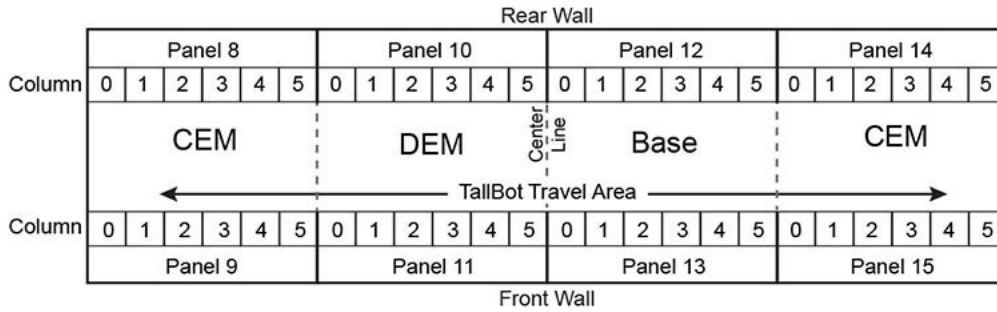
Column

The horizontal location of a slot from left to right (0 to 5). However, drive bays always have a column value of 0 (see "[Tape Drive Hardware Numbering](#)" on page E-15").

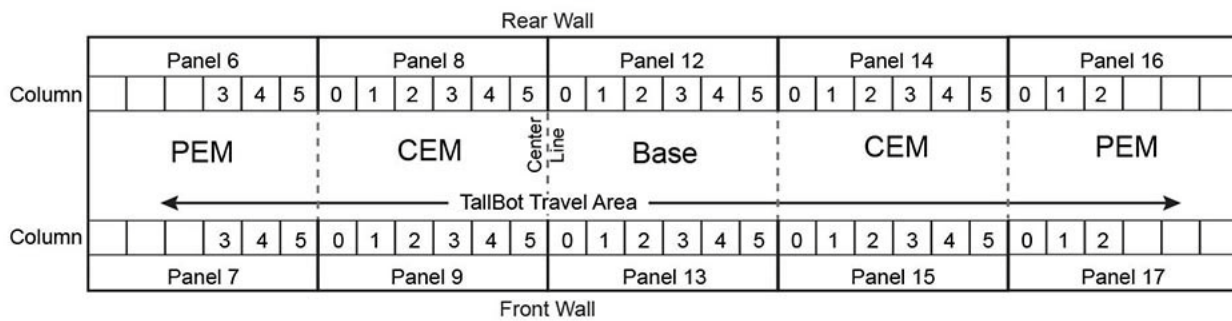
AEM column numbering starts at the rear wall and runs left to right (columns 0–2), then proceeds to the front wall and runs left to right (columns 3–5).

Figure E-4 HLI-PRC Panel and Column Addressing Examples (viewed from top of library)

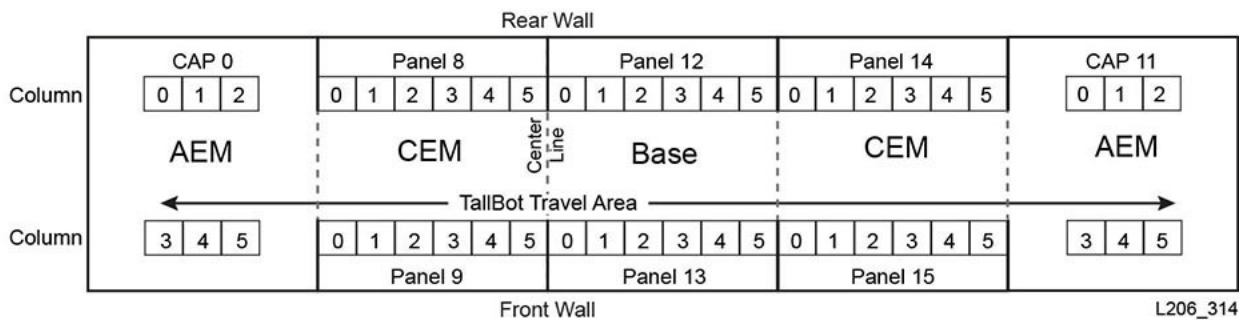
Example 1



Example 2



Example 3



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HLI Addressing of CAPs

HLI addressing defines CAP locations with a CAP ID instead of a panel value. The addressing is LSM, CAP ID, row, column.

- [Rotational CAP Addressing](#)
- [AEM CAP Addressing](#)

Rotational CAP Addressing

LSM

Always equal to 0.

CAP ID

Ranges from 1 to 10

- CEMs left of centerline = 1 to 4 (left to right)
- DEM = 5
- Base Module = 6
- CEMs right of centerline = 6 to 10 (left to right)

Row

The value is the slot in the CAP (can be values 0 to 25).

Column

The value always equals 0.

Example - Rotational CAP HLI Addressing

For this example, the library has a Base, DEM, and eight CEMs (four on each side). The address refers to the sixth slot down in the CAP in the CEM on the far left.

The HLI address is: (0, 1, 5, 0)

AEM CAP Addressing**LSM**

Always equal to 0.

CAP ID

Left AEM equals 0.

Right AEM equals 11.

Row

The value is the slot in a column (can be values 0 to 38).

Column

Rear wall = columns 0 to 2

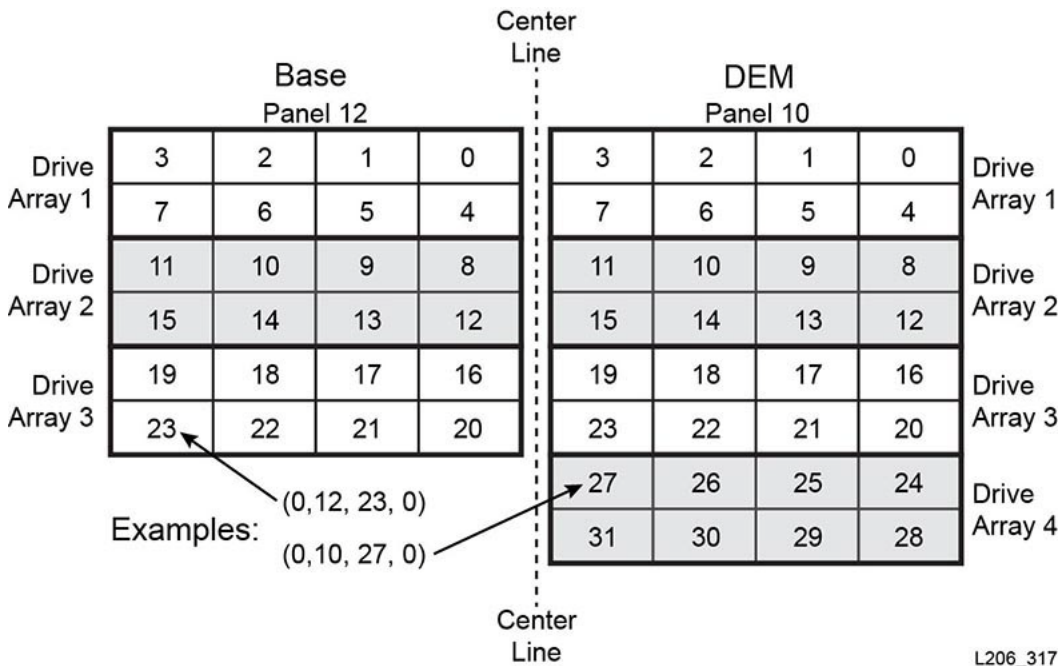
Front wall = columns 3 to 5

HLI Addressing of Tape Drives

HLI addressing defines tape drives with a drive ID instead of a row value. The addressing is LSM, panel, drive ID, column (see "[Tape Drive Hardware Numbering](#)" on page E-15). HLI distinguishes a drive based on the panel and drive value. The LSM and column values are always equal to 0.

Note: The perspective in [Figure E-5](#) is from the drive-side (rear) of the library.

Figure E-5 Tape Drive HLI-PRC Addressing (viewed from rear of library)



FC-SCSI Element Numbering

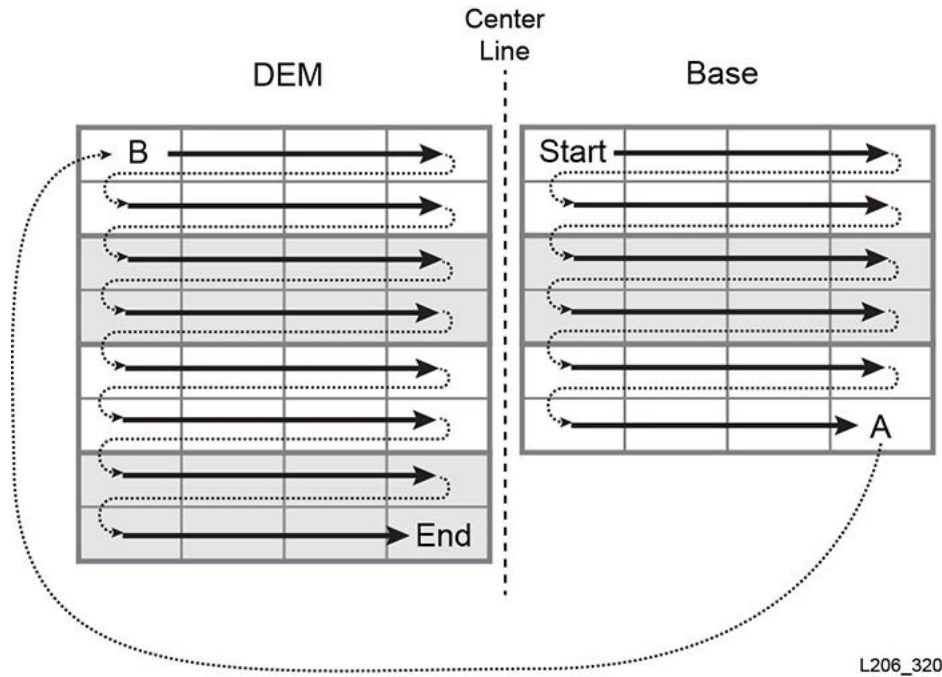
Note: Changing the library configuration can cause the library to re-assign element numbers.

