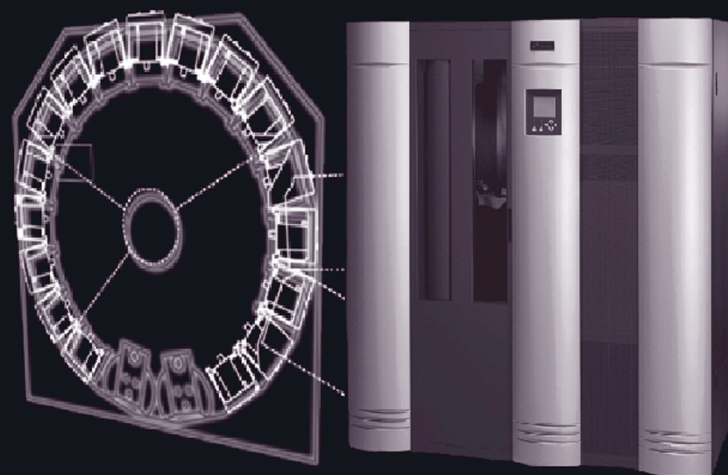
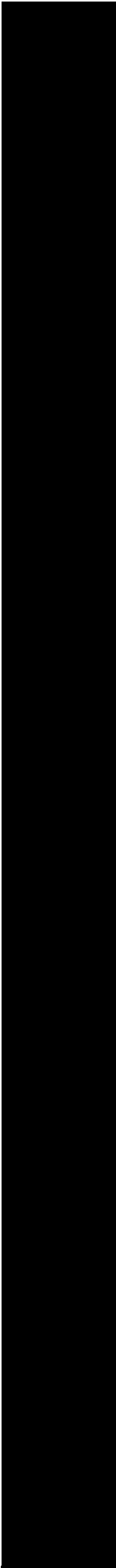


# L700/700e Tape Library and L700-Pass-thru Port

Service Manual







# L700/700e Tape Library and L700-Pass-thru Port

Service Manual

Information contained in this publication is subject to change without notice. Comments concerning the contents of this publication should be directed to:

Information Development  
Storage Technology Corporation  
One StorageTek Drive  
Louisville, CO 80028-3256  
USA

URL: <http://sts.stortek.com/sts/nid>

---

**Proprietary Information Statement**

---

This document and its contents are proprietary to Storage Technology Corporation and may be used only under the terms of the product license or nondisclosure agreement. The information in this document, including any associated software program, may not be reproduced, disclosed or distributed in any manner without the written consent of Storage Technology Corporation.

---

This edition contains 366 pages. See “[Summary of Changes](#)” on page iii for the revision history and summary of changes made to this publication.

---

**Export Destination Control Statement**

---

These commodities, technology or software were exported from the United States in accordance with the Export Administration Regulations. Diversion contrary to U.S. law is prohibited.

---

A Reader’s Comment Form at the back of this publication lets you communicate suggestions or requests for change. StorageTek encourages and appreciates reader feedback. StorageTek employees with access to PowerPort may complete an online Reader’s Comment Form. Point your browser to:

<http://sts.stortek.com/sts/nid/nidrcf.htm>

©1999, 2003 Storage Technology Corporation. All rights reserved. StorageTek and the StorageTek logo are trademarks or registered trademarks of Storage Technology Corporation. Other products and names mentioned herein are for identification purposes only and may be trademarks of their respective companies.

# Summary of Changes

---

EC	Date	Edition	Description
53897	August 1999	First	Initial Release
111809	October 2002	Thirteenth	Refer to this edition for a description of the changes.
111827	February 2003	Fourteenth	<p><b>Title page:</b> Revised Proprietary Information Statement (see page ii).</p> <p><b>Throughout:</b> Revised all footers to state “Proprietary Information.”</p> <p><b>Chapter 1:</b> Added that Hewlett Packard LTO Gen2 SCSI drives are now available (see “<a href="#">Drive Types</a>” on page 1-2, “<a href="#">Tape Drive Features</a>” on page 1-13, and “<a href="#">Gen2 Ultrium SCSI Drives</a>” on page 1-15).</p> <p>Added that IBM LTO Gen2 Fibre Channel drives are now available (see “<a href="#">Drive Types</a>” on page 1-2, “<a href="#">Tape Drive Features</a>” on page 1-13, and “<a href="#">Gen2 Ultrium Fibre Channel Drives</a>” on page 1-15).</p> <p>Revised library optional features table for library Fibre Channel operation (see <a href="#">Table 1-7</a> on page 1-8).</p> <p>Revised table for StorageTek Optional Interfaces (see <a href="#">Table 1-8</a> on page 1-10 through <a href="#">Table 1-10</a> on page 1-11).</p> <p><b>Chapter 6:</b> Revised information regarding the top cell in the reserved area (see “<a href="#">Reserved Cells</a>” on page 2-4).</p> <p><b>Appendix C:</b> Added “Statistics” information regarding L-Series Library Admin (see “<a href="#">Library Statistics</a>” on page C-4).</p> <p><b>Reader Comment Form:</b> Revised address (see last page).</p>

This page intentionally left blank.

