

Dell PowerVault[®] 130T Library

SERVICE MANUAL





Dell PowerVault[™] 130T Library

SERVICE MANUAL

www.dell.com

Information in this document is subject to change without notice. © 1997–1998 Dell Computer Corporation. All rights reserved.

Reproduction in any manner whatsoever without the written permission of Dell Computer Corporation is strictly forbidden.

Trademarks used in this text: *Dell*, the *DELL* logo are registered trademarks, and PowerVault is a trademark of Dell Computer Corporation.

Other trademarks and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. Dell Computer Corporation disclaims any proprietary interest in trademarks and trade names other than its own.

Contents

Preface	vii
About This Manual	vii
Organization	vii
Alert Messages	vii
Related Publications	viii
Ordering Publications	viii
Safety and ESD	ix
Safety	ix
Lifting Techniques	ix
Using Shoulders, Elbows, Wrists, and Hands	х
Preventing Electrostatic Discharge Damage	х
Precautions	х
ESD-Protection Procedure	xi
Rack-Mounted Library Safety and Precautions	xii
Chapter 1.	
General Information	1–1
Components	1–1
Component Locations	1-2
Robot	1-4
Electronics Module	1-4
Operator Panel	1-4
Cartridge Access Port	1_5
Interfaces	1_5
Storage Cells	1_5
Removable Five-Cell Magazine	1_6
Software	1_6
Microcode	1_7
	17
	1-7
Chanter 2	
TIPs Diagnostics and Procedures	2_1
Trouble Isolation Procedures	2_1
Fxamining FSCs	2 1 2_1
Procedure	2^{-1}
ΤΙΡ (000) - STAPT	2-1 2 3
TID 1000. Dowor	2-3
TIP 1010. Library Device Droblems	2-4
TIP 1020. Tana Driva	2-3
TIP 2000: Operator Danel	2-0
TIP 2000, SCSI Interface	2-1
Library Discretifies	2-8
	2-9
Procedure	2-9
Important Procedures	2 - 10

Loading Microcode	2-10
Setting Tape Drive SCSI IDs	2-12
Setting the Library SCSI ID	2-13
Cleaning Tape Drives	2-14
Chapter 3.	2.1
Removal and Replacement	3–1
Preparation	3–1
Powering On and Off the Library	3–2
Removing the Front Door	3–3
Required Tools	3–4
Customer Replaceable Units	3–4
Field Replaceable Units	3–4
CYC Card	3–6
CYO Card	3–8
DLT Drive Tray Assembly	3-13
Electronics Module	3–19
Hand/Camera Assembly	3–25
Theta Motor	3–32
Z Motor	3–38
Check-Out Procedures	3–43
Appendix A.	
Supporting Information	A-1
Specifications	A-1
Glossary	G-1
Index	X–1

Figures

Figure 1–1.	PowerVault 130T Library	1 - 1
Figure 1–2.	Front View of the PowerVault 130T Library	1-2
Figure 1–3.	Rear View of the PowerVault 130T Library	1–3
Figure 1–4.	PowerVault 130T Library Operator Panel	1–4
Figure 1–5.	PowerVault 130T Library Cell Locations	1–6
Figure 3–1.	Powering On and Off the Library	3–2
Figure 3–2.	Removing the Library Front Door	3–3
Figure 3–3.	CYC Card Shown Removed from Library	3–6
Figure 3–4.	Operator Panel	3–8
Figure 3–5.	DLT Drive Tray Assembly	3–13
Figure 3–6.	Electronics Module	3–19
Figure 3–7.	Electronics Module (and CYC card) showing Cable Locations	3-21
Figure 3–8.	Electronics Module Shown Removed from Library	3-22
Figure 3–9.	Hand/Camera Assembly	3–25
Figure 3–10.	Theta Motor	3–32
Figure 3–11.	Z Motor	3–38

Tables

Table 1–1.	DLT4000/DLT7000 Comparison	1–7
Table 3–1.	CRU Locations and Functions	3–4
Table 3–2.	FRU Locations and Functions	3–4
Table A–1.	Functional Data	A-1
Table A–2.	Reliability	A-2
Table A–3.	Physical Specifications	A-2
Table A–4.	Power Specifications	A-2
Table A–5.	Environmental Specifications	A-2
Table A–6.	Agency Certifications	A-3

Preface

About This Manual

This manual provides instructions for servicing the Dell PowerVault 130T Library. It is written for the *technically trained* personnel in charge of those operations.

Organization

This manual is organized as follows:

Chapter 1	"General Information" provides a high-level description of the library components and their functions, including how to open the access doors and power-on and power-off the library. It describes the controls and indicators, shows wall panel and storage cell locations, shows service clearances, and lists some specifications.
Chapter 2	"TIPS, Diagnostics, and Procedures" describes how to troubleshoot and isolate power faults in the library, how to run diagnostic routines, and important procedures.
Chapter 3	"Removal and Replacement" describes removing and replacing Field Replaceable Units (FRUs) and Customer Replaceable Units (CRUs).
Appendix A	"Supporting Information" provides library and drive specifications.
Glossary	The Glossary defines relevant terms and acronyms.
Index	The Index assists in locating information in this manual.

Alert Messages

This manual contains alert messages that must be read carefully and followed.

NOTE: Provides additional information that might be of special interest. A note can point out exceptions to rules or procedures. A note usually, but not always, follows the information to which it relates.

CAUTION: Informs the user of conditions that might result in damage to hardware, corruption of customer data or application software, or long-term health hazard to people. A caution always precedes the information to which it relates.

WARNING: Alerts the user to conditions that might result in injury or death. A warning always precedes the information to which it relates.

Related Publications

Additional information is contained in the following publications:

Publication	Part Number
PowerVault 130T Library User's Guide	2473D
PowerVault 130T Quick Install Guide	5473D
PowerVault 130T Product Information CD	0194D
PowerVault 130T Safety Booklet	3473D

Ordering Publications

To order publications, contact your Dell sales/marketing representative or go to our web site at www.dell.com.

Safety and ESD

The following pages cover three topics that are *essential* to all service activity:

- 1. Safety
- 2. Preventing electrostatic discharge (ESD) damage to equipment
- 3. Rack-mounted library safety and precautions

Safety

On-the-job safety is important; therefore, observe the following safety precautions during all maintenance activity. Failure to do so could result in injury.

- Remove all conductive jewelry, such as watches and rings, before servicing powered-on equipment.
- Be careful to avoid shocks when working near power connectors and supplies.
- Power off the equipment being serviced before removing a field replaceable unit (FRU) or other component. Remember that dangerous voltages could still be present in some areas even though power is off.

NOTE: The disconnect device for the PowerVault 130T library is the AC power receptacle, located at the bottom of the rear panel of the electronics module.

- Ground all test equipment and power tools.
- Lift objects properly, as outlined under "Lifting Techniques."
- Enforce good housekeeping practices in the equipment area to help prevent fire and accidents.

Lifting Techniques

Lifting, regardless of how much or how little, can create serious back stress. Follow these guidelines to reduce the risk of back injury:

- Do not twist your body to pick something up or put it down. Twisting puts extreme pressure on your back, especially when you lift or carry objects. Instead of twisting, make the task two separate moves; first lift, and then use your feet to turn your body.
- Plan the lift by examining the object and determining how it will be lifted and where it will be placed.
- Choose the appropriate lifting technique. Examine the weight, size, location, frequency, and direction of the lift. Plan to avoid awkward postures and determine if material-handling aids are needed.

- Place your feet 31–46 centimeters (12–18 inches) apart and place one foot a little behind the other. Keep your back straight, because even light loads can significantly increase pressure on the spine when you lean forward.
- Do not use a pinch grip to lift large or heavy loads, because this puts a lot of tension on hand and wrist tendons. Whenever possible, grip the load with your whole hand, and use two hands.
- Keep the objects being lifted, lowered, or carried close to your body. The farther away you hold an object, the more force it puts on your lower back.
- Lift with your legs instead of your back. When you squat and lift with your legs, you can lift more weight safely.
- Alternate lifting tasks with tasks less stressful to the same muscles. This technique ensures recovery time.

Using Shoulders, Elbows, Wrists, and Hands

Follow these guidelines to minimize the possibility of injuring your shoulders, elbows, wrists, and hands.

- Work within your safety zone—the area between shoulder level and knuckle level of your lowered hands.
- Bend elbows to keep loads close to your body and decrease the amount of force necessary to do the job, putting less weight and pressure on your shoulders.
- Keep your wrists straight and avoid bending, extending, or twisting for long periods of time.
- Use as much of your hands as possible when holding an object so you will not have to pinch with your fingers. Alternate hands to give them rest.

Preventing Electrostatic Discharge Damage

Anyone handling ESD-sensitive components must be aware of the damage ESD can cause to those components and take proper precautions to prevent it. Handle ESD-sensitive components only if you are protected against ESD. To meet this requirement, always use an ESD grounding kit.

Precautions

Always take these general precautions when working with ESD-sensitive components:

- Wear ESD protection whenever you install, maintain, or repair electronic equipment.
- Keep ESD-sensitive components in their ESD-protective packages until all preventive steps have been taken and it is time to install the component.
- Do not allow anyone to touch or handle an unprotected ESD-sensitive component unless that person has taken all ESD precautions.

- Reinstall covers and close doors when equipment is not being serviced.
- If the grounding-kit work surface has been exposed to temperatures above 66°C (150°F) or below 4.5°C (40°F), acclimate the work surface to room temperature before unrolling it.
- Place any removed component into an ESD-protective package.
- Keep the grounding-kit work surface clean. Use a mild detergent and water, as needed, and make sure that the surface is completely dry before you use it.
- Periodically check the resistance of the ground cord and the wrist-strap coil cord. The ground cord should measure less than 1.2M ohms, and the coil cord should measure between 0.8M ohms and 1.2M ohms. Repair or replace the cords as required.

ESD-Protection Procedure

Remember that each environment is different. Make sure that all concerns have been addressed before working on equipment.