For FC-SCSI element numbering, each active component in the library has a unique element ID. SCSI element numbering consists of three element types:

- **Storage Elements** (active storage slots)
 - Begins at 2000.
 - Numbered top to bottom, left to right, and rear to front.
- **Import/Export Elements** (rotational CAPs)
 - Begins at 10 for the left most CAP in the library. Storage and Import/Export elements are numbered sequentially by slot. No slots are skipped.
 - Numbered top to bottom, left to right (see [Figure E-9](#))
- **Data Transfer Elements** (drives)
 - Begins at 1000 and increments by one for every installed drive.
 - Numbered left to right, top to bottom, starting at the center line in the base module and continuing in the DEM if installed.

Note: When the library powers on, a vacant drive slot will not be included in the element number sequence. Open Systems backup applications do not tolerate Data Transfer Elements that cannot or do not respond when you power-on the library.

Figure E-7 SCSI Data Transfer Element Numbering (viewed from front of library)



Default Numbering Example

Note: The library in this example has been simplified. It is not an exact representation of an SL3000.

The example library includes:

- Four modules: one Base, one DEM, and two CEMs
- 166 data cartridge slots: numbered 2000 to 2165
- 40 tape drive bays (two tape drives are missing, one in each module): numbered 1000 to 1037
- Two CAPs, each with seven slots: numbered 10 to 23

The default numbering is shown in the figures below.

Figure E-8 Default SCSI Element Numbering - Rear Wall (viewed from front of library)

Left		Center Line				Right					
CEM		DEM				Base				CEM	
2000	2010	1023	1024	1025	1026	1000	1001	1002	1003	2060	2070
2001	2011	1027	1028		1029	1004	1005	1006	1007	2061	2071
2002	2012	1030	1031	1032	1033	1008	1009	1010	1011	2062	2072
2003	2013	1034	1035	1036	1037	1012	1013	1014	1015	2063	2073
2004	2014	2020	2026	2032	2038	1016		1017	1018	2064	2074
2005	2015	2021	2027	2033	2039	1019	1020	1021	1022	2065	2075
2006	2016	2022	2028	2034	2040	2044	2048	2052	2056	2066	2076
2007	2017	2023	2029	2035	2041	2045	2049	2053	2057	2067	2077
2008	2018	2024	2030	2036	2042	2046	2050	2054	2058	2068	2078
2009	2019	2025	2031	2037	2043	2047	2051	2055	2059	2069	2079

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Figure E-9 Default SCSI Element Numbering - Front Wall (viewed from front of library)

Left		Center Line				Right					
CEM		DEM				Base				CEM	
2080	2090	2100	2107	CAP 10		2123	2130	CAP 17		2146	2156
2081	2091	2101	2108	11		2124	2131	18		2147	2157
2082	2092	2102	2109	12		2125	2132	19		2148	2158
2083	2093	2103	2110	13		2126	2133	20		2149	2159
2084	2094	2104	2111	14		2127	2134	21		2150	2160
2085	2095	Door Latch	2112	15		Door Latch	2135	22		2151	2161
2086	2096		2113	16			2136	23		2152	2162
2087	2097		2114	2117	2120		2137	2140	2143	2153	2163
2088	2098	2105	2115	2118	2121	2128	2138	2141	2144	2054	2164
2089	2099	2106	2116	2119	2122	2129	2139	2142	2145	2055	2165

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SCSI Numbering in Non-Partitioned Library Using Custom Capacity

After activating an area of the library, the numbering begins with the left most slot on the rear wall within the active area. Then, the numbering scheme follows the pattern defined in "Default SCSI Storage Element (Cartridges) Numbering Scheme" on page E-11 for all active slots, but skips over any inactive slots.

When you activate additional capacity later, the SCSI numbering of previously activated slots does not change. The library appends the SCSI numbering for newly activated slots.

If you add tapes drives, the library reassigns SCSI Data Transfer element numbering following the "Default SCSI Data Transfer Element (Drives) Numbering Scheme" on page E-11. Then, the library restarts.

Custom Capacity Numbering Example

Note: The library in this example has been simplified. It is not an exact representation of an SL3000.

For this example, the user activates 50 slots, beginning with the DEM. As a result, the SCSI storage element numbering begins at 2000 with the upper left-most active slot in the DEM (see [Figure E-10](#) below).

Figure E-10 SCSI Element Numbering for Custom Capacity - Rear Wall

Left				Center Line										Right	
CEM		DEM				Base				CEM					
		Tape Drives				Tape Drives				2040					
										2041					
										2042					
										2043					
										2044					
		2000	2006	2012	2018					2045					
		2001	2007	2013	2019										
		2002	2008	2014	2020	2024	2028	2032	2036	2046					
		2003	2009	2015	2021	2025	2029	2033	2037	2047					
		2004	2010	2016	2022	2026	2030	2034	2038	2048					
		2005	2011	2017	2023	2027	2031	2035	2039	2049					

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At a later date, the user activates the remaining 30 slots in the library. The library numbers the slots starting with 2050 in the upper left corner of the CEM (see [Figure E-11](#) below).

Figure E-11 Appended SCSI Element Numbering for Added Capacity - Rear Wall

Left				Center Line										Right	
CEM		DEM				Base				CEM					
2050	2060	Tape Drives				Tape Drives				2040	2070				
2051	2061									2041	2071				
2052	2062									2042	2072				
2053	2063									2043	2073				
2054	2064									2044	2074				
2055	2065	2000	2006	2012	2018					2045	2075				
2056	2066	2001	2007	2013	2019										
2057	2067	2002	2008	2014	2020	2024	2028	2032	2036	2046	2076				
2058	2068	2003	2009	2015	2021	2025	2029	2033	2037	2047	2077				
2059	2069	2004	2010	2016	2022	2026	2030	2034	2038	2048	2078				
		2005	2011	2017	2023	2027	2031	2035	2039	2049	2079				

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SCSI Numbering in a Partitioned Library

When you define a partition, the numbering begins with the left most slot on the rear wall within the partition. The numbering scheme follows the pattern defined in

"Default SCSI Storage Element (Cartridges) Numbering Scheme" on page E-11 for all active slots, but skips over any inactive slots and slots not within the partition. Therefore, element numbering is continuous within each partition, even if slot locations for the partition are not adjacent.

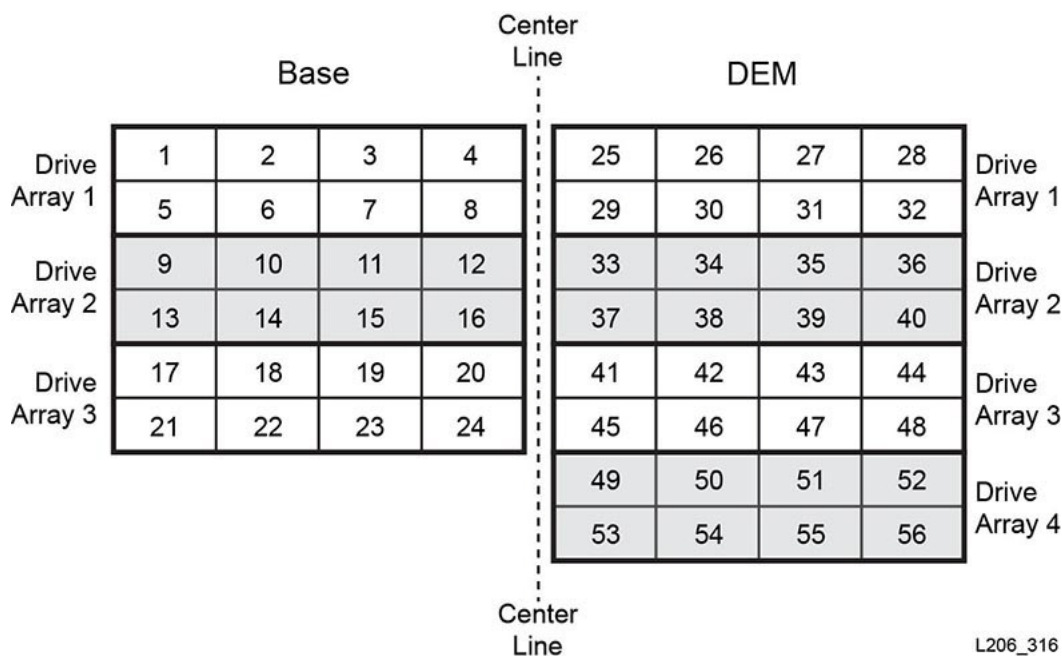
If you allocate more resources to the partition, the SCSI numbering of previously numbered elements in the partition do not change. The library simply appends the SCSI numbering for newly activated slots or newly inserted tape drives within the partition.

Tape Drive Hardware Numbering

The hardware numbering is assigned by the HBC controller card. It is used to identify a tape drive slot. The card automatically assigns a number, 1-56, to each drive slot.

Note: The perspective in [Figure E-12](#) is from the drive-side (rear) of the library.

Figure E-12 Tape Drive Physical Hardware Numbering (viewed from rear of library)



See Also

- "Internal Firmware Addressing of Tape Drives" on page E-4
- "HLI Addressing of Tape Drives" on page E-9
- "Default SCSI Data Transfer Element (Drives) Numbering Scheme" on page E-11).

Wall Diagrams

- Base Module front wall ([Figure E-13](#))
- Base Module rear wall ([Figure E-14](#) and [Figure E-15](#))
- DEM front wall ([Figure E-16](#) and [Figure E-17](#))

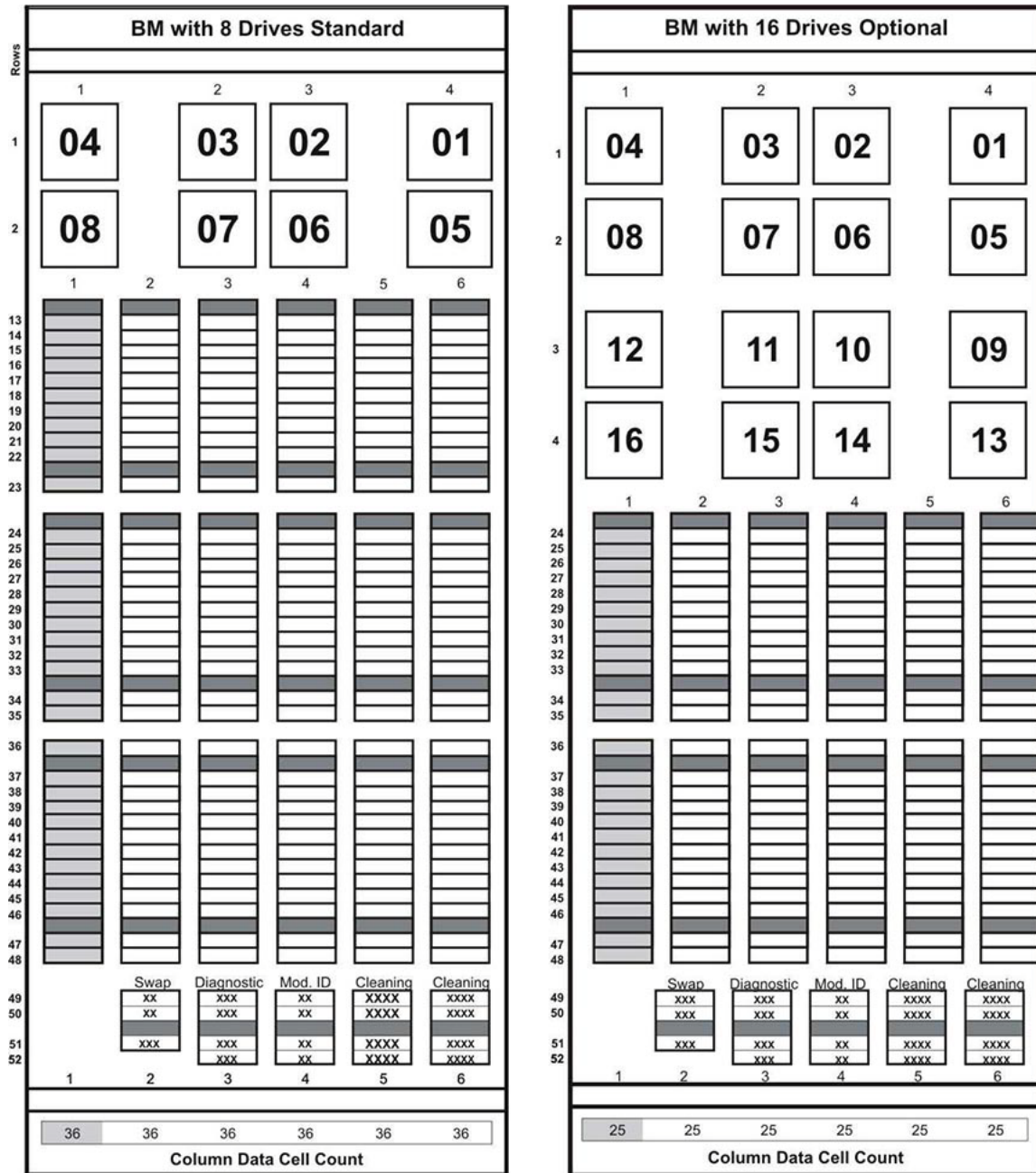
- DEM rear wall (Figure E-18 and Figure E-19)
- CEM front wall (Figure E-20)
- CEM rear wall (Figure E-21)
- Left PEM (Figure E-22)
- Right PEM (Figure E-23)
- Left AEM (Figure E-24)
- Right AEM (Figure E-25)