Preparation

- 1. Before opening the equipment, unfold the work surface completely and place it on any convenient surface, such as a table or the floor next to the equipment to be serviced.
- 2. Attach one end of the ground cord to the work surface using the snap fastener. The free end will be attached in a later step.
- 3. Slip on a wrist strap making sure that it is comfortable but still makes contact with the entire circumference of your wrist.
- 4. Snap one end of the coil cord to the wrist band; attach the other end to the work surface where the ground cord is attached.

Accessing the equipment

Open the doors or panels of the equipment and immediately attach the free end of the ground cord to any convenient ground point on the equipment frame.

Replacing components

- 1. Remove the suspect component and place it on the work surface.
- 2. Remove the replacement component from its ESD-protective package and install it in the equipment.
- 3. Place the suspect component in the ESD-protective package emptied in Step 2.

Cleanup

- 1. Disconnect the ground cords from the equipment.
- 2. Reinstall all covers and close the doors.
- 3. Disconnect the coil cord from your wrist and the ground cord from the work surface.

4. Properly store the work surface and other Field Service Grounding Kit items.

Rack-Mounted Library Safety and Precautions

WARNING: The PowerVault 130T Library, with four tape drives, weighs approximately 68 kilograms (149 pounds). Installing or removing the library from the rack requires at least two people. Be careful to prevent an unbalanced condition that could cause the rack to become unstable and tip over.

Review the following safety and handling precautions for rack-mounted installations:

- Follow the manufacturer's guidelines for positioning, supporting, and fastening the library in the rack.
- If the rack has a front door, there must be sufficient clearance to the front door of the library, and sufficient ventilation to allow for cooling air flow front to back.
- If the rack has a rear door, there must be at least 10 cm (4 in.) of clearance between the door and the library. A rear door must have louvers to provide air circulation to the libraries. The internal rack ambient temperature must not exceed the recommended library operating temperature range of 16 to 32°C (60 to 90°F).
- Ensure that the library, together with other equipment installed in the rack, does not create an overcurrent condition, whether it is connected directly to the branch circuit or to a power distribution strip.
- Ensure that all units in the rack have reliable earth-ground connections, whether they are connected directly to the branch circuit or to a power distribution strip.
- *NOTE:* The library relies on the ground pin of the power cord for its earthground connection.

Chapter 1. General Information

The PowerVault 130T Library is a self-contained, rack-mountable, fully automated cartridge system that uses Digital Linear Tape (DLT) drives for data storage and retrieval. An automated cartridge system is a removable-medium, robotic system that mounts and dismounts cartridge tapes into cells for storage, tape drives for read/write operations, or the cartridge access port (CAP) to remove or replace cartridge tapes.



Figure 1–1. PowerVault 130T Library

Components

The PowerVault 130T has seven major components/features:

- Robot
- Electronics module
- Operator panel
- Cartridge access port
- Small computer system interface attachment
- Storage cells
- Slots for up to four tape drives

Component Locations



Following are descriptions of the major library components and their locations.

Figure 1–2. Front View of the PowerVault 130T Library

The locations below are described as you face the front of the library:

Operator Panel	The operator panel is at the top left, above the cartridge access port.
Cartridge Access Port	The cartridge access port (CAP) is at the lower left, below the operator panel.
Hand/Camera Assembly	The hand/camera assembly is at the front of the library inside the door, mounted to the bearing block on the Z column.
Theta Motor	The theta motor is at the bottom right corner, inside the front door.
Z Motor	The Z motor is at the top of the Z column, attached by four screws to the Z motor bracket.



Figure 1–3. Rear View of the PowerVault 130T Library

The locations below are described as you face the rear of the library:

Hinged Access Door	The hinged access door is between the electronics module and the drive slots. Drive and CYC card cables and connectors are accessed through it.
DLT Drive	DLT tape drives are in the drive slots on the left.
SCSI Connectors	Small Computer Systems Interface (SCSI) connectors are at the top right, beside the power switch on the electronics module (EM).
CYC Card	The CYC card is mounted inside, on the EM.
Electronics Module	The electronics module is on the right side. It houses the power supply, CYC card, and two fans.
Debug Connector	<i>For engineering use only</i> The debug connector is between the fans; left of the CSE connector.
CSE Connector	The CSE connector is between the fans; right of the debug connector.
Fans	The fans are mounted to the electronics module.
AC Power Receptacle	The AC power receptacle is on the lower right, on the electronics module.

Robot

The robot is the mechanical assembly that moves cartridge tapes from storage cells to tape drives for data processing. It has the following components:

Z column and motor	For control and vertical movement of the hand/camera assembly
Theta assembly and motor	For rotational movement of the Z column and the hand/camera assembly
Hand/camera assembly	For targeting cartridge tapes and picking them from the storage cells, CAP, or tape drives

Electronics Module

The electronics module contains all of the logic and power components of the library, including:

CYC card	(with 32-bit microprocessor) controls all library functions such as robotics motion, vision control, and SCSI attachment for communication with the host system
AC power supply	(auto ranging) provides AC power to the tape drives and regulated DC voltages for the library
Cooling fans (two)	For cooling the library, CYC card, and power supply

Operator Panel

The operator panel has three light emitting diodes (LEDs), five function buttons, and a four-line 20-character display.



Figure 1–4. PowerVault 130T Library Operator Panel

The following functions are performed at the operator panel:

- Displaying library and tape drive status
- Configuring the library and tape drives
- Running diagnostic tests
- Displaying error information

Message Lines

Message	Description
Cap Locked	The Cartridge Access Port (CAP) is locked.
Not Installed	Drive slot 2 is empty (third slot from bottom in the library)
DLT7000	Drive slot 1 (second from bottom) contains an installed DLT4000 that is loaded with a cartridge tape. If a DLT7000 drive installed, this will display in place of DLT4000.
DLT7000	Drive slot 0 (bottom) contains an installed DLT4000 drive that is not loaded with a cartridge tape. If a DLT7000 drive is installed, this will display in place of DLT4000.

NOTE: If the library contains four *DLT* drives (the fourth in slot 3 at the top), you can see the status of the fourth drive by pressing the up arrow on the operator panel to allow the drive status lines to scroll.

Cartridge Access Port

The CAP, located just below the operator panel, is used for inserting and/or removing cartridges from the library.

Interfaces

The library and the tape drives support the small computer system interface (SCSI) differential alternative.

The PowerVault 130T supports 8-bit wide asynchronous transfer and attaches to the SCSI bus using a SCSI-3, 68-pin, high density connector and cable (P–cable).

IMPORTANT: The PowerVault 130T supports only SCSI–3 type connectors. SCSI–1 or SCSI–2 type connectors require an adapter.

Storage Cells

Depending on the configuration, the PowerVault 130T can hold up to 30 cartridge tapes. Figure 1–5 shows the storage cell mapping and locations of the cleaning cartridge, target arrays, cartridge access port, and tape drive slots.

In the figure, the number in parentheses equals the total cartridge count. The other number is the storage cell number in one of the three columns. The storage cell layout as a whole is called the "array," and the array targets are used for robotic calibration during initialization. The shaded area (Column1, Cells 0 through 4) is the location of the removable cartridge magazine.

Removable Five-Cell Magazine

A removable five-cell cartridge magazine is included with the PowerVault 130T Library. This can be easily taken out, loaded with batch jobs or special applications, and replaced in the library whenever it is required.



Figure 1–5. PowerVault 130T Library Cell Locations

Software

The PowerVault 130T Library requires host-level software and device-level microcode to function. Numerous software solutions integrate well with a variety of servers and operating systems to meet the specific customer needs and applications, such as

• Backup and restore

- Data archive
- Hierarchical storage management (HSM)
- Media management
- Disaster recovery

The type of host-software solution chosen can optimize the performance of small to medium-sized networks, support multiple platforms, improve availability and scalability of products, and deliver fully automated operations.

Host-level software also contains drivers using SCSI commands to control the motion of the robot and track the location of cartridge tapes (audit) using the volume serial number (VOLSER) on the cartridge bar code labels.

Microcode

Microcode for the library and tape drives controls the functional operation of these devices.

The microcode for tape drives is loaded from a cartridge tape.

The microcode for the library is loaded from a personal computer (PC) through the CSE port on the rear of the library. Since library microcode is stored in flash prom, in the event of a power outage, the PowerVault 130T powers on and returns to its functional state without requiring microcode reload when power comes back.

DLT Drives

The PowerVault 130T Library has slots for up to four DLT4000 or DLT7000 tape drives. These are high-performance, large capacity, streaming cartridge tape drives using half-inch CompacTape types III, III XT, or IV. Depending on the tape, type of data, type of tape drive, and compression algorithm, each cartridge tape can store from 10 to 70 gigabytes (GB) of data.

Table 1–1. DLT4000/DLT7000 Comparison		
Parameter	DLT4000	DLT7000
Cartridge Capacity		
Native Compressed	20 GB 40 GB	35 GB 70 GB
Transfer Rate		
Native Compressed	1.5 MB/sec 3.0 MB/sec	5 MB/sec 10 MB/sec
SCSI Interface	Fast/Narrow	Fast/Wide
Track Density	256 trks/in.	416 trks/in.
Buffer Size	2 MB	8 MB
Read/Write Tape Speed	98 in./sec	160 in./sec
Rewind Tape Speed	150 in./sec	175 in./sec

Table 1–1. DLT4000/DLT7000 Comparison		
Parameter	DLT4000	DLT7000
Linear Search Speed	150 in./sec	175 in./sec
Average Rewind Time	70 sec	60 sec
Maximum Rewind Time	140 sec	120 sec

Chapter 2. TIPs, Diagnostics, and Procedures

This chapter contains trouble isolation procedures (TIPs), diagnostic routines, and other important procedures to help you service the PowerVault 130T Library.

Trouble Isolation Procedures

Most faults detected in the library result in a fault symptom code (FSC), four hexadecimal digits that identify an error. If you have a problem and know the FSC, you can replace the suggested field replaceable units (FRUs) listed for that FSC.

Examining FSCs

The "Examine FSCs" menu option allows the operator to view the last 20 fault symptom codes. An example of the FSC display is shown below.