Figure E-13 Base Module, Front Wall



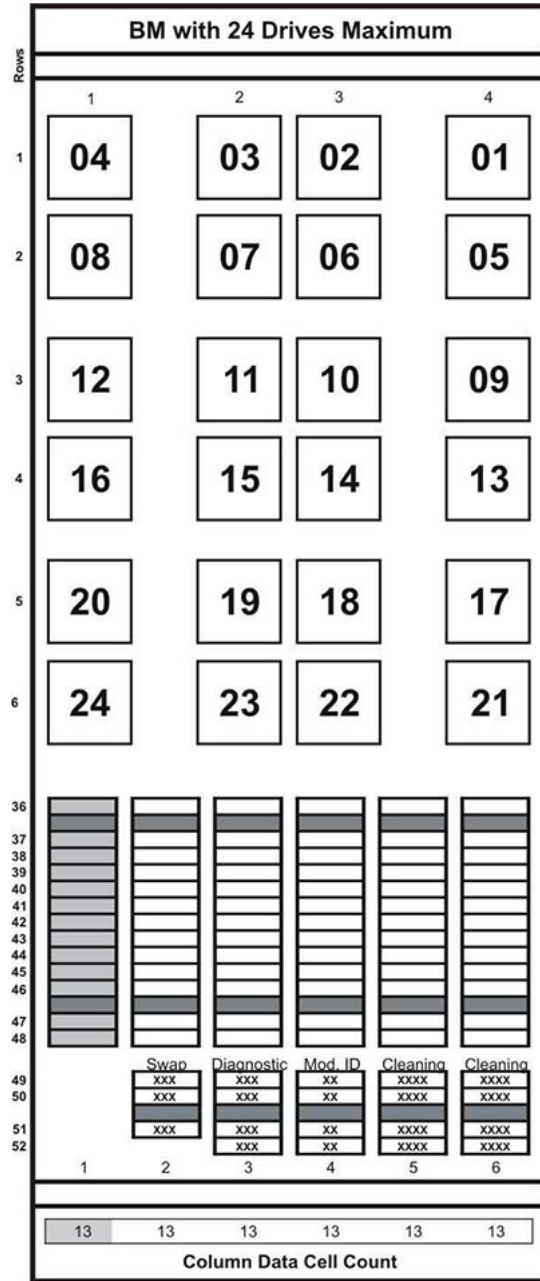
L206_326

Figure E-14 Base Module, Rear Wall



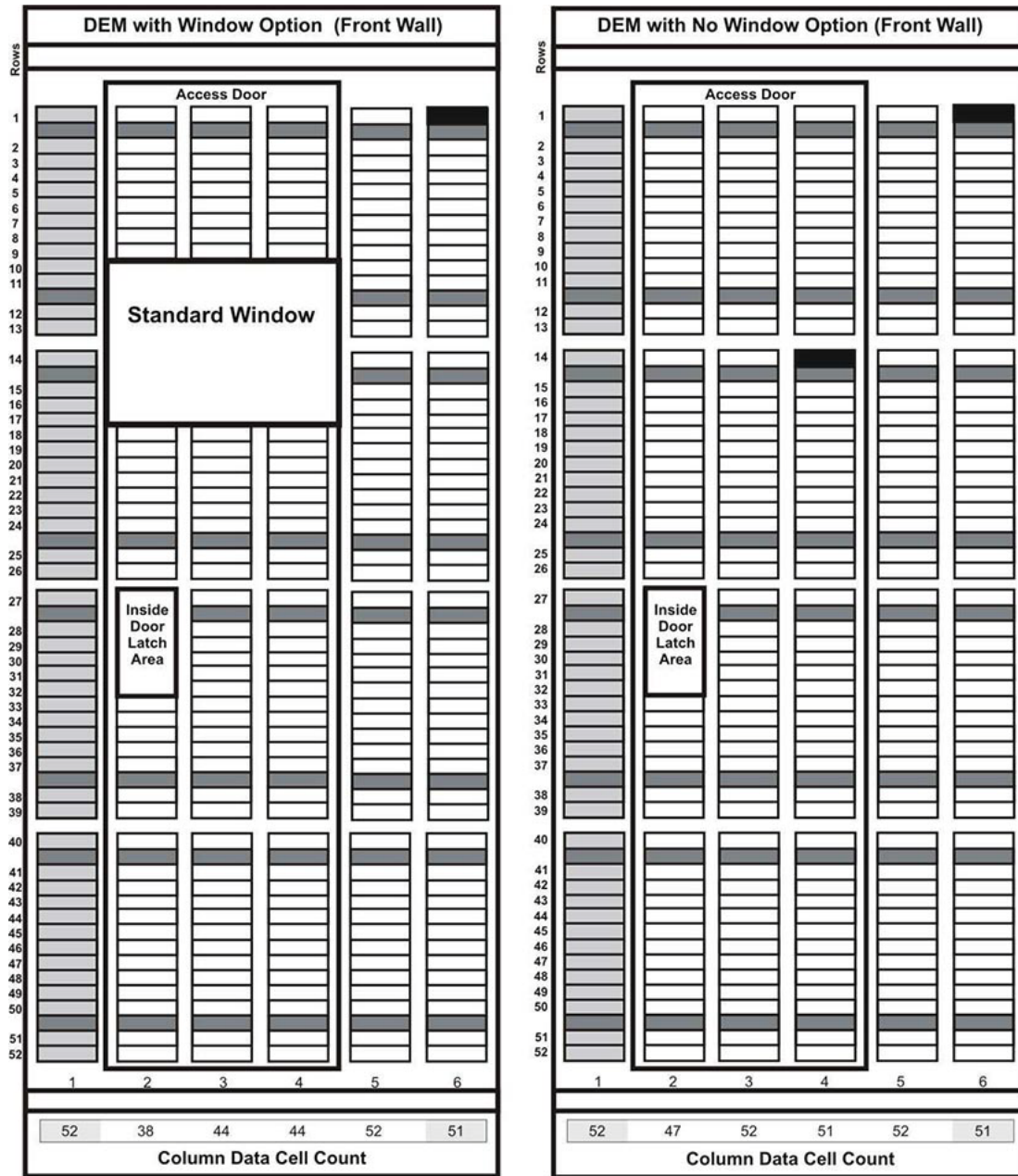
L206_321

Figure E-15 Base Module, rear wall with 24 drives



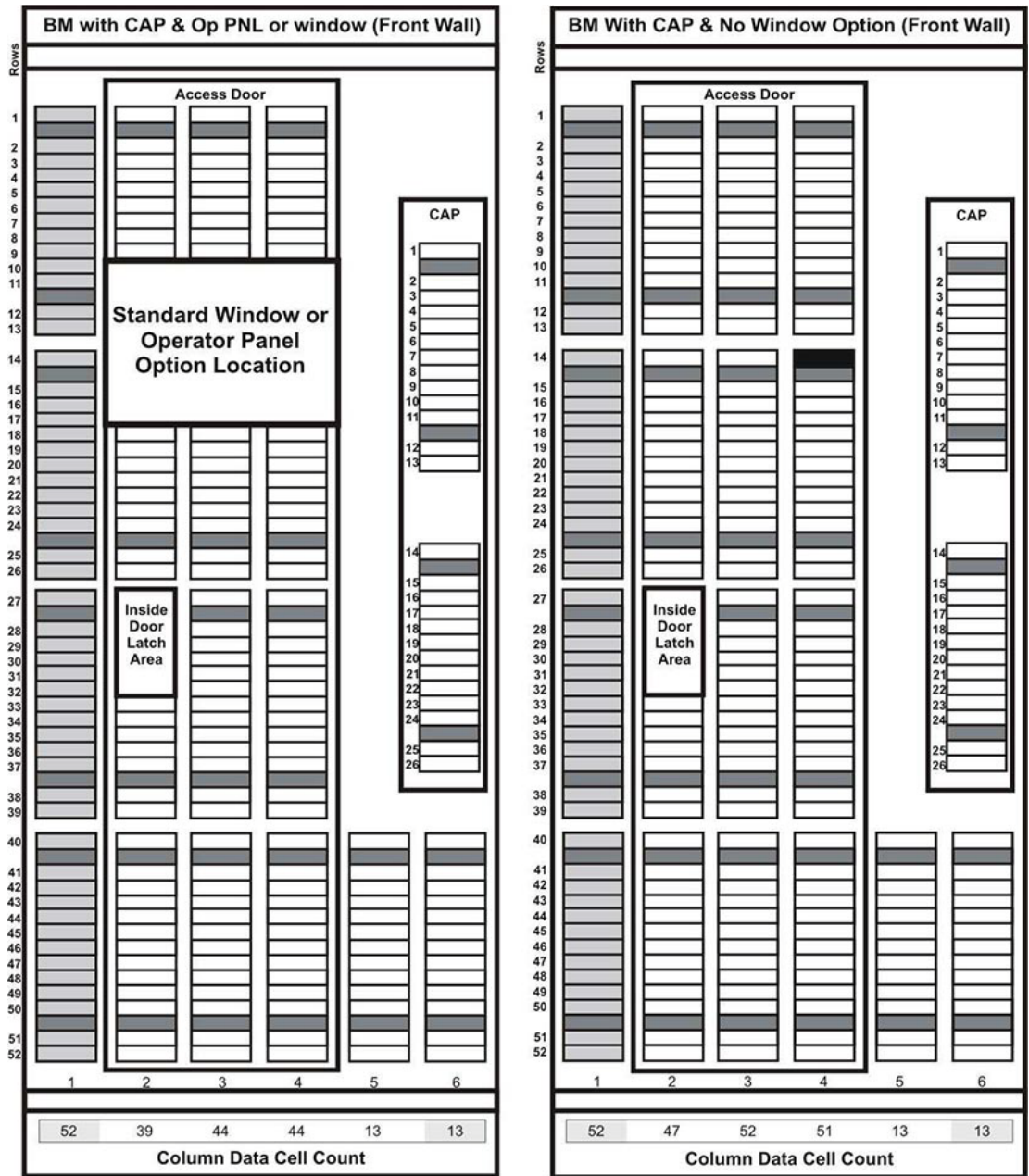
L206_322

Figure E-16 DEM Front Wall



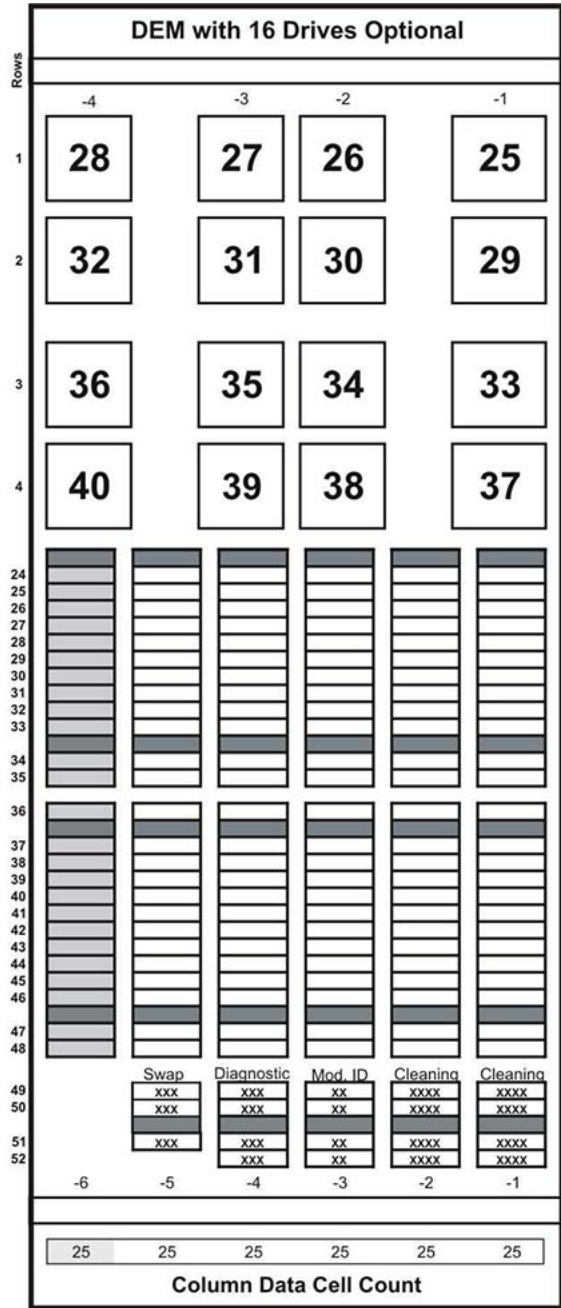
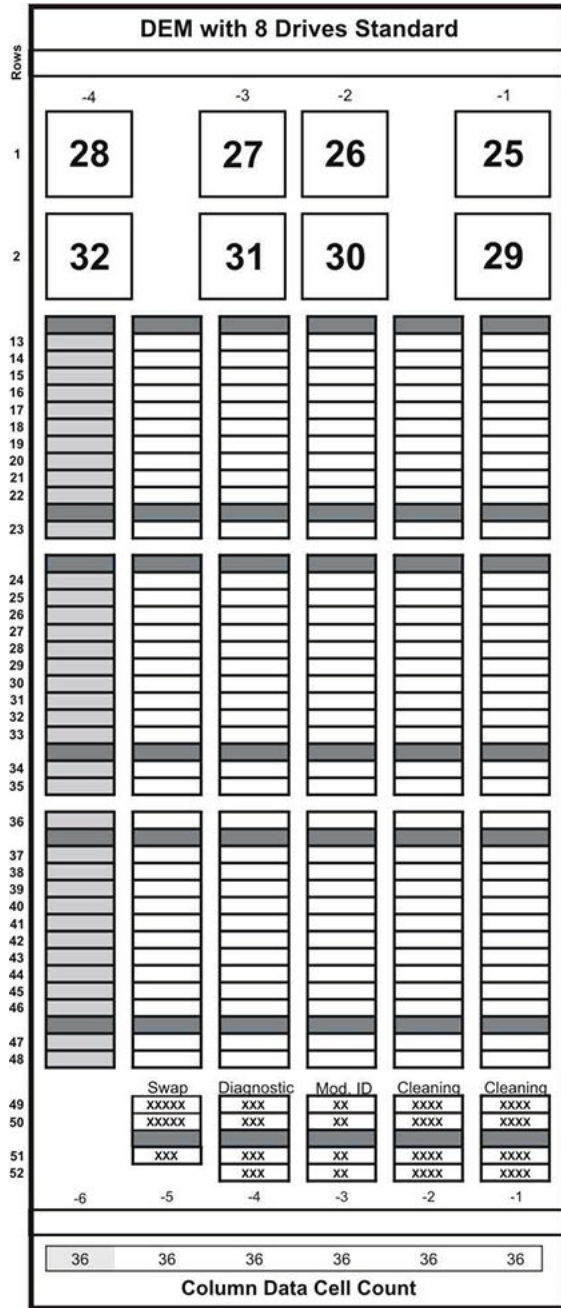
L206_325

Figure E-17 DEM Front Wall (continued)