Procedure

To examine FSCs, select the "Library Utilities" menu on the operator panel, and then select "Examine FSCs." Use the arrow buttons to scroll the lines of the display.

A listing of FSCs and their meanings is found on the microcode floppy/CD that comes with the library, under the filename FSC.txt.

Sometimes a fault may exist without any indication of an FSC, such as

- A power problem
- A display problem
- An interface problem
- An intermittent or performance problem

The following TIPs are guidelines to help diagnose and fix these problems and others with no associated FSC.

Each TIP begins with a summary of symptoms and their possible causes, followed by step-by-step instructions to help isolate the problem. Always start with TIP 0000 to direct you to the correct procedure.

TIP 0000: START

The Start TIP is the beginning point for all of the following PowerVault 130T Library TIPs. Whenever a problem occurs and no FSC is displayed, begin the trouble isolation process here to help isolate and fix the problem.

Problem	Conditions That Could Cause This Problem
A failure has been detected, or is suspected with the library or tape drives.	• Power problems are detected in some part of the library.
	• There is no display on the operator panel.
	• The operating system does not recognize the library or tape drives.
	• The customer has observed an abnormal condition with the library or tape drive.
1. Do you have a power problem?	Yes: Go to TIP 1000
	No: Go to Step 2.
2. Do you have a problem with the	Yes: Go to TIP 2000
operator panel?	No: Go to Step 3.
3. Do you have a problem where the	Yes: Go to TIP 3000
operating system cannot access the library or tape drives?	No: Go to Step 4.
4. If you are uncertain, run diagnostic tests on the library and the drives.	Refer to Chapter 2, TIPs, Diagnostics, and Procedures for more information about running diagnostic tests.

TIP 1000: Power

TIP 1000 is the starting point for power problems in the PowerVault 130T Library.

Symptom Explanation	Conditions That Could Cause This Problem
Power problems are detected in some	• Faulty switches, cables, or connections
part of the fibrary.	• Faulty power supply (on the electronics module)
	• Faulty tape drive power supply
	• Problems with input power

WARNING: Observe the safety precautions in "Safety and ESD" when working with voltage in the PowerVault 130T Library, tape drives, and with input line voltage.

1.	Is there a problem with library power?	Yes? Go to TIP 1010. No? Go to step 2.
2.	Is there a problem with tape drive power?	Yes? Go to TIP 1020. No? Go to step 3.
3.	Is there a display problem with operator panel power?	Yes: Go to TIP 2000.

TIP 1010: Library Power Problems

Use this TIP to troubleshoot and repair power problems with the library.

Symptom Explanation	Conditions That Could Cause This Problem
The library does not power on.	• Electronics module is faulty.
	• Power cable connection is loose or faulty.
	• Faulty library power switch.
	• Customer supplied power is missing.

WARNING: Observe the safety precautions in "About This Manual" when working with voltage in the PowerVault 130T Library, and with input line voltage.

1.	Is the power switch on?	Yes: Go to step 2.No: Turn on the power switch.
2.	Is the power cable properly seated in the library and in the input?	Yes: Go to step 3. No: Turn off power switch. Reseat the AC power cable connector at the back of the library and at the AC wall outlet. Turn on power switch.
3.	Is the customer's input power circuit breaker on?	Yes: Go to step 4. No: Reset the circuit breaker.
4.	Are the library fans turning?	Yes: Go to step 5.No: Replace the electronics module.
5.	Are all of the connectors on the CYC card seated?	Yes: Go to step 6. No: Seat the connectors.
6.	Are there any displays or LEDS on the operator panel?	Yes: Go to step 7.No: Replace the operator panel.
7.	Place a service call.	

TIP 1020: Tape Drive

Use this TIP to troubleshoot and repair power problems with the tape drive.

Symptom Explanation	Co	onditions That Could Cause This Problem
A tape drive does not power on.	•	Faulty cable connection exists between the electronics module and the tape drive
	•	Defective tape drive power supply
	•	Electronics module power supply faulty

WARNING: When the Tape Drive assembly is not installed into the PowerVault 130T, do not apply power. (Refer to S02 in the Safety Booklet.)

WARNING: Do not touch any components on the power supply located within the electronics module or on the drive trays. Live voltage could be present even though the PowerVault 130T is powered off. (Refer to S05 in the Safety Booklet.)

1.	Is only one of the drives not powered on?	Yes: Go to step 3. No: Plug the drive power cable into a different drive power receptacle on the electronics module. If it works but the power receptacle cannot be used for this drive, go to step 4.
2.	Are all drives powered off?	Yes: Go to step 3. No: Turn off the library power switch. Reseat the AC power cable connector at the back of the library and in the AC wall outlet. Turn on the library power switch.
3.	Is the customer's input power circuit breaker in the correct position?	Yes: Go to step 4 No: Reset the circuit breaker.
4.	Is the electronics module working?	Yes: Go to step 5. No: Replace the electronics module.

5. Place a service call.

TIP 2000: Operator Panel

Use this TIP to troubleshoot and repair problems with the operator panel.

Symptom Explanation	Conditions That Could Cause This Problem
No display on the operator panel.	• Faulty cable connections exist between the electronics module and the operator panel.
	• Faulty cable connections exist between the signal cable and the operator panel.
	• Defective operator panel
	• Defective electronics module

WARNING: Do not touch any components on the power supply located within the electronics module or on the drive trays. Live voltage could be present even though the PowerVault 130T is powered off. (Refer to S05 in the Safety Booklet.)

1.	Is the power switch on?	Yes: Go to step 2. No: Turn on the power switch.
2.	Is the power cable properly seated in the library and in the input?	Yes: Go to step 3. No: Turn off power switch. Reseat the AC power cable connector at the back of the library and at the AC wall outlet. Turn on power switch.
3.	Is the customer's input power circuit breaker on?	Yes: Go to step 4 No: Reset the circuit breaker.
4.	Are the library fans turning?	Yes: Go to step 5. No: Replace the electronics module.
5.	Are all of the connectors on the CYC card seated?	Yes: Go to step 6. No: Seat the connectors.
6.	Are there any displays or LEDs on the operator panel?	Yes: Go to step 7. No: Replace the operator panel.
7.	Is the operator panel power connector properly seated at the operator panel?	Yes: Go to step 8. No: Reseat the DC power connector at the front of the operator panel.

^{8.} Place a service call.

TIP 3000: SCSI Interface

Use this TIP to troubleshoot and repair problems with the SCSI interface.

Symptom Explanation	Conditions That Could Cause This Problem
The operating system does not recognize the library or the tape	• SCSI cables may be loose.
drives.	• SCSI terminators may be missing or loose.
	• The SCSI terminator might not be at the end of the bus or there may be more than two terminators present.
	• The SCSI bus may be too long.
	• Too many devices may be on the bus.
	• Your system may not be configured to recognize the electronics module or tape drive SCSI IDs.
1. Are the SCSI cables properly connected?	Yes: Go to step 2. No: Reseat the connectors.
2. Are there SCSI terminators at both ends of the bus?	Yes: Go to step 3. No: Add SCSI terminators.
3. Are there more than two terminators present?	Yes: Go to step 4. No: Remove extra terminators so there are no more than two present.
4. Is the length of the SCSI bus within specification?	Yes: Go to step 5. No: Connect a shorter SCSI cable.
5. Are there more than the maximum permitted number of devices on the SCSI bus?	Yes: Go to step 6.No: Check the library and drive configurations for valid IDs.
6. Is the system configured to recognize the tape drives?	Yes: Go to step 7.No: Reset the tape drive SCSI IDs.
7. Is the system configured to recognize the library?	Yes: Go to step 8. No: Reset the library SCSI ID.

8. Place a service call.

NOTE: Most SCSI adapters provide an internal terminator, so no external terminator is required.

Library Diagnostics

The following diagnostic routines are available from the "Library Diags" menu:

Get-Put Loop	Robot removes diagnostic tape from the CAP, moves, returns tape to the CAP.
Mount Diagnostic	Robot mounts diagnostic tape to a specified drive.
Dismount Diag	Robot dismounts diagnostic tape from a specified drive.
Unlock CAP Test	Robot unlocks the CAP and prompts operator to open and close the CAP to complete the test.
Mount–Dismnt Loop	Robot mounts and dismounts a tape to a drive.
Initialize Mechs	Initializes the library and performs an audit.
Demo mode	Robot makes random moves. (You must have at least one data cartridge in the library and at least one empty cell.)

CAUTION: Demo mode shuffles cartridges in the library, which invalidates catridge location information between the library and the host. After exiting Demo mode, the host software should perform a re-audit to update the location of the tapes.

Procedure

To run any diagnostic routine, select the "Library Utilities" menu and then select "Library Diags." The library provides detailed prompts. Select the desired diagnostic routine using the arrow buttons, and press ENTER. Then follow the prompts displayed on the operator panel.

NOTE: When you first choose one of the diagnostic routines listed above, the library prompts you to press ENTER to put the library in Maintenance mode. In Maintenance mode, the library goes offline to the host. Make sure all host activity has stopped before proceeding.

If you wish to continue, the display prompts you to insert a "diagnostic" cartridge. A diagnostic cartridge is an ordinary DLT data cartridge with a "DG" label attached. (The cartridge should be empty to avoid data loss.) This label is required for diagnostics.

If you start these routines and do not have a diagnostic tape ready, you might need to reset the library by pressing **RESET** or by opening and closing the front door, in order to exit the Maintenance mode.

Once in Maintenance mode with a diagnostic tape inserted, the library retains that tape enabling you to run more than one diagnostic routine without leaving Maintenance mode. When you are finished, press MENU (once or several times, as required) to exit, retrieve the diagnostic tape, and return to a higher-level menu.

Important Procedures

This section includes the following procedures that may sometimes be required:

- Loading Microde
- Setting tape drive SCSI IDs (from the operator panel)
- Setting the library SCSI ID (from the operator panel)
- Cleaning tape drives

Loading Microcode

Items required:

- DOS-based computer with available com/serial port
- Adapter DB9 to RJ45 to computer
- RJ45 8-conductor cable
- Adapter DB9 to RJ45 to CSE port on library
- PowerVault 130T microcode floppy/CD

Procedure

- 1. Attach the cable to the serial port of the computer and to the CSE port on the library. Power on or reset the library.
- 2. During boot, while the library display reads <Menu> Available (visible for about five seconds), press the MENU button on the operator panel.
- 3. The operator panel displays the choices

>Functional Reflash NVRAM test & init

Select Functional Reflash using the arrow buttons and press ENTER.

The operator panel displays

FUNCTIONAL RE-FLASH

IN PROGRESS

Connect CSE port...

- 4. Insert the microcode diskette into the floppy drive of the PC and access the floppy drive. This is usually done by typing A: and pressing **RETURN**
- 5. At the DOS prompt, type Flash97.exe reflash.prm

The program will then prompt you for the serial port number. Type in the serial port number that is connected to the cable and press ENTER.

The PC displays Sending and the library Operator Panel displays Receiving.

Next, the PC displays Send Status: File transfer completed successfully. The Operator Panel displays Writing......

WARNING: Do not power down or reset the library while in the writing mode.

- 6. When the library Operator Panel displays Write OK...<Reset>, push the Reset button on the operator panel.
- 7. The library will reboot and the operator panel will display:

BOOT RE-FLASH APPLICATION RUNNING

Connect CSE Port ...

8. At the DOS prompt, type flash97.exe boot.prm The program will then prompt you for the serial port number. Type in the serial port number that is connected to the cable and press ENTER.

The PC displays Sending and the library Operator Panel displays Receiving.

Next, the PC displays Send Status: File transfer completed successfully. The library Operator Panel displays Writing.....

WARNING: Do not power down or reset the library while in the writing mode.

- 9. When the library Operator Panel displays Write OK...<Reset>, push the Reset button on the operator panel.
- 10. During boot, while the library display reads <Menu> Available (visible for about five seconds), press the MENU button on the operator panel.
- 11. The operator panel displays the choices

>Functional Reflash NVRAM test & init

Select Functional Reflash using the arrow buttons and press ENTER

The operator panel displays

Connect CSE port ...

12. At the DOS prompt, type flash97.exe release.prm The program will then prompt you for the serial port number. Type in the serial port number that is connected to the cable and press ENTER.

The PC displays Sending and the library Operator Panel displays Receiving

Next, the PC displays Send Status: File transfer completed successfully. The library Operator Panel displays Writing.....

WARNING: Do not power down or reset the library while in the writing mode.

- 13. When the library Operator Panel Write OK...<Reset>, push the Reset button on the operator panel.
- 14. The firmware update is complete.
- 15. The new Boot code and Functional Code will be displayed during the first 5 seconds of the library boot process. Verify the correct levels of code are displays. The format appears below:

Boot: #.#.## <Day><Month><Year> Func: #.#.## <Day><Month><Year>

Setting Tape Drive SCSI IDs

SCSI IDs for the tape drives are set at the operator panel, where you can make a selection by pressing ENTER when the cursor is on that selection. You can return to a higher-level menu by pressing MENU. You can scroll to see hidden selections or alter numerical values by pressing the ARROW buttons.

NOTE: Before setting or resetting tape drive SCSI IDs, make sure the library has a valid drive count (number of tape drives installed). To check or reset the drive count, select the "Library Utilities" menu and then select "Set Configuration." Then select "Set Drive Count" (scroll the display using the arrow buttons). If you change this value, you must **RESET** the library before setting tape drive SCSI IDs.

Procedure

- 1. Select the "Library Utilities" menu, then select "Set Configuration."
- 2. Select "Set Drive SCSI ID."
- 3. Scroll using the arrow buttons to select the correct drive (drives are numbered 0 through 3 starting from the bottom) and press ENTER.
- 4. Set the desired SCSI ID for that drive using arrow buttons, and press ENTER.

For DLT 4000 drives, SCSI IDs can be set from 0-7. For DLT 7000 drives, SCSI IDs can be set from 0-15. As an additional option under "Set Drive SCSI ID" you can set tape drives to be "On Bus" (the same SCSI bus as the library) or "Off Bus" (a different SCSI bus). The illustration below is an example of setting a drive off–bus. SCSI channel 1 (item 2) is connected to the library ports (item 1) and then daisy chained to Drive 0 (item 6). SCSI channel 2 (item 4) is connected directly to drive 1 (item 5). Therefore, Drive 0 is on–bus (the same bus as the library) and Drive 1 is off–bus.



D_C63228

Setting the Library SCSI ID

The library SCSI ID is set at the operator panel, where you can make a selection by pressing ENTER when the cursor is on that selection. You can return to a higher-level menu by pressing MENU. You can scroll to see hidden selections or alter numerical values by pressing the ARROW buttons.

Procedure

- 1. Select the "Library Utilities" menu, then select "Set Configuration."
- 2. Select "Set Library SCSI ID."
- 3. Choose the desired library SCSI ID using the arrow buttons and press ENTER. (Valid IDs are 0 through 7.)
- 4. To finish, press the RESET button. The library resets to the desired SCSI ID.

Cleaning Tape Drives

If a drive needs cleaning, a "Clean Me" message appears on the display for that drive. Follow this procedure to clean the drive. (When Auto Clean is enabled, the library automatically performs this operation. See the *PowerVault 130T User's Guide* for detailed information about Auto Clean.)

Procedure

- 1. Select the "Drive Utilities" menu, then select "Clean a Drive."
- 2. Select the number of the drive to be cleaned using the arrow buttons and press ENTER. The library unlocks the CAP.
- 3. Insert a cleaning cartridge into the CAP, close the CAP, and press ENTER. The display reads Performing Operation.
- 4. When the cleaning is finished, follow the prompts on the display to retrieve the cleaning cartridge and return to operation.
Chapter 3. Removal and Replacement

This chapter describes how to remove and replace the field replaceable units (FRUs) and customer replaceable units (CRUs) in the PowerVault 130T Library.

Preparation

NOTE: If you are replacing a FRU or CRU because of a fault symptom code (FSC), run diagnostic tests to make sure you can duplicate the problem. Information about FSCs can be found on page 2–1 and about diagnostic tests on page 2–9. After you have replaced the FRU or CRU, run the diagnostic tests again to make sure the problem has been fixed.

CAUTION: Review the following steps *before* attempting to remove and replace any FRUs or CRUs:

- 1. Follow the safety and electrostatic discharge (ESD) precautions outlined in *About this Manual* at the beginning of this document.
- 2. Follow the safety precautions outlined in *Rack-Mounted Library Safety and Precautions* in *Preface*.
- 3. Read each procedure completely to familiarize yourself with the warnings and steps involved with the procedure before starting.
- 4. End all jobs being performed by the library and place the tape drives offline before removing power. Removing power without placing the drives offline could result in loss of data or damage to the cartridge tape.

CAUTION: Observe these SCSI bus precautions when disconnecting the SCSI cables from the PowerVault 130T library and tape drives.

- Before connecting the external SCSI cables, make sure there is no activity on the SCSI bus. The host must be quiesced; do not connect to a hot bus.
- Any third party software must be quiesced.
- All signals must be terminated at each end of the SCSI bus.

Powering On and Off the Library



Figure 3–1. Powering On and Off the Library

To power-on the library:

- 1. Connect the power cable to the rear of the electronics module.
- 2. Press the '|' on the power switch located at the top right corner of the electronics module on the rear of the library.

To power-off the library:

- 1. Press the 'O' on the power switch located at the top right corner of the electronics module at the rear of the library.
- 2. Disconnect the power cable from the rear of the electronics module.

CAUTION: Before performing any removal or replacement procedures, make sure that all jobs being performed by the library and the tape drives have ended and power is removed.

Removing the Front Door

You will need to open the library front door to service the robotics and the arrays. The tape drives and the electronics module are serviced from the rear of the library.



Figure 3–2. Removing the Library Front Door

To open and remove the front door:

- 1. Place the library offline.
- 2. Unlock the front door with the key provided.
- 3. Remove the door by pulling out the two hinge pins and lifting the door up and away from the library.

Set the door off to the side and out of the way. Be careful not to break the key off in the lock.

To replace and close the front door:

- 1. Align the door with the hinges.
- 2. Install the two hinge pins.
- 3. Close the library front door. The safety interlock engages when you close the door.

Required Tools

The following tools are required for some removal/replace procedures and must be provided by the customer:

- Flashlight
- Torx screwdriver
- Wire clipper

Customer Replaceable Units

Customer Replaceable Units (CRUs) are designed to be removed/replaced by an individual with minimal technical experience. Follow all precautions and instructions.

Table 3–1. CRU Locations and Functions					
Units	Locations	Functions	Page #s		
DLT drive tray assembly	Left rear of the library	Holds tape drive and its power supply	3–13		

Field Replaceable Units

Field Replaceable Units (FRUs) are to be removed/replaced only by technically trained service personnel.

Table 3–2. FRU Locations and Functions					
Units	Locations	Functions	Page #s		
CYC card	Part of the electronics module (EM)	Microprocessor that monitors and controls all functions of the 130T library.	3–6		
CYO card (operator panel assembly)	Front of the library, above the CAP.	Displays library and drive statuses. Used for configuring the system, running diagnostics, and examining errors.	3–8		
DLT Drive Tray Assembly	Left rear of the library	Holds drive assembly for read/write operations	3–13		
Electronics module	Right rear of the library	Houses the power supply, CYC card, fan assemblies	3–19		
Hand/camera assembly	Attaches to the bearing block on the Z column	Mounts and dismounts cartridge tapes from storage cells and tape drives.	3–25		

Table 3–2. FRU Locations and Functions				
Units	Locations	Functions	Page #s	
Theta motor	Inside the library, in the lower right corner.	Provides power for theta movement of the robot.	3–32	
Z motor	Inside the front of the library, at the top of the Z column	Provides power for vertical movement of the robot.	3–38	

NOTE: Theta motor and Z motor assembly are the same FRU part number.