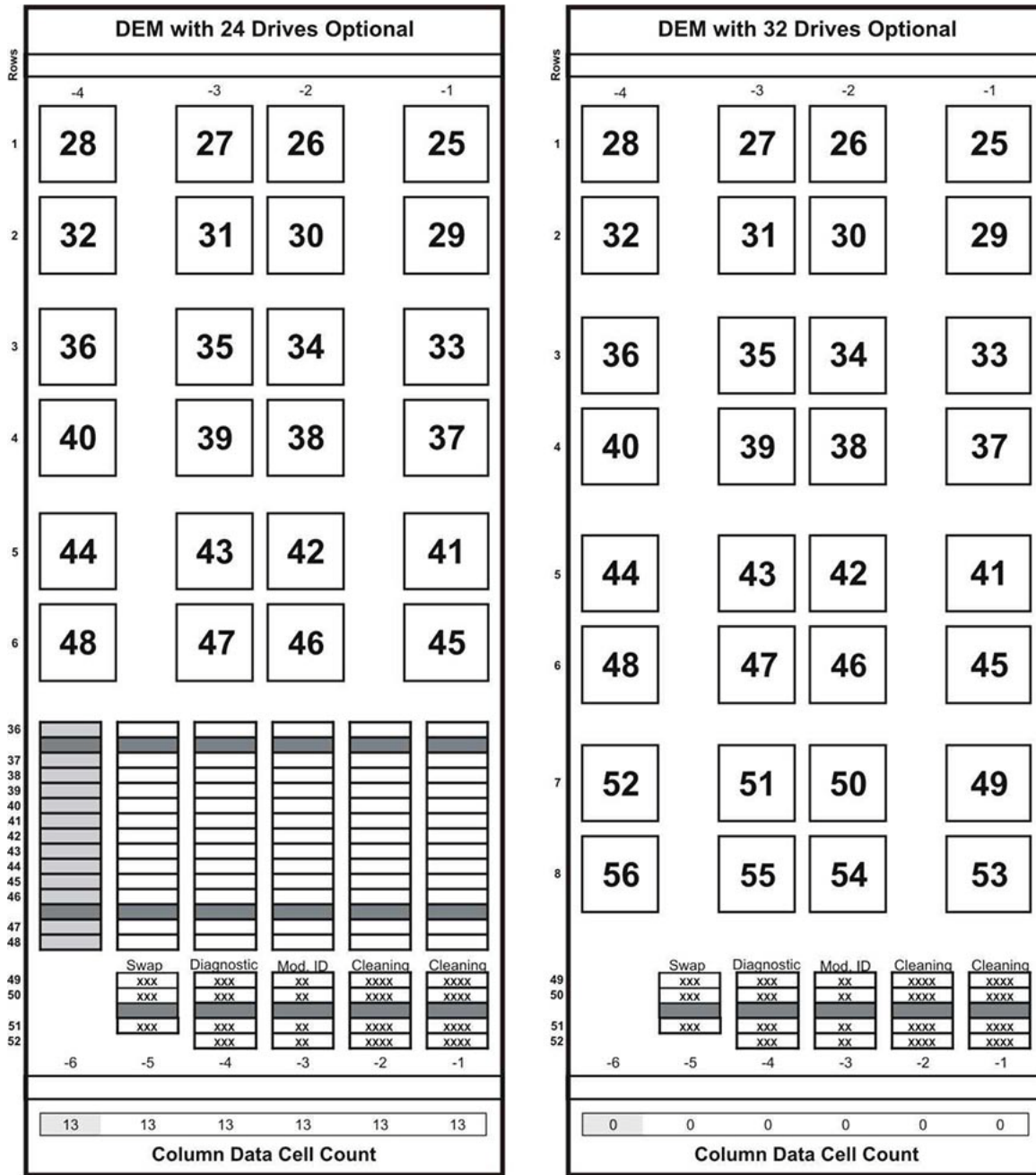
L206_326

Figure E-18 DEM Rear Wall



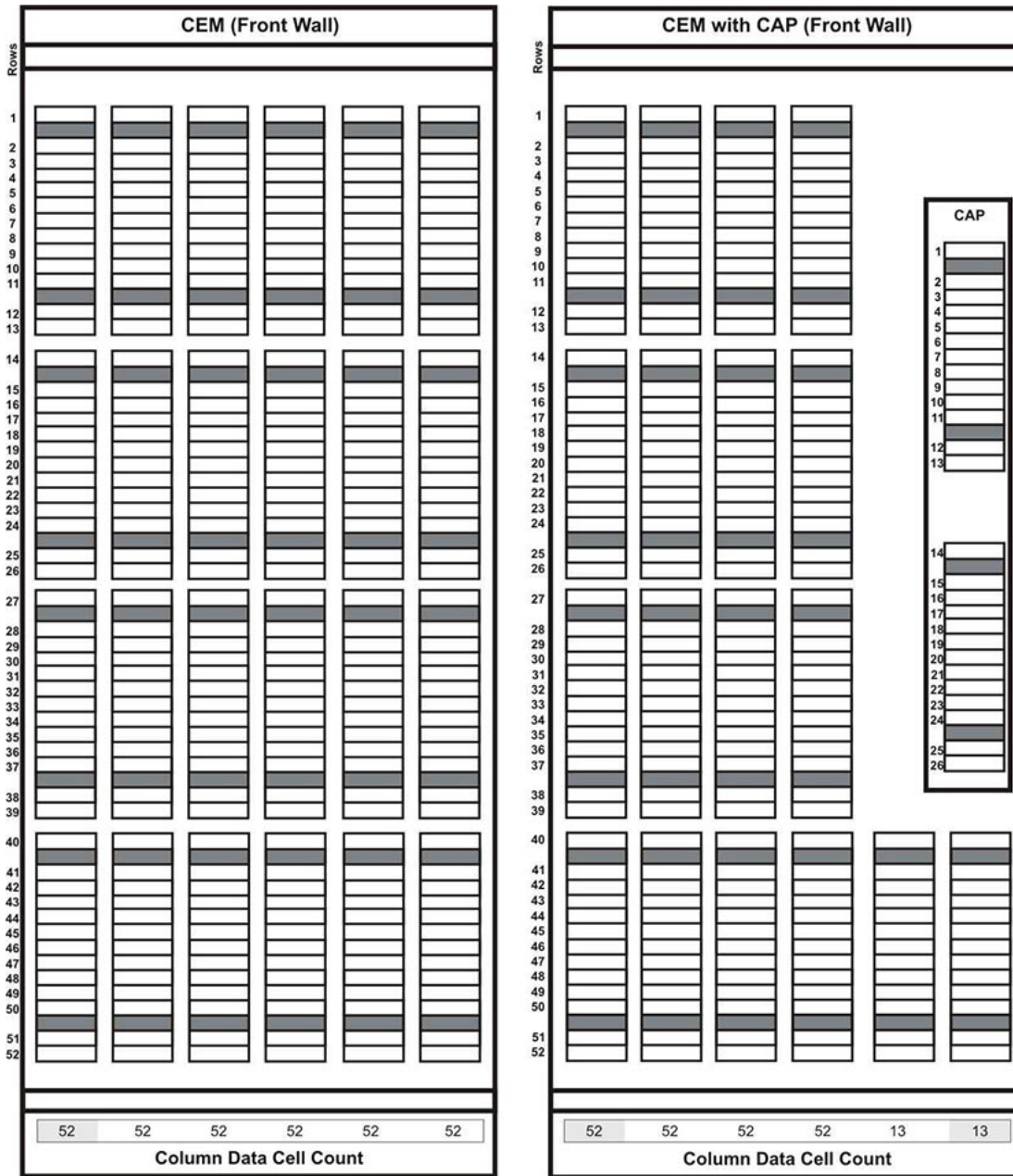
L206_323

Figure E-19 DEM Rear Wall (continued)