CYC Card

The CYC card FRU is mounted within the electronics module. The electronics module is inside the library and is accessed from the right rear side.

You must remove the electronics module to service the CYC card.

Tools required:

- ESD grounding kit
- Torx driver and a T-10 and T-15 bit
- Flashlight
- Note paper and a pen or pencil to record configuration information



Figure 3–3. CYC Card Shown Removed from Library

Removal

- 1. Try to view the library configuration information by accessing Library Utilities from the Operator Panel menu and selecting View Configuration.
- 2. Manually log all of the configuration information, including library SCSI ID, tape drive SCSI IDs, etc.
- 3. Remove the electronics module following the procedures beginning on page 3–20.
- 4. Disconnect cables J41, J42, J44, and J15S or D from their connectors. Refer to Figure 3–3 for connector locations.
- 5. Remove the 18 screws attaching the CYC card to the standoffs on the electronics module chassis using a Torx driver with a T-10 bit.

Replacement

- 1. Remove the new CYC card from its packaging.
- 2. Align the card with the 18 standoffs on the electronics module chassis.
- 3. Install the 18 screws attaching the CYC card to the EM chassis using a Torx driver with a T-10 bit.
- 4. Connect cables J41, J42, J44, and J15 S or D to their connectors. Refer to Figure 3–3 for connector locations.
- 5. Replace the electronics module following the procedure beginning on page 3–23.
- 6. Reconfigure the new CYC card using the information you obtained from the View Configuration menu in step 1 of the removal procedure above.

NOTE: Refer to Chapter 2 for instructions about setting library and tape drive SCSI IDs. A detailed configuration procedure is available in the PowerVault 130T User's Guide.

CYO Card

The CYO card FRU is behind the operator panel. The operator panel is on front of the library, to the left of the window and above the cartridge access port. You must remove the operator panel to access the CYO card and the magnetic sensor switch.

Tools required:

- ESD grounding kit
- 5/16" Keps nut driver
- Torx driver with a T-10 and a T-15 bit.
- Key to the library front door



Figure 3–4. Operator Panel

Removal

- 1. Review the information under "Preparation" at the beginning of this chapter before starting this procedure.
- 2. Power off the library. Refer to "Powering On and Off the Library" on page 3–2.
- Unlock and open the library front door. Refer to "Opening/Closing/Removing the Library Front Door" on page 3–3.

CAUTION: Do not drop the Keps nuts into the library.

4. Remove the two bottom Keps nuts on the op panel. OPERATOR PANEL 5. Loosen, but do not remove the two top Active Cap Service Required nuts. С 0 ayotlarri Roscof 6. Pull the bottom of the op panel forward to KEPS NUTS disengage the top two flanges. P240 INTERFACE 7. Allow the op panel cover to tilt forward to CONNECTOR provide access to the rear of the op panel. E63041 8. Disconnect P240 connector on the ribbon cable. 9. Disconnect P1 power cable. P240 INTERFACE CONNECTOR P1 POWER CONNECTOR 9 E63042



Replacement

Magnetic Sensor Replacement

- 1. Push the magnetic sensor switch through the cutout as shown.
- 2. Connect the magnetic sensor connector.



CYO Card Replacement

3. Align the four screw holes in the CYO card with the screw holes in the operator panel enclosure.

NOTE: Make sure the trace side of the card is facing you and that the component side is down. The operator panel display must align with the cutout in the operator panel enclosure.

4. Install the four CYO card screws using a Torx driver with a T-10 bit.



- 5. Connect P1 power cable.
- 6. Connect P240 connector on the ribbon cable.



7. Align the op panel cover flanges with the top two screw holes on the library frame.

CAUTION: Do not pinch the cables when replacing the operator panel cover.

- 8. Align the two bottom holes on the op panel cover with the library frame.
- 9. Tighten the top two Keps nuts.
- 10. Install the two bottom Keps nuts.
- 11. Carefully close the library door to check for alignment.

NOTE: Adjust the four mounting Keps nuts as necessary for alignment.

12. Proceed to the checkout procedures on page 3–43.



DLT Drive Tray Assembly

The DLT drive tray assembly FRUs are located in the tape drive slots at the left rear of the library. This assembly is also a CRU.

Tools required:

- ESD wrist strap
- Flat blade screw driver



Figure 3–5. DLT Drive Tray Assembly

NOTE: Tape drives are hot swappable, meaning they can be removed and replaced without powering off the library or interrupting its operations. Hot swapping should only be performed by trained technicians.

WARNING: Do not apply power to the drive tray assembly when it is not installed in the library.

Removal

CAUTION: If the drives are daisy chained do not disconnect them from the bus without stopping all data processing on the channel. Before disconnecting the external SCSI cables, make sure there is no activity on the SCSI bus. The host must be quiesced; do not disconnect a hot bus. Any third party software must be quiesced. All signals must be terminated at each end of the SCSI bus. Do not mix single–eneded and differential terminators.



3. Disconnect the tape drive interface cable from the tape drive.

NOTE: The tape drive interface cable (P980-P983) markings face the rear of the tape drive. Note this orientation when reinstalling the drive interface cable. The connector is keyed but it is still possible to insert it incorrectly.

- 4. Disconnect the SCSI cable connectors and/or terminator from the rear of the drive. Save the old terminator, if any.
- 5. Loosen the two thumbscrews at the rear of the tape drive assembly.
- 6. Using both hands, remove the drive assembly from the slot, placing it on a flat, stable surface.



WARNING: Do not apply power to the drive tray assembly when it is not installed in the library.

Replacement

- 1. Unpack the assembly and inspect it for damage such as bent, broken, or loose parts.
- 2. Verify that the tape drive model and serial numbers match those on the shipping invoice. Labels on top of the drive show either DLT4000 or DLT7000 and either single-ended or differential.
- 3. Verify that required cables are present.
- 4. Report any damaged, missing, or incorrect items to the phone number on the invoice.

WARNING: Do not apply power to the drive tray assembly when it is not installed in the library.

- To check terminator power (TERMPWR), remove the two power supply cover screws using a Torx driver with a T–15 bit, and lift the cover (pulling forward slightly) enough to see the jumpers. For safety, do not remove the cover completely.
- 6. Set the TERMPWR on or off (enabled or disabled) on the new tape drive to match the drive you are replacing. The figure shows the right side of the tape drive (as you face its front).
 - ► Install the jumper on the pins as shown to set TERMPWR on.
 - Remove the jumper from the pins to set TERMPWR off. You may store the jumper by placing it on one pin only.
- 7. Return the power supply cover to its previous position and reinstall the two screws holding it in place.



CAUTION: When sliding the drive into its bay, make sure the tape drive interface cable (with connectors P980-P983) is out of the way. Do not force the tape drive into the drive slot.

- 8. Slide the drive into its slot, being careful not to catch or crush any cables.
- 9. Tighten the two thumbscrews on the back of the drive assembly.

CAUTION:

- Before connecting the external SCSI cables, make sure there is no activity on the SCSI bus. Do not connect to a hot bus.
- Any third party software must be quiesced.
- All signals must be terminated at each end of the SCSI bus. Do not mix single-ended and differential terminators.
- 10. Connect the SCSI cables and/or terminator to the SCSI connectors on the rear of the tape drive.

CAUTION: The tape drive interface cable (P980-P983) marking faces the rear of the tape drive. Note this orientation when reinstalling. The connector is keyed but it is still possible to insert it incorrectly.

11. Connect the tape drive interface cable to the tape drive interface connector on the tape drive.

The connectors are numbered:

P980 – Drive 3
P981 – Drive 2
P982 – Drive 1
P983 – Drive 0







TAPE DRIVE

C63088

Electronics Module

The electronics module FRU is inside the library on the right rear side as you face the rear of the library. The electronics module is also a CRU.

Tools required:

- ESD grounding kit
- Torx driver and T-15 bit
- Flashlight
- Note paper and a pen or pencil to record configuration information



Figure 3–6. Electronics Module

Removal

- 1. Review the information under "Preparation" at the beginning of this chapter before starting this procedure.
- 2. Power off the library. Refer to "Powering On and Off the Library" on page 3–2.
- 3. Try to view the library configuration information by accessing Library Utilities from the Operator Panel menu. Then select View Configuration.
- 4. Manually log all of the configuration information, including library SCSI ID, tape drive SCSI IDs, etc.
- 5. Disconnect the SCSI connectors from the electronics module.
- 6. Disconnect the AC power cable from the electronics module.
- Remove the four screws from the top and bottom of the electronics module using a Torx driver with a T-15 bit.
- 8. Loosen the three thumbscrews on the hinged access door at the rear of the library.
- 9. Open the door.



TAPE DRIVE

C63088



Figure 3–7. Electronics Module (and CYC card) showing Cable Locations

10. Reaching into the access door, disconnect J17, J25, J31, J37 and J39 cables from their connectors on the CYC card. (The CYC card is the large controller card mounted to the electronics module.) Use a flashlight to see, if necessary.

NOTE: The connectors are different and are therefore removed differently. For example, connector J37 requires that you loosen its thumbscrews before you can remove it. Some connectors require you to pinchtabs together or push tabs apart.

11. Disconnect the tape drive power cables from the electronics module power receptacles.

CAUTION: Failure to disconnect all the cables described above will cause cable damage and possibly card connector damage when you slide out the electronics module. When the cables are disconnected, take care not to snag them on the electronics module when you slide it out.

12. Slide the electronics module out of the library, verifying that all cables are disconnected.

13. Place the damaged electronics module on a flat, stable surface.

WARNING: Do not apply power to the electronics module assembly when it is not installed in the PowerVault 130T. (Refer to S04 in the Safety Booklet.)



Figure 3–8. Electronics Module Shown Removed from Library

Replacement

WARNING: Do not apply power to the electronics module assembly when it is not installed in the PowerVault 130T. (Refer to S04 in the Safety Booklet.)