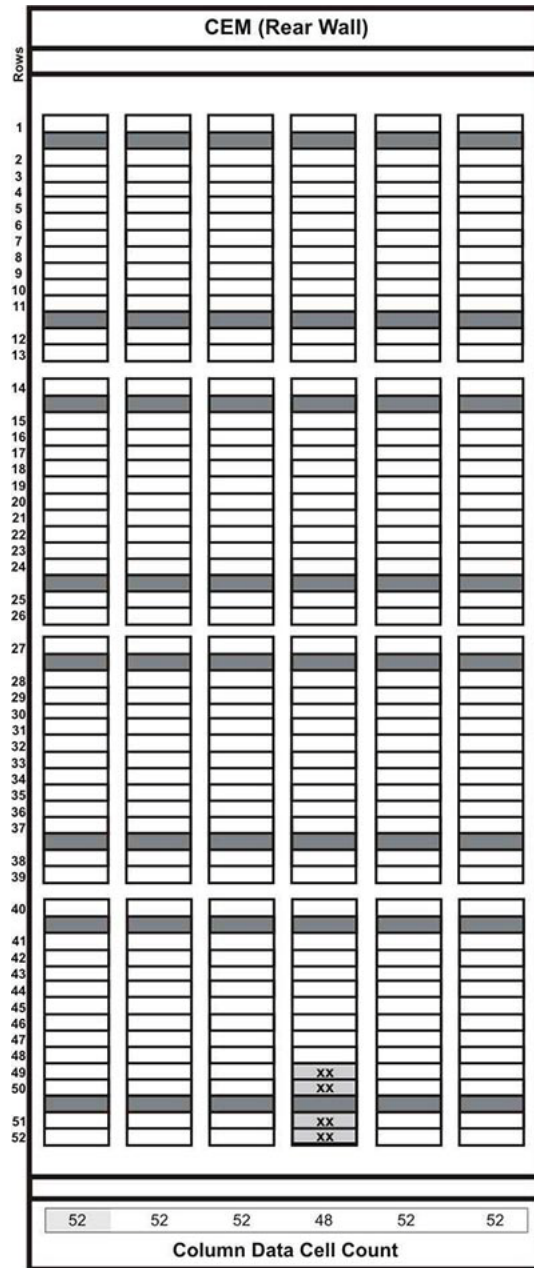
L206_324

Figure E-20 Cartridge Expansion Module, Front Wall



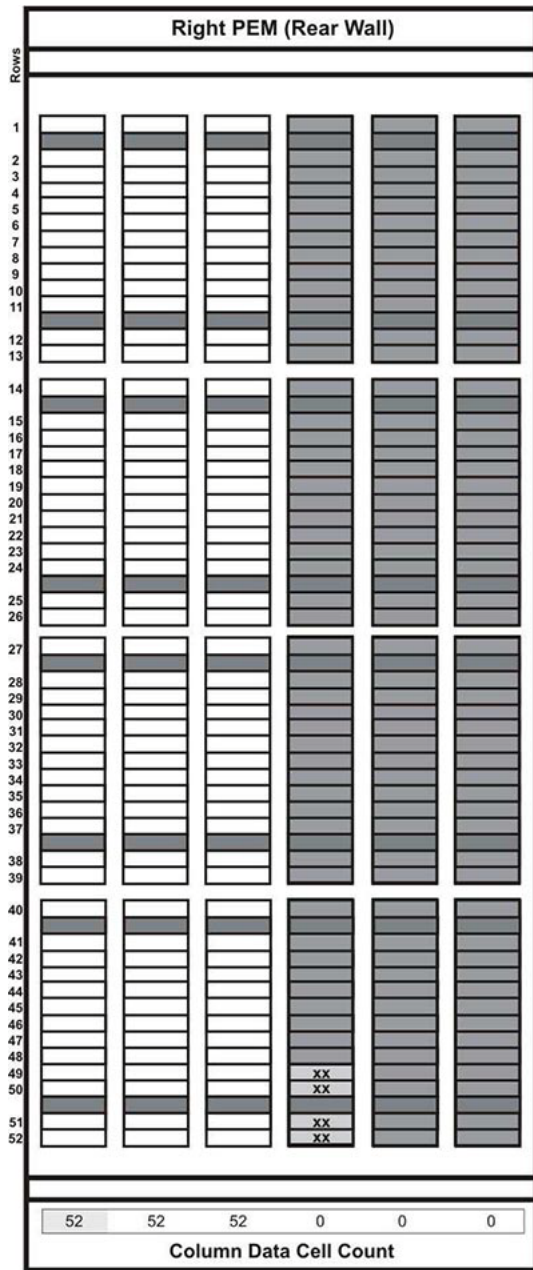
L206_328

Figure E-21 Cartridge Expansion Module, Rear

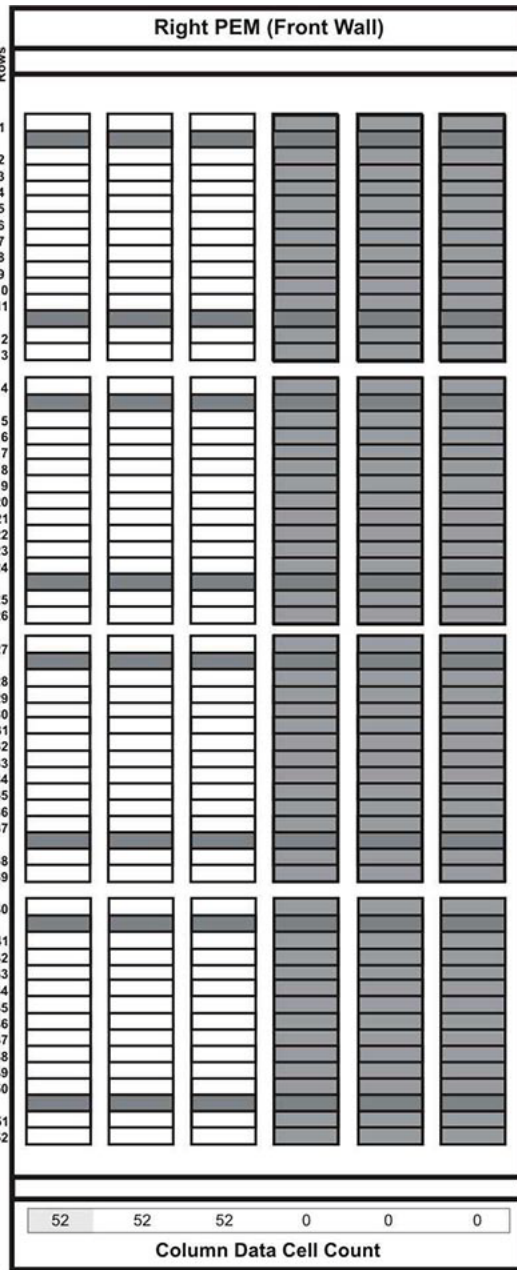


L206_329

Figure E-23 Parking Expansion Module, Right

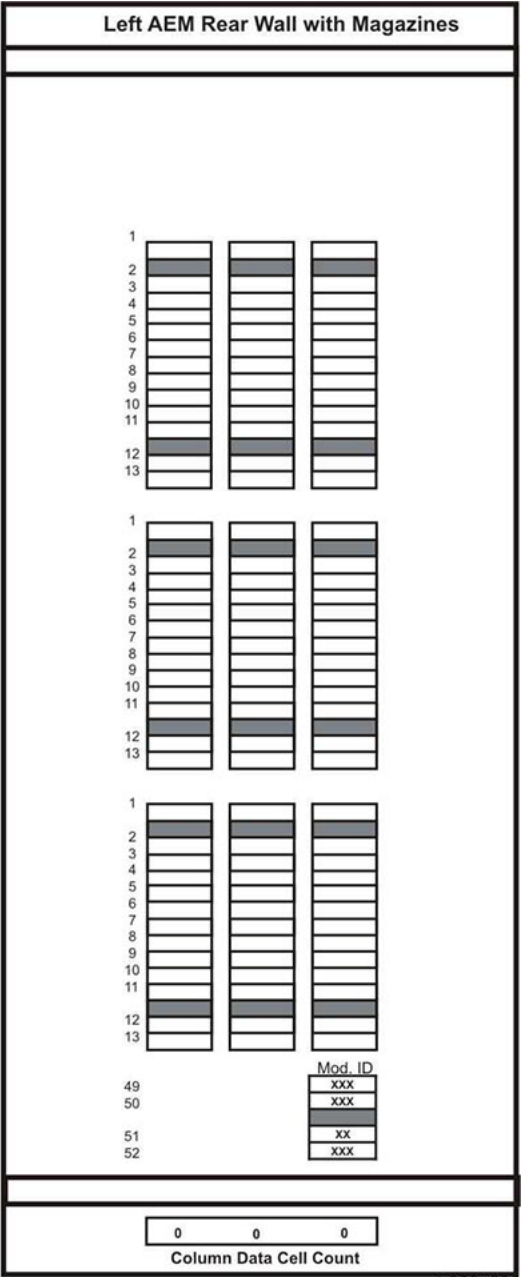
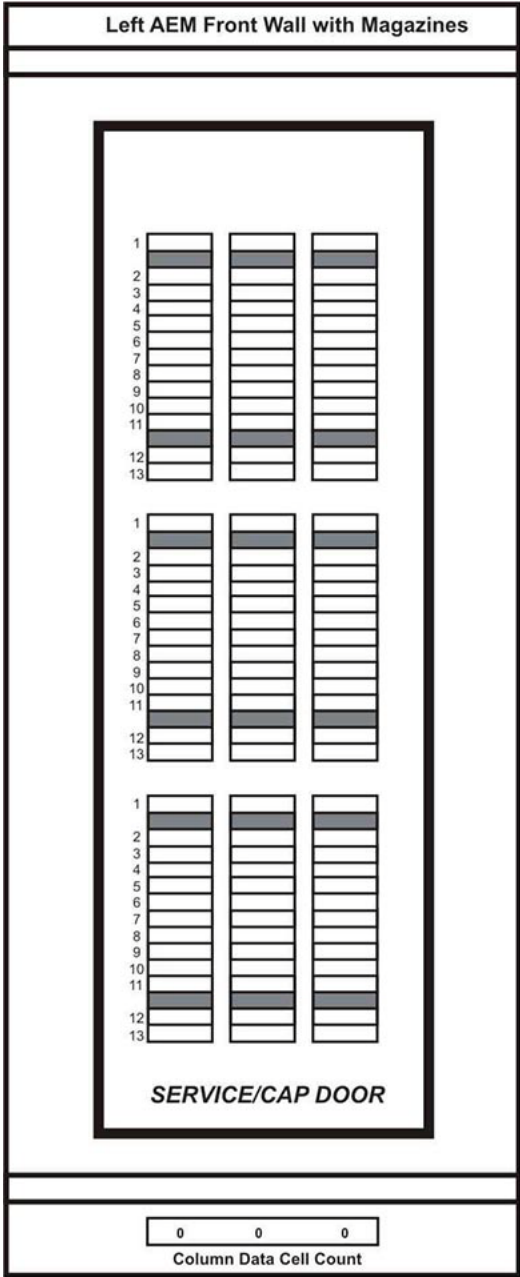


L206_329



L206_329

Figure E-24 Access Expansion Module, Left



L206_332

Barcode Labels

This section describes the requirements for cartridge barcode labels used in Oracle’s StorageTek tape libraries. All tape cartridges must have a proper barcode label. Mis-aligned, mis-oriented, or improperly-labeled cartridges may cause equipment damage.

- [Barcode Standards](#)
- [Label Design](#)
- [Applying a Label](#)
- [Label Care](#)

Barcode Standards

StorageTek libraries use labels based on the Code 39 barcode standard (refer to ANSI/AIM BC1/1995, Uniform Symbology Specification - Code 39). This standard uses discrete barcodes, meaning a fixed pattern of bars represents a single character. Each character is made up five black and four white, where three bars are wider than the others.

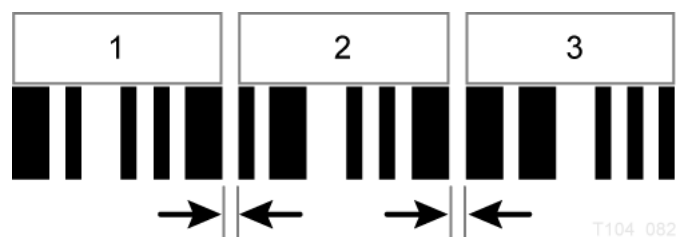
For example, [Figure F-1](#) represents the letter A using six narrow bars and three wide bars (two black and one white).

Figure F-1 Code 39 Barcode Standard — Letter A



When multiple barcode characters are arranged together as a label, a narrow white bar is placed between the individual characters. This bar is called the inter-character gap.

Figure F-2 Code 39 Barcode Standard — Inter-Character Gap



Label Design

Each label must have a six-character volume serial ID (vol-id) and a one- or two-character media ID. The media ID identifies the cartridge type. The labels can only use the uppercase letters A through Z, the numbers 0 through 9, and an asterisk (*) for the start and stop character (for example, *ABC123L6*, where ABC123 is the vol-id and L6 is the media ID).

The StorageTek T-series cartridge labels made by Tri-optic use a dollar sign (\$) as the start and stop character. Never use the asterisk or dollar sign as part of the customer-defined characters of a barcode. Barcode algorithms only decode the characters between the end stops, ignoring any characters outside. Refer to the table below for examples.

Table F-1 Start and Stop Character Placement

Actual Barcode Label	After Decoding	Result
ABC123L6	ABC123L6	Correct label
*ABC*23L6*	ABC	Misplaced stop character
*ABC1234L6	Unreadable	No stop character

Figure F-3 Barcode Placement Standards (T10000 and LTO)