- 1. Verify that the jumper position and cable connections for the single-ended or differential alternative at connector J12 on the CYC card match those of the CYC card you are replacing. The jumper connects the middle row of pins on J12 to one of the following rows: (See Detail A of Figure 3–8.)
 - ► **Differential:** Upper row (toward the top of the CYC card), to the left of the word "DIFF" silkscreened on the CYC card.
 - ► Single-ended: Lower row (below DIFF), to the left of the word "SING" silkscreened on the CYC card.
- 2. Verify that the cables connect the two SCSI connectors on the back panel of the electronics module to one of the following connectors on the CYC card:
 - ► **Differential:** Connector J15D
 - ► Single-ended: Connector J15S
- 3. Set the jumper position for TERMPWR at connector J14 to match the position on the card being replaced. The jumper connects the middle pin of J14 with the one of the following pins: (See Detail A of Figure 3–8.)
 - ► **TERMPWR off:** Left pin (toward the left of the CYC card), near the word "OFF" silkscreened on the CYC card.
 - ► **TERMPWR on:** Right pin (toward the right of the CYC card), near the word "ON" silkscreened on the CYC card.

NOTE: "Bottom", "top", "left", and "right" in Step 3 refers to directions on the CYC card on the component side with the silkscreened words appearing normally.

- 4. Slide the electronics module into the library. Use care not to snag loose cables.
- 5. Connect the cables to the J31, J25, J17, J37 and J39 connectors on the CYC card.
- 6. Connect the drive power plugs to the electronics module.
- 7. Install the four screws to the top and bottom of the electronics module using a Torx driver with a T-15 bit. Refer to the illustration in Step 7 on page 3–20.
- 8. Connect the customer's SCSI cable connectors to the electronics module. Refer to the illustration in Step 5 on page 3–20.
- 9. Close the hinged access door.
- 10. Tighten the three thumbscrews on the hinged access door.
- 11. Connect the AC power cable to the electronics module.

12. Power on the library.

13. Observe the front panel to ensure that power comes on to the library and tape drives.

NOTE: The library must now be reconfigured.

- 14. Reconfigure the new CYC card using the information you obtained from the View Configuration menu in step 3 on page 3–20. Refer to Chapter 2 for instructions about setting library and tape drive SCSI IDs. More detailed configuration information is available in Chapter 3 of the Installation manual.
- 15. Proceed to the checkout procedures on page 3–43.

Hand/Camera Assembly

The hand/camera assembly FRU mounts to the bearing block on the Z column. The hand/camera assembly is also a CRU.

Removing and replacing the hand/camera assembly requires access through the library front door. The tools required are

- ESD wrist strap
- Torx driver and a T-10 and T-15 bit
- Key to the library front door



Figure 3–9. Hand/Camera Assembly

Removal

- 1. Review the information under "Preparation" at the beginning of this chapter before starting this procedure.
- 2. Power off the library. Make sure all system activity is stopped before proceeding.
- 3. Unlock and open the library front door.
- 4. Carefully raise the hand/camera assembly with your hand, as shown in the figure, to the middle of the Z column assembly.
- 5. Remove the lower theta stop from the floor of the library using a Torx driver with a T-15 bit.



- 6. Remove both upper theta stops from the ceiling of the library using a Torx driver with a T-15 bit.
- 7. Rotate the robot counterclockwise so that the hand extends beyond the front opening of the library. This allows more convenient access to the cable connectors on the CYH card (on the hand).

E63005

- 8. Remove the screw holding the CYH card cover using a Torx driver.
- 9. Move the cover horizontally until its front and side flanges are disengaged from the CYH card, and remove the cover.

- 10. Note the routing of the cables for replacement.
- 11. Flip up one side of the cable clamp located under the hand and release the cable.
- 12. Disconnect cables from the J3, J20, and J18 connectors on the CYH card.
- 13. Rotate the robot clockwise so the hand is inside the library.
- 14. Carefully raise the hand to the top of the Z column assembly.
- 15. Remove the two screws securing the flex cable clamp bracket to the bottom of the hand using a Torx driver with a T-10 bit.
- 16. Lay the cable on the library floor, making sure it does not interfere with Z column movement.



CYH CARD



- 17. Remove the screw securing the anti-rotation block (under the hand) using a Torx driver with a T-15 bit.
- 18. Slide the anti-rotation block down to the base of the Z column.
- 19. Carefully lower the hand/camera assembly to the bottom of the Z column.
- 20. Prop up the counterweight using something like an eight–inch screwdriver and placing it between the counterweight and the base of the robot. (Optional but easier.)



- 21. Supporting the hand assembly with your left hand, remove the two screws securing the hand/camera assembly to the bearing block (located on the end of the hand assembly near the reach motor) using a Torx driver with a T-15 bit.
- 22. Carefully lift and remove the hand by rotating it so the card side (top) of the hand faces the front of the library, making sure the hand motor clears the Z column and the Z belt.
- 23. Pull the hand/camera assembly out through the front opening of the library.



SCREW

Replacement

- 1. Holding the assembly with your left hand, rotate it so the card side (top) faces the front of the library, making sure the hand motor clears the Z column and the Z belt.
- 2. Rotate the assembly until it clears the Z column and the Z belt and align it with the two screw holes on the bearing block using the locator pins on the bearing block.



- 3. Install the two screws securing the hand/camera assembly to the bearing block (located on the end of the hand assembly near the reach motor) using a Torx driver with a T-15 bit.
- NOTE: Do not overtighten
- 4. Remove the prop holding up the counterweight.
- 5. Carefully raise the hand/camera assembly to the top of the Z column.



- 6. Slide the anti-rotation block up the Z column and register it to the locating pins on the hand assembly.
- 7. Install the screw securing the anti-rotation block (under the hand) using a Torx driver with a T-15 bit.

- 8. Install the two screws securing the flex cable clamp bracket to the bottom of the hand using a Torx driver with a T-10 bit. Make sure the flex cable is not twisted.
- 9. Carefully raise and lower the hand/camera assembly to be sure the hand flex cable has full range of movement to the top and bottom of the Z column.
- 10. Connect the J3, J20, and J18 cables to the connectors on the CYH card.
- 11. Secure the J20 connector under the cable clamp by flipping the clamp over the cable.
- 12. Rotate the robot so the hand is inside the library.
- 13. Carefully raise the hand to the top of the Z column assembly.





Theta Motor

The theta motor FRU is at the bottom right corner of the library, inside the front door. The theta motor cables, but not the mounting bracket, are part of the FRU.

Tools required:

- ESD grounding kit
- Torx driver and T-15 bit
- Diagonal wire cutters
- Key to the library front door



Figure 3–10. Theta Motor

Removal

- 1. Review the information under "Preparation" at the beginning of this chapter before starting this procedure.
- 2. Power off the library. Refer to "Powering On and Off the Library" on page 3–2.
- Unlock, open, and remove the library front door. Refer to "Removing the Front Door" on page 3–3.
- 4. Disconnect the theta motor power cable connector from the library.



- 5. Remove the two screws on top of the theta belt tensioner assembly using a Torx driver with a T-15 bit.
- 6. Remove the theta belt tensioner assembly (including the spring, which slips over a hook), noting the position of the belt for replacement.



7. Remove the lower theta stop from the TORXDRIVER floor of the library using a Torx driver with a T-15 bit. LOWER THETA STOP E63043 8. Remove both theta stops from the ceiling of the library using a Torx driver with a T-15 bit. UPPER THETA (2X) TORXDRIVER 5 | || E63005 l 9. Carefully move the hand to the top of the Z column. 10. Rotate the robot so that the hand extends HAND RESET BEARING beyond the front opening of the library. This allows access to the screw at the right rear of the theta motor mount. ~ E63004

11. Remove the two screws from the theta motor mounting bracket (on the floor of the library) using a Torx driver with a T-15 bit, being careful not to damage the theta motor power cable.



E63023

- 12. Lift the motor up and toward the robot so that the theta motor pulley clears the theta belt.
- 13. Remove the two screws holding the mounting bracket (baseplate) to the theta motor, noting the orientation of the bracket (slotted alignment hole goes towards back of library).



Replacement

- 1. Bundle the theta motor power cable using a tie wrap, to match the original cable.
- 2. Attach the mounting bracket (baseplate) to the bottom of the new theta motor, using the two screws taken from the original. Note the orientation of the alignment slot and mounting hole relative to the cable outlet on the motor.
- 3. Place the motor into the library so the theta belt loops around the motor pulley, and match the alignment slot and mounting hole on the baseplate with the chassis mounting holes.
- 4. Loop the theta motor belt around the theta motor pulley. Make sure it moves freely.
- 5. Aligning the front of the theta motor mounting bracket flush with the front edge of the chassis, replace the mounting screws using a Torx driver with a T-15 bit, being careful not to damage the theta motor power cable.

NOTE: Make sure to use short screws. Using longer screws may cause the mechanism to bind.

- 6. Reinstall the tensioner spring, reposition the theta belt tensioner and reinstall the two screws using a Torx driver with a T-15 bit. Align the theta belt flush with the base plate of the Z column.
- 7. Test for free movement of the belt tensioner and spring by pressing on the belt retention flange on the tensioner.



E63024






Z Motor

The Z motor FRU is located at the top of the Z column and is attached by four screws to the Z motor bracket. The Z motor cable is part of the FRU.

Tools required:

- ESD grounding kit
- Torx driver and T-15 bit
- Torque screwdriver capable of applying 10 in–lb. with a T-15 bit
- Key to the library front door



Figure 3–11. Z Motor

Removal

- 1. Review the information under "Preparation" at the beginning of this chapter before starting this procedure.
- 2. Power off the library. Refer to "Powering On and Off the Library" on page 3–2.
- Unlock, open, and remove the library front door. Refer to Opening/Closing/ Removing the Library Front Door" on page 3–3.
- 4. Rotate the robot to give clear access to the Z cable connector.
- 5. Disconnect the Z motor cable.



 Loosen or remove the Z belt tensioner assembly located at the base of the Z column using a Torx driver with a T-15 bit to remove the screw holding it to the Z column baseplate.

NOTE: Do not change the tensioner setting by loosening the two tensioner adjustment screws, so you can replace the tensioner with the same belt tension as before.



- 7. Remove the four screws holding the Z motor to the Z motor bracket using a Torx driver with a T-15 bit. Remove the top screw last.
- 8. Remove the top screw, holding the Z motor from behind, being careful not to damage the Z motor cables.



- 9. Slide the motor to the bottom of the cutout and lift the belt from the motor shaft while holding the Z motor from behind.
- 10. Remove the motor by pushing the shaft through the cutout in the Z motor bracket.



Replacement

- 1. Insert the Z motor pulley through the cutout in the Z motor bracket so that the end of the pulley faces the front of the library.
- 2. Rest the pulley on the bottom of the cutout. The Z motor cable connector hangs toward the floor of the library.
- 3. Place the Z belt over the Z motor shaft.
- 4. Slide the motor up to align the holes.



5. Install the four screws holding the Z motor to the Z motor bracket using a Torx driver with a T-15 bit.



6. Connect the Z motor cable.

NOTE: Be sure that the cable is routed directly to the connector and not through the ribbon cable near the connector.



 Replace or tighten the Z belt tensioner assembly located at the base of the Z column using a Torx driver with a T-15 bit to remove the screw holding it to the Z column baseplate.

NOTE: Do not change the tensioner setting by loosening the two tensioner adjustment screws, so you can replace the tensioner with the same belt tension as before.

8. Proceed to the checkout procedures on page 3–43.



Check-Out Procedures

To make sure that it is safe to resume library operation:

- 1. Make sure that all cards are installed and properly seated.
- 2. Make sure that all cables are installed and connectors are tight.
- 3. Visually check the library for loose parts, connectors, and tools.
- 4. Make sure that the reach mechanism on the hand assembly is fully retracted by pushing the cartridge picker into the hand assembly.
- 5. Close and lock the library doors.
- 6. Connect the power plug to the library at the rear of the electronics module.
- 7. Power on the library.
- 8. Run diagnostic tests. Refer to Chapter 2.
- 9. Inform the customer that the system is available.
- 10. Complete any necessary paperwork.
- 11. Return any parts.

Appendix A. Supporting Information

This appendix lists the specifications for the PowerVault 130T Library.

Specifications

Table A–1 through Table A–6 list the specifications of the PowerVault 130T Library.

Table A–1. Functional Data			
Item	Measurement or Comments		
Media	DLT CompacTape IV (read and write) DLT CompacTape III and IIIXT (read only)		
Number of cartridge tape cells	30 (28 with four tape drives)		
Number of tape drives	Up to four DLT4000 or 7000 tape drives		
Average cartridge access time	Six seconds		
Audit time	Less than one minute		
Robotics control	SCSI–2 media changer command set, single–ended or differential (selectable in field)		
Cartridge access port	Single cartridge capacity		
Bar code reader	Standard		
Serviceability	Key components are customer–serviceable. The drives are hot–swappable (with independent SCSI interface)		
Library Capacity (30 Cells)	Uncompressed	Compressed (2:1)	
DLT4000	600 GB	1.2 TB	
DLT7000	1.05 TB	2.1 TB	
Library Throughput (Four Drives)	Uncompressed	Compressed (2:1)	
DLT4000	21.6 GB/hr.	43.2 GB/hr.	
DLT7000	72 GB/hr.	144 GB/hr.	

Table A-2. Reliability	
Item	Measurement
Mean exchanges between failures (MEBF)	1,000,000
Mean time to repair (MTTR)	less than 30 minutes

Table A–3. Physical Specifications	
Item	Measurement
Width	48.3 cm (19 in.)
Height	44.5 cm (17.5 in.)
Depth	72.6 cm (28.6 in.)
Rear clearance, library to any wall or other cabinet	20.5 cm (8 in.)
Front clearance, library to any wall or other cabinet	50.8 cm (20 in.)
Minimum rear clearance required to remove/replace electronics module or tape drives	61 cm (24 in.)
Weight with no drives	50 kg (110 lb)
Weight with 4 drives	68 kg (149 lb)

Table A-4. Power Specifications		
Item	Measurement	
Input Voltage	90–264 VAC, single phase	
Frequency	47–63 Hz	
Maximum power consumption (library)	1.0 A at 120 V or 0.5 A at 240 V	
Maximum power consumption (each DLT4000 drive)	0.8 A at 120 V or 0.42 A at 240 V	
Maximum power consumption (each DLT7000 drive)	0.92 A at 120 V or 0.46 A at 240 V	

Table A–5. Environmental Specifications			
Item	Measurement		
	Operating	Storage	Transit
Temperature	+15 to +32°C +59 to +90°F	+10 to +40°C +50 to +104°F	-40 to +60°C -40 to +140°F
Humidity	20 to 80%	10 to 95%	10 to 95%
Wet bulb (max, non–condensing)	+29.2°C +84.5°F	+35°C +95°F	+35°C +95°F
Altitude	-76 to 3,048 m (-	-250 to 10,000 ft)	•

Table A–6. Agency Certifications		
Category	Certification	
Safety	CSA standard CAN/CSA-C22.2 no. 950-M93	
	UL standard 1950, Third Edition	
	EN60950	
Emissions	FCC #47, Part 15, Subpart B, Class A	
	EMC Framework AS/NZS 3598: 1995 (Australia, N.Z.)	
	VCCI Class A	
	European Union CE emissions standards	
	Canadian EMC Law; ICES-003	
	BCIQ EMC Law CNS 13438 (Taiwan)	
Immunity	European Union CE immunity standards	

Specifications

Glossary

This glossary defines new or special terms. For definitions of other terms about other products refer to the glossary in the appropriate document.

A

A Ampere

AC Alternating current.

algorithm An ordered set of well–defined rules used to govern an operation.

ANSI American National Standards Institute.

ASCII American Standard Code for Information Interchange.

audit (1) For a library, a part of its IPL sequence that catalogs all cartridge locations within the library cells and retains the data in the CYC card's memory. (2) For a host, its request to catalog the cartridges in a library by library number, VOLSER, panel, row, and column.

B

BTU British thermal unit.

Bus (1) A facility for transferring data between devices on a common connection. (2) An interface.

byte An 8–bit binary character.

С

C Centigrade

CAP. See cartridge access port.

cartridge. The plastic housing around the tape. A plastic leader block is attached to the tape for automatic threading when loaded in a transport. The spine of the cartridge contains a VOLSER label listing the volume identification number.

cartridge access port (CAP). An assembly that allows an operator to enter/eject one cartridge during automated operations. The operator can open the CAP and place a cartridge into the CAP cell. The CAP is located on the left front door of the library.

cartridge tape. Magnetic tape enclosed in a plastic housing.

cell Storage location for a cartridge tape.

channel A device that connects the host and main storage with the input and output CUs.

configuration. The description of an library, listing the panel types and drives.

CRU Customer Replaceable Unit.

CYC card. Main processor card for library communication to a host, library control signals to and from the robot, and servo control to library motors.

CYH card. An interface between the CYC card and reach mechanism; this card controls cartridge movements in the library.

CYO card. Operator panel interface.

D

DC Direct current.

device A host adapter or control unit attached to the SCSI bus.

diagnostic tests. Tests, accessible through the library operator panel, that allow a local user to run offline tests within the library.

differential A SCSI bus alternative with a maximum cable length or 25 meters (82 feet).

disabled (1) Inactive. (2) Off.

DLT Digital linear tape.

E

enabled (1) Active. (2) On.

F

F Fahrenheit

fault symptom code Four–digit hexadecimal code generated in response to a subsystem error.

FCC Federal Communications Commission.

FRU Field replaceable unit.

FSC See fault symptom code.

L

library An automated device for storing cartridge tapes.

\mathbf{M}

m Meter.

mm Millimeter.

MB/s Megabytes per second.

Q

quiesced Allowing all activity to complete before any new activity is allowed to start.

S

SCSI Small computer system interface.

SCSI device A host adapter or control unit attached to the SCSI bus.

single–ended A SCSI bus alternative with a maximum cable length of 6 meters (25 feet).

Т

target A SCSI device that performs an I/O operation requested by the initiator.

TERMPWR Terminator power. A SCSI bus signal for device termination networks.

U

UL Underwriters Laboratory.

V

V. Volts or voltage.

VAC Volts alternating current (AC).

Index

A

about this manual, vii access door. *See* hinged access door agency certifications, A-3 alert messages, vii

В

brackets theta motor, 3–35 z motor, 3–40

С

CAP, 1-2, 1-5 capacity drive, A-1 library, A-1 cards CYC, 1-3, 3-6 CYO, 3-8 cartridge access port (CAP), 1-5cartridge accessport (CAP), 1-2 cautions possible cable damage, do not pinch operator panel cables, 3-12possible loss of parts, do not drop Kepx nuts from operator panel, 3-9cell mappings, 1-6 check-out procedures, 3-43 cleaning, tape drive, 2-14 components, 1-1 connectors CSE, 1-3 debug, 1-3J12, 3-23 J14, 3-23 P1, 3-9 P240, 3-9 SCSI, 1-3**CRUs** electronics module, 3-19

list, 3–4 locations, 3–4 CSE connector, 1–3 CYC card, 3–6 CYO card, 3–8

D

debug connector, 1–3 diagnostic tests, 2–9 demo mode, 2–9 dismount, 2–9 examine FSCs, 2–1 get-put loop, 2–9 initialize mechs, 2–9 mount, 2–9 mount-dismount, 2–9 unlock CAP, 2–9 Digital Linear Tape drives, overview, 1–7 dismount diagnostic, 2–9 DLT drive tray assembly, 3–13 DLT drives, 1–7 cleaning, 2–14

Ε

electronics module, 1–4, 3–19 electrostatic discharge precautions, x EM, 3–19 *See also* electronics module emissions certifications, A–3 environmental specifications, A–2 ESD precautions, x examine FSCs, 2–1

F

fans, electronics module, 1-3front door, removing, 3-3front view of the 9730, 1-2FRU List, 3-4