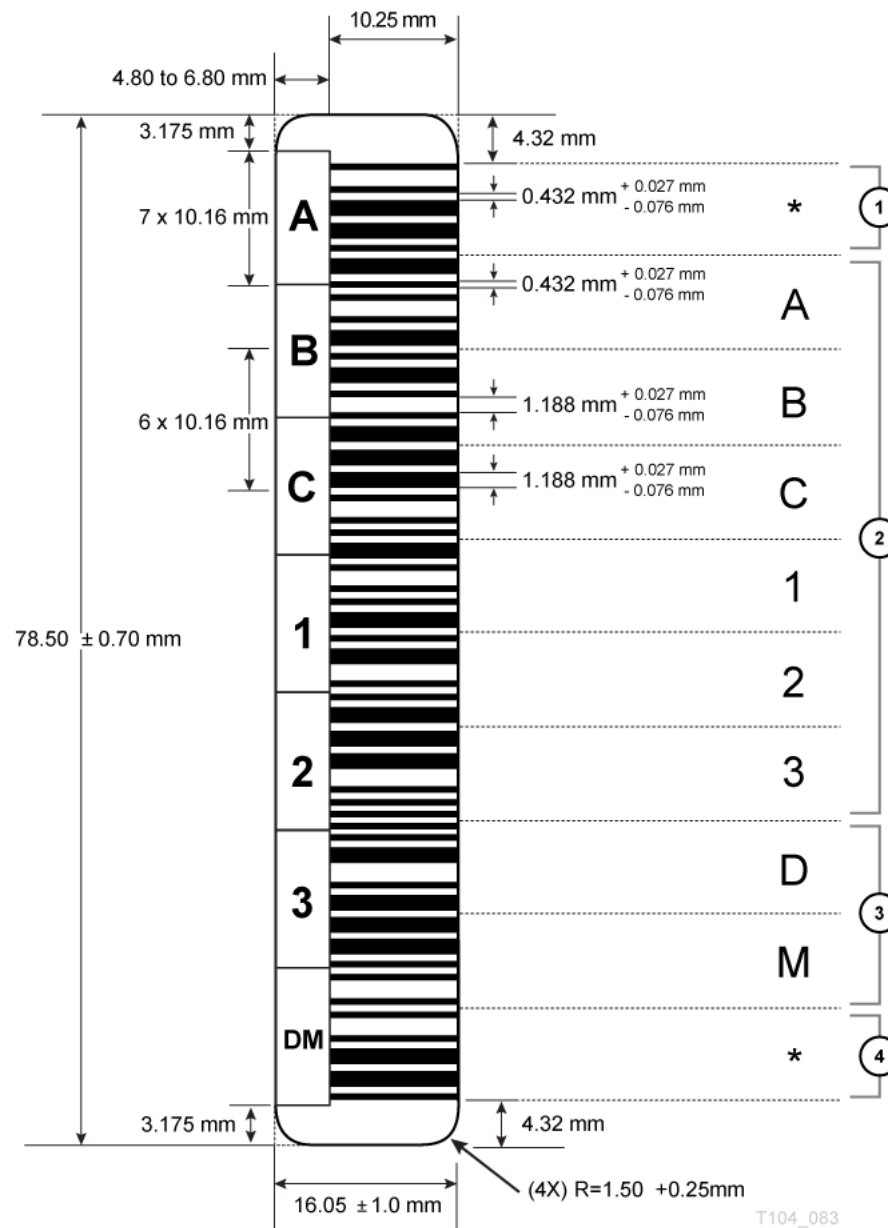


Figure Legend:

1. Start character
2. Volume ID
3. Media ID
4. Stop character

LTO

These cartridges require an eight-character label — a six-character vol-id and a two-character media ID. The media ID characters are:

- L3 = Generation 3

- L4 = Generation 4
- L5 = Generation 5
- L6 = Generation 6
- L7 = Generation 7
- L8 = Generation 8
- LT = Generation 3 WORM
- LU = Generation 4 WORM
- LV = Generation 5 WORM
- LW = Generation 6 WORM
- LX = Generation 7 WORM
- LY = Generation 8 WORM
- CU = universal cleaning

T9840 and T9940

These cartridges require a six-character vol-id label plus a separate one-character media ID label. Only Tri-Optic Corporation, American Eagle Systems/Wrightline, or Imation Corporation can print these labels. The media ID characters are:

- R = T9840 data
- U = T9840 A/B/C cleaning
- Y = T9840 D cleaning
- P = T9940 data
- W = T9940 cleaning

T10000

These cartridges require an eight-character label — a six-character vol-id and a two-character media ID. The media ID characters are:

- T1 = T10000 A/B data
- T2 = T10000 C/D data
- TS = T10000 A/B sport
- TT = T10000 C/D sport
- CT = cleaning (A and B only)
- CL = universal cleaning

Cleaning and Diagnostic Labels

Cleaning and diagnostic cartridges require unique labels to distinguish them from data cartridges. The first three alphanumeric characters in the vol-id determine the type of cartridge.

- **Cleaning cartridges** — use CLNnnn for the vol-id plus the cleaning-specific media ID, where CLN is the cleaning cartridge identifier and nnn is a sequence of numbers (for example, CLN001CU could be an LTO cleaning cartridge label).

- **Diagnostic cartridges** — use DG[space]nmn plus the media ID, where DG[space] is the diagnostic cartridge identifier, and nmn is a sequence of numbers (for example, DG 001L6 could be an LTO6 diagnostic cartridge label).

Cartridge Label Examples

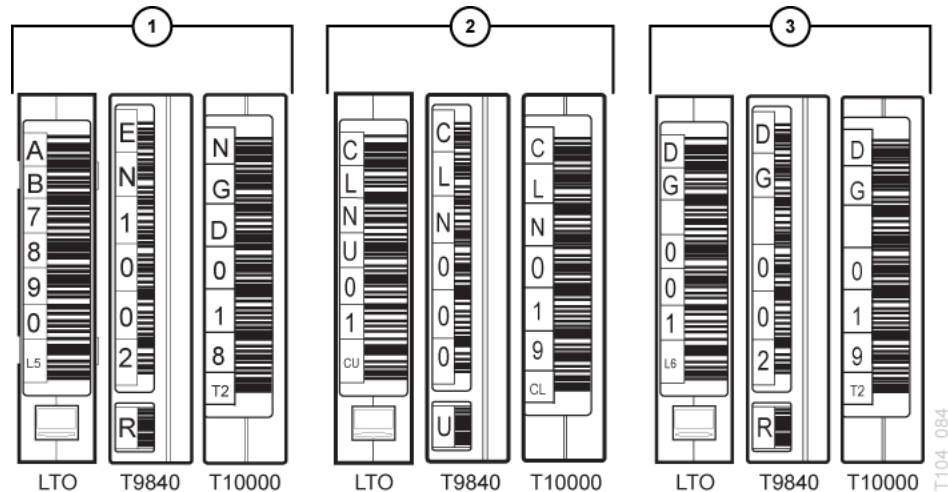


Figure Legend:

1. Data cartridges
2. Cleaning cartridges
3. Diagnostic cartridges

Applying a Label

Caution: Mis-aligned, mis-oriented, or improperly-labeled cartridges may cause equipment damage.

Guidelines for applying the labels include:

- Inspect and clean the cartridge. Wipe all dust, dirt, and moisture using a lint-free cloth. Use a safe cleaning solution (such as isopropyl alcohol) to clean the cartridge exterior housing.
- Ensure the cartridge and label are oriented correctly. Orient the label with the barcode below the human-readable characters and the cartridge with the hub-side down. For LTO cartridges, hold the cartridge so that the write-protect switch is toward you. For a T10000 cartridge, ensure the write-protect switch is away from you. For a T9840 cartridge, ensure the write-protect switch is on the right side.
- Apply the labels with in the recess on the cartridge as straight as possible. Ensure the edges of the label are parallel to the edges of the cartridge. The label must not overlap the edge of the recessed area.
- For T9840 and T9940 labels, align the vol-id label and media ID label.
- For best adhesion, apply the label within one year of purchase.

Figure F-4 Cartridge Label Orientation

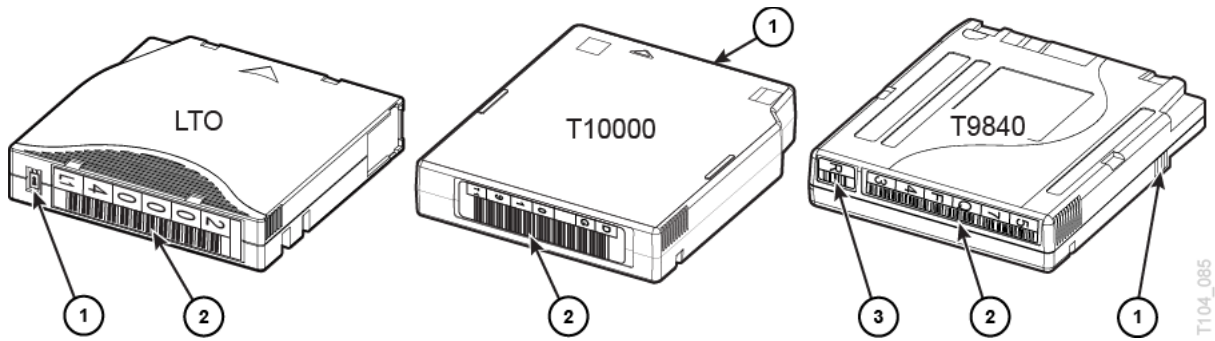


Figure Legend:

- 1. Write-protect switch
- 2. Cartridge label
- 3. Separate media ID label (T9840 and T9940 only)

T9840 and T9940 Label Issues

All media ID labels must have a correctly sized white area above and below the barcode. If the white area is too small, the radius of the label die can cut into the first black bar of the barcode, causing barcode read errors.

Figure F-5 White Area on Separate Media ID Label

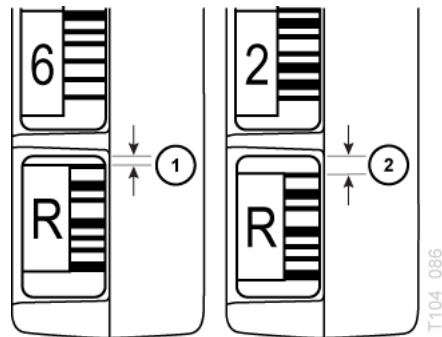
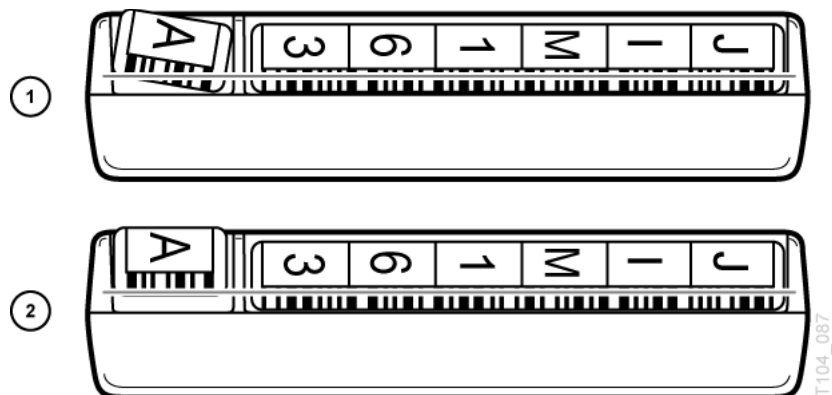


Figure Legend:

- 1. White area is too small
- 2. Correctly sized white area

The media ID label must be aligned with the vol-id label. Ensure the media ID label is not rotated or off-center from the vol-id label.

Figure F-6 Mis-aligned Media ID Label**Figure Legend:**

1. Rotated media ID label
2. Off-center media ID label

Label Care

Proper label care is required to prevent barcode read errors or damage to the equipment:

- Keep the barcode intact. Do not mark or damage the barcode label or place any kind of tape across the label.
- Remove old labels completely before applying a new label. Do not apply a new label on top of an old one.
- Do not use sharp instruments to seat or remove a label.