X-1

Index

FRUs CYC card, 3–6 CYO card, 3–8 DLT drive tray assembly, 3–13 electronics module, 3–19 EM, 3–19 hand/camera assembly, 3–25 list, 3–4 locations, 3–4 operator panel. *See* CYO card theta motor, 3–32 Z motor, 3–38 FSCs, 2–1 functional data, A–1

G

general information, 1–1 get-put loop, 2–9 grounding kit, x

Η

hand/camera assembly, 3-25hinged access door, 1-3, 3-20host software, 1-6

immunity certifications, A-3initialize mechanics, 2-9interfaces, 1-5

J

jumpers CYC card, 3–23 TERMPWR off, 3–23 TERMPWR on, 3–23 differential, 3–23 single–ended, 3–23

Κ

kit, grounding, x

Х-2

L

library capacity, A-1front view, 1-2rear view, 1-3throughput, A-1 library diagnostics, 2-9 library, power problems, 2-5lifting techniques, ix loading microcode, 2-10locations, 1-2, 3-6AC power receptacle, 1-3access door. See hinged access door cartridge access port (CAP), 1-2CRUs, 3-4 CSE connector, 1-3CSE input to J41, 3-6CYC card, 1-3debug connector, 1-3DLT drive, 1-3electronics module, 1-3fans, electronics module, 1-3FRUs, 3-4 hand flex connector, 3-6hand/camera assembly, 1-2, 3-25hinged access door, 1-3J14, 3-6J15D, 3-6 J15S, 3-6 J17, 3-6 J25, 3-6J31, 3-6J37, 3-6J39, 3-6J41, 3-6 J42, 3-6 J44, 3-6 operator panel, 1-2op panel connector, 3-6P44, 3-6 SCSI connectors, 1-3SCSI input to J15S or J15D, 3-6 tape drive, 1-3theta flex connector, 3-6theta motor, 1-2Z flex connector, 3-6Z motor assembly, 1-2

Μ

manual organization, vii MEBF, A-2 messages, alert, vii microcode, 1–6, 1–7 loading, 2–10 motors theta, 3–32 Z, 3–38 mount diagnostic, 2–9 mount–dismount loop, 2–9 MTTR, A–2

0

operator panel, 1–4 overview, 1–1

Ρ

physical specifications, A-2 power fault isolation, 2-4 library problems, 2-5 problems, 2-5 specifications, A-2 TIPs, 2-4 precautions electrostatic discharge, x rack-mount library safety, xii procedures, 2-10 cleaning tape drives, 2-14 loading microcode, 2-10 powering off the library, 3-2

powering on the library, 3-2setting the library SCSI ID, 2-13setting tape drive SCSI ID, 2-12

R

rack-mounting requirements, xii safety, xii related publications, viii removal and replacement, 3–1 CYC card, 3–6 CYO card, 3–8 DLT drive tray assembly, 3–13 EM, 3–19 hand/camera assembly, 3–25 operator panel, 3–8 preparation, 3–1 theta motor, 3–32 Z motor, 3–38 resume library operation, 3–43 robot, 1–4

S

safety, rack-mount library, xii safety certifications, A-3 SCSI connectors, 1-3ID setting library, 2-13tape drive, 2-12software, 1-6specifications, A-1 environmental, A-2functional data, A-1 MEBF, A-2MTTR, A-2physical, A-2 power, A-2 reliability, A-2 start TIP, 2-3storage cells, 1-5

T

tape drives, cleaning, 2-14tensioner assembly, 3-33 TERMPWR off, 3-23 on, 3–23 theta belt, tensioner assembly, 3-33theta motor, 3-32throughput drives, A-1 library, A-1 TIPS 0000: Start, 2-3 1000: power, 2-4 1010: Library Power Problems, 2-5 1020: Tape Drive, 2–6 2000: Operator Panel, 2-7 3000: SCSI interface, 2-8tools, required customer provided, 3-4 Trouble Isolation Procedures, 2–1 library power, 2–5 operator panel, 2–7 power, 2–4 library, 2–5 SCSI interface, 2–8 start, 2–3 tape drive, 2–6

U

unlock CAP test, 2-9

W

warnings, isolating power problems, 2-4, 2-5

Ζ

Z motor, 3–38 bracket, 3–40

Index

Spaces

library, power problems, 2–5

A

about this manual, vii access door. See hinged access door agency certifications, A-3alert messages, vii

В

brackets theta motor, 3–35 z motor, 3–40

С

CAP, 1-2, 1-5

capacity drive, A-1library, A-1 cards CYC, 1-3, 3-6 CYO, 3-8 cartridge access port (CAP), 1-5cartridge accessport (CAP), 1-2cautions possible cable damage, do not pinch operator panel cables, 3-12possible loss of parts, do not drop Kepx nuts from operator panel, 3-9cell mappings, 1-6 check-out procedures, 3-43 cleaning, tape drive, 2-14components, 1-1 connectors CSE, 1-3 debug, 1-3J12, 3-23 J14, 3-23 P1, 3-9 P240, 3-9 SCSI, 1-3

CRUs electronics module, 3–19 list, 3–4 locations, 3–4 CSE connector, 1–3 CYC card, 3–6 CYO card, 3–8

D

debug connector, 1–3 diagnostic tests, 2–9 demo mode, 2–9 dismount, 2–9 examine FSCs, 2–1 get-put loop, 2–9 initialize mechs, 2–9 mount, 2–9 mount-dismount, 2–9 unlock CAP, 2–9 Digital Linear Tape drives, overview, 1–7 dismount diagnostic, 2–9 DLT drive tray assembly, 3–13 DLT drives, 1–7 cleaning, 2–14

Ε

electronics module, 1–4, 3–19 electrostatic discharge precautions, x EM, 3–19 *See also* electronics module emissions certifications, A–3 environmental specifications, A–2 ESD precautions, x examine FSCs, 2–1

F

fans, electronics module, 1–3 front door, removing, 3–3 front view of the 9730, 1–2 FRU List, 3–4 FRUs CYC card, 3–6

PowerVault 130T Service Manual

Index

CYO card, 3–8 DLT drive tray assembly, 3–13 electronics module, 3–19 EM, 3–19 hand/camera assembly, 3–25 list, 3–4 locations, 3–4 operator panel. *See* CYO card theta motor, 3–32 Z motor, 3–38 FSCs, 2–1

functional data, A-1

G

general information, 1–1 get-put loop, 2–9 grounding kit, x

Η

hand/camera assembly, 3-25hinged access door, 1-3, 3-20host software, 1-6

immunity certifications, A-3initialize mechanics, 2-9interfaces, 1-5

J

jumpers CYC card, 3–23 TERMPWR off, 3–23 TERMPWR on, 3–23 differential, 3–23 single–ended, 3–23

Κ

kit, grounding, x

L

library capacity, A-1front view, 1-2rear view. 1-3throughput, A-1 library diagnostics, 2-9lifting techniques, ix loading microcode, 2-10locations, 1-2, 3-6AC power receptacle, 1-3access door. See hinged access door cartridge access port (CAP), 1-2CRUs, 3-4 CSE connector, 1-3CSE input to J41, 3-6CYC card, 1-3 debug connector, 1-3DLT drive, 1-3electronics module, 1-3fans, electronics module, 1-3FRUs, 3-4 hand flex connector, 3-6hand/camera assembly, 1-2, 3-25hinged access door, 1-3J14, 3-6J15D, 3-6 J15S, 3-6 J17, 3-6 J25, 3-6J31, 3-6J37, 3-6J39, 3-6J41, 3-6 J42, 3-6J44, 3-6operator panel, 1-2op panel connector, 3-6P44, 3-6 SCSI connectors, 1-3SCSI input to J15S or J15D, 3-6 tape drive, 1-3theta flex connector, 3-6theta motor, 1-2Z flex connector, 3-6Z motor assembly, 1-2

Μ

manual organization, vii MEBF, A-2 messages, alert, vii microcode, 1–6, 1–7 loading, 2–10 motors theta, 3–32 Z, 3–38 mount diagnostic, 2–9 mount–dismount loop, 2–9 MTTR, A–2

0

operator panel, 1–4 overview, 1–1

Ρ

physical specifications, A-2 power fault isolation, 2-4 library problems, 2-5 problems, 2-5 specifications, A-2 TIPs, 2-4 precautions electrostatic discharge, x rack-mount library safety, xii procedures, 2-10 cleaning tape drives, 2-14 loading microcode, 2-10 powering off the library, 3-2

powering on the library, 3-2setting the library SCSI ID, 2-13setting tape drive SCSI ID, 2-12

R

rack-mounting requirements, xii safety, xii related publications, viii removal and replacement, 3–1 CYC card, 3–6 CYO card, 3–8 DLT drive tray assembly, 3–13 EM, 3–19 hand/camera assembly, 3–25 operator panel, 3–8 preparation, 3–1 theta motor, 3–32 Z motor, 3–38 resume library operation, 3–43 robot, 1–4

S

safety, rack-mount library, xii safety certifications, A-3 SCSI connectors, 1-3ID setting library, 2-13tape drive, 2-12software, 1-6 specifications, A-1 environmental, A-2functional data, A-1 MEBF, A-2MTTR, A-2physical, A-2 power, A-2 reliability, A-2 start TIP, 2-3storage cells, 1-5

T

tape drives, cleaning, 2-14tensioner assembly, 3-33**TERMPWR** off, 3-23 on, 3–23 theta belt, tensioner assembly, 3-33theta motor, 3-32throughput drives, A-1 library, A-1 TIPS 0000: Start, 2-3 1000: power, 2-4 1010: Library Power Problems, 2-5 1020: Tape Drive, 2–6 2000: Operator Panel, 2-7 3000: SCSI interface, 2-8tools, required customer provided, 3-4 Trouble Isolation Procedures, 2–1 library power, 2–5 operator panel, 2–7 power, 2–4 library, 2–5 SCSI interface, 2–8 start, 2–3

U

tape drive, 2-6

unlock CAP test, 2-9

W

warnings, isolating power problems, 2-4, 2-5

Ζ

Z motor, 3–38 bracket, 3–40

Index



Printed in the U.S.A.