Glossary

2N

A PDU that supplies power to the redundant AC power grid and the third and fourth accessory racks. See also [N+1](#) and [2N+1](#).

2N+1

Two PDUs for AC redundancy. Each PDU has extra DC power supplies for N+1 redundancy for each PDU.

ACSLs

See [Automated Cartridge System Library Software \(ACSLs\)](#).

ADI

Automation drive interface.

Address Resolution Protocol (ARP)

A network layer protocol that converts IP address into physical addresses, like Ethernet addresses. Address Resolution Protocol (ARP) Takeover allows traffic to be redirected from a failing OSA-Express connection to another OSA-Express connection

AEM

See [access expansion module](#).

access expansion module

Essentially a very large CAP, with all the characteristics of a CAP, such as online/offline state, ability to be shared by partitions, and so on. The cartridge slots in the AEM cannot be used for long-term cartridge storage.

access door

A door on either side of the front facade through which service personnel can enter the library. Optional CAPs are attached to the right access door.

activated capacity

The number of storage slots the library is activated to use. This cannot exceed the installed capacity.

Automated Cartridge System Library Software (ACSLs)

An open systems software package that manages library contents and controls library hardware to mount and dismount cartridges on tape drives. This application also provides library management services such as cartridge tracking, pooling, reports, and library control.

Automated Cartridge System Library Software (ACSL) High Availability (HA)

A hardware and software configuration that provides dual redundancy, automatic recovery, and automatic failover recovery to ensure uninterrupted library management for the SL3000.

audit

An inventory of cartridge locations in all areas of the library, including the slots in the storage and reserved areas. Audits occur when:

- The library initializes at power-on.
- After either one or both access doors are opened and closed without activating the service safety door.
- A physical audit request is made through SL Console.

base module

Provides the entry level offering for an SL3000 library. Consists of a single frame and centralizes the infrastructure for all other modules in the library. This module includes the power supplies, robotic units, electronics control module, cartridge access port, storage slots, tape drives, and operator controls.

bulk load

Manually loading cartridges into the library, for example, during library installation.

CAP

See [cartridge access port \(CAP\)](#).

CEM

See [cartridge expansion module](#).

capacity

The storage capacity of the library. See also [activated capacity](#) and [installed capacity](#).

cartridge

A container holding magnetic tape that can be processed without separating the tape from the container. The library uses data, diagnostic, and cleaning cartridges.

cartridge access port (CAP)

A bi-directional port built into the door panel of the library which provides for the manual entry or automatic ejection of data or cleaning cartridges. Same as import/export mail slot in SCSI and open system libraries.

cartridge expansion module

An optional module for the library that provides additional cartridge slot capacity and growth.

cleaning cartridge

A tape cartridge that contains special material to clean the tape path.

Cold swap

To remove and replace a system component (typically one such as a logic board that has no redundant backup) after system operations have been stopped and system power has been disabled.

Control Data Set (CDS)

Data set used by the ELS/HSC host software to control the functions of the automated library. Also called an ELS library database.

DEM

See [drive expansion module \(DEM\)](#).

dWWN

See [dynamic WWN](#).

data cartridge

A cartridge onto which a tape drive may write data.

diagnostic cartridge

A data cartridge used for diagnostic routines.

data path

The path where data is transferred between the host and tape drives.

drive expansion module (DEM)

A module that allows further expansion of tape drives.

drive slot

A partitioned section of the tape drive array assembly that holds one tape drive tray assembly.

drive slot address

A two-digit integer (01–64) that represents the physical locations into which drive tray assemblies are inserted.

drop-off slots

Cells used to hold a cartridge if a robot failure occurs while a cartridge is in the robot hand.

Dual TCP/IP

Provides two separate host connections between the host software (ACSL or HSC) and the library controller.

dynamic WWN

When enabled, dWWN assigns names to library drive slots rather than devices. When a drive is replaced, the new drive receives the same name as the one it replaced, thereby eliminating the need for system re-configuration. dWWN assigns names to individual tape drive slots rather than devices

ECM

See [electronics control module](#).

ELS

See [Enterprise Library Software \(ELS\)](#).

EPO

See [emergency power-off \(EPO\)](#).

eject

See [export](#).

electronics control module

A module that includes the HBK card, HBC/HBCR card and HBT card. The assembly that:

- Processes commands from a host system
- Coordinates the activities of robots and tape drives
- Monitors status inputs from sensors and switches

emergency power-off (EPO)

(1) A safety scheme that allows a power down of a subsystem or a system as a whole instead of powering it down component-by-component.

(2) A safety switch on a system or in a data center that allows a user to immediately turn off a system or a data center power supply by cutting off the external source power.

enter

See [import](#).

Enterprise Library Software (ELS)

The software products that automate tape operations for mainframe users.

export

The action in which the library places a cartridge into the cartridge access port so that the operator can remove the cartridge from the library. Same as eject.

FRU

Field replaceable unit.

failover

The act of moving to a secondary or redundant path when the primary path fails. Also, in ACSLS HA, failing over to the standby (alternate) ACSLS server.

get

An activity in which a robot obtains a cartridge from a slot or drive.

HBC/HBCR card

The controller card on SL3000.

HLI/PRC

Host Library Interface/Panel Row Column

Host Software Component (HSC)

A component of ELS, HSC is software that resides on mainframe operating systems and controls the library. The HSC receives requests from the programmatic interface and translates them into commands which are carried by the control path to the library. HSC is the overall manager of the library, the interface between a mainframe operating system and a library. HSC maintains a control data set, records of the cartridges stored in each library.

host audit

The process of updating the cartridge vol-ids and locations in a host CDS. This audit is initiated by a host command.

import

The process of placing a cartridge into the cartridge access port so that the library can insert it into a storage slot.

installed capacity

The number of storage slots physically present in the library.

interlock switch

A switch that disconnects power to library mechanisms, excluding tape drives, when the front door is opened.

LCM

See [Library Content Manager \(LCM\)](#).

LTO

See [linear tape open format \(LTO\)](#).

LUN

See [logical unit number](#).

Library Content Manager (LCM)

Software that provides content management for mainframe automated tape environments.

library operator panel

See [touch screen operator control panel](#).

linear tape open format (LTO)

A set of tape data format standards created to enable data interchange among different LTO Ultrium tape drive vendors. These standards allow data cartridges to be shared.

logical library

A virtual representation of a physical library. Same as virtual library partition.

logical unit number

A unique identifier for a physical storage allocation. A LUN could reference an entire RAID set, a single hard disk or partition, or multiple disks or partitions. Unlike a physical LUN, the virtual LUN does not map to a specific device or allocation of storage space but a virtualized space that can be created in excess of the actual physical space available.

magazine

A removable array that holds cartridges and is placed into the cartridge access port (CAP).

N+1

A power configuration that provides AC power and redundant DC power by adding a second DC power supply to each DC bus. See also [2N](#).

operator panel

See [touch screen operator control panel](#).

orphaned cartridge

A cartridge in a partitioned library that is located in an unallocated slot or drive (that is, a slot or drive not allocated to any defined partition). Cartridges may become orphaned when partition boundaries are changed, partitions are deleted, or cartridges are manually moved to unallocated or inaccessible slots.

PDU

See [power distribution unit \(PDU\)](#).

PEM

See [power distribution unit \(PDU\)](#).

PLI

See [primary library interface \(PLI\)](#).

parking expansion module (PEM)

An additional module available for the SL3000 library that allows a redundant robot to be parked in it.

physical audit

Physical audits occur when the robots:

- Scan the cartridge locations in the library
- Verify the volumes
- Update the library control card inventory
- Set the status of the cartridge location to true

power distribution unit (PDU)

A device for the distribution of AC line power from one inlet to multiple outlets. Multiple PDUs provide higher availability because the power continues if one PDU (or its alternating current source if the PDUs use separate AC sources) loses power.

primary library interface (PLI)

The communication path between the operator panel and the library controller.

put

An activity in which a robot places a cartridge into a slot or drive.

RE

See [Redundant Electronics \(RE\)](#).

rail

(1) That portion of the upper robot track assembly that provides power and communication to the robot. (2) All of the cartridge slots and drives accessible through a rail.

rail assembly

The mechanism on which the robot travels between cartridge arrays and tape drives.

Redundant Electronics (RE)

A feature that provides failover protection in enterprise libraries. RE uses two sets of library controller cards. At any given time, one set is active and the other set is standby. The active library controller can failover to the standby in response to a command from ACSLS or the SL Console. Automatic failover can be initiated by the library if a library card fails.

robot

A mechanism that moves horizontally along a track to transport tape cartridges to and from other locations in the library.

routing

The process of moving a packet of data from a source to a destination. Routing enables messages to pass from one device to another device, and eventually reach their target.

SSL

See [Secure Sockets Layer \(SSL\)](#).

Secure Sockets Layer (SSL)

A cryptographic protocol that provides communication security. The communication path between the PLI and the remote operator console occurs through SSL.

TTI

See [tape transport interface \(TTI\)](#).

tape cartridge

A container holding magnetic tape that can be processed without separating the tape from the container. The library uses data, diagnostic, and cleaning cartridges. These cartridges are not interchangeable.

tape drive

An electromechanical device that moves magnetic tape and includes mechanisms for writing and reading data to and from the tape.

tape drive tray assembly

The mechanical structure that houses a tape drive, fan assembly, power and logic cards, cables, and connectors for data and logic cables. Same as drive tray assembly.

tape transport interface (TTI)

An interface to control and monitor tape movement.

touch screen operator control panel

A flat-panel display with a touch screen interface and a panel mount computer. This feature is attached to the front of the library.

vol-id

Volume ID assigned to a cartridge. Same as [VOLSER](#).

VOLSER

Volume serial number. Same as [vol-id](#).

verified audit

Verified audits are invoked from SLC and validate the status of a specific cartridge slot or range of slots.

World Wide Name (WWN)

A 64-bit address that uniquely identifies each individual device and vendor, much like the MAC address of an Ethernet interface. Each port on a Fibre Channel network must have its own WWN. The WWN is not just a physical hardware address. It also serves as the logical address of a node on the SAN, meaning the SAN configuration changes if any of the attached hardware changes. If a device fails and is replaced, the WWN of the node changes, forcing reconfiguration of the SAN. There are three World wide Names reserved for each drive bay: Node, Port A, and Port B.

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