# Contents

---

<b>Summary of Changes</b> .....	<b>iii</b>
<b>Contents</b> .....	<b>v</b>
<b>Figures</b> .....	<b>xiv</b>
<b>Tables</b> .....	<b>xvi</b>
<b>Preface</b> .....	<b>xix</b>
Organization .....	xix
Alert Messages .....	xx
Conventions .....	xx
Related Publications .....	xxi
Additional Information .....	xxiii
StorageTek's External Web Site .....	xxiii
Customer Resource Center .....	xxiii
e-Partners Site .....	xxiv
Global Services Support Tools .....	xxiv
Documents on CD .....	xxiv
Hardcopy Publications .....	xxiv
<b>Safety, Fiber Optic, and ESD</b> .....	<b>xxv</b>
Safety Precautions .....	xxv
Lifting Techniques .....	xxv
Shoulder, Elbow, Wrist, and Hand Safety .....	xxvi
Fiber Optic Safety .....	xxvi
Laser Product Label .....	xxvii
Fiber-optic Cable Installation .....	xxvii
Fiber-optic Cable Handling .....	xxviii
Rack Safety and Precautions .....	xxix
Electrostatic Discharge (ESD) Damage Prevention .....	xxx
ESD Precautions .....	xxx
ESD-Protection Procedure .....	xxxi
Prepare the Work Area .....	xxxi
Access the Equipment .....	xxxi
Replace Components .....	xxxii
Clean Up .....	xxxii
L700/700e Door Interlock .....	xxxii

L700/700e Servo Power Interrupt .....	xxxii
<b>1: General Information .....</b>	<b>1-1</b>
Overview .....	1-1
MPC and MPCL Cards .....	1-1
Library Interfaces .....	1-2
Drive Types .....	1-2
SCSI Cable Considerations .....	1-5
Models .....	1-5
13U Rack Area .....	1-6
Rack Cooling .....	1-7
APC Power Backup System .....	1-7
Matrix Switch .....	1-8
Optional Library Features .....	1-8
StorageTek Optional Interfaces .....	1-10
StorageTek L-Series Library Admin .....	1-10
StorageTek Framework Library Monitor .....	1-10
StorageTek Library Manager .....	1-11
Tape Drive Features .....	1-13
ESCON .....	1-15
Gen2 Ultrium SCSI Drives .....	1-15
Gen2 Ultrium Fibre Channel Drives .....	1-15
Robotic and Major Electronic Components .....	1-16
Pass-thru Port (L700-PTP) .....	1-16
Service Clearances .....	1-20
Weight Variations .....	1-21
Power Information .....	1-22
Library Power Specifications .....	1-22
Site Power Considerations .....	1-22
Power Cable Part Numbers .....	1-24
Library Environmental Specifications .....	1-25
Maintenance Tools .....	1-26
Required Tools .....	1-26
Optional Tools .....	1-26
<b>2: Firmware Operation .....</b>	<b>2-1</b>
IPL Sequence .....	2-1
Functional Firmware Loading .....	2-1
Initialization Process .....	2-1
Initialize and Calibrate Mechanisms .....	2-1
Vision Calibration .....	2-2
Hand-Camera Assembly Testing .....	2-2



Pass-thru Port Initialization . . . . .	2-2
Audit . . . . .	2-3
Audit Definition . . . . .	2-3
Audit Conditions . . . . .	2-3
Drive Targeting . . . . .	2-3
Audit of Reserved Cells . . . . .	2-3
Load Handle Cycling . . . . .	2-4
Reserved Cells . . . . .	2-4
In-transit Cell . . . . .	2-4
Diagnostic/Cleaning Cells . . . . .	2-4
Updating Firmware . . . . .	2-5
Pass-thru Port . . . . .	2-6
Download Methods . . . . .	2-7
Download File Types . . . . .	2-7
Recommended Download Sequences . . . . .	2-8
Separate Controller Card Method . . . . .	2-9
Combined Controller Card Method . . . . .	2-9
Firmware Editions . . . . .	2-9
Firmware 2.xx . . . . .	2-9
Firmware 3.00 and Later Download Times . . . . .	2-10
CLI Port - DOS Method . . . . .	2-10
CLI Port - Hyperteminal Method . . . . .	2-11
Emergency Code Load Instructions . . . . .	2-13
“Download Waiting for Connection” Message . . . . .	2-13
“Using Z-modem CSE Port 38400 Download Waiting for Connection” Message . . . . .	2-14
Configuration . . . . .	2-15
L700/700e Capacity Variations . . . . .	2-16
Operator Panel Entry . . . . .	2-19
Operator Panel Navigation . . . . .	2-19
Library Information . . . . .	2-20
Configuration Tables . . . . .	2-21
Library Entries . . . . .	2-22
Setting the Library’s SCSI ID . . . . .	2-23
Setting the Library Fibre Channel Port 0 Address . . . . .	2-24
Port 0 Worldwide ID . . . . .	2-25
Library Worldwide ID . . . . .	2-26
Enabling or Disabling Fast Load . . . . .	2-26
Setting the Date . . . . .	2-27
Setting the Time . . . . .	2-27
Installing a Personality Module . . . . .	2-28
Setting the Web Password . . . . .	2-28
Drive Entries (SCSI Drives Only) . . . . .	2-28

Drive Entries (T9x40) .....	2-30
Drive Entries (LTO Fibre Channel Only) .....	2-30
Network Entries .....	2-31
Viewing the Ethernet Address .....	2-31
Setting the Library Name .....	2-32
Setting the IP Address .....	2-32
Setting the Network Gateway Address .....	2-33
Setting the Subnet Mask Address .....	2-34
DNS Configuration .....	2-35
Dynamic Worldwide Name .....	2-36
Background .....	2-36
Enabling dWWN .....	2-36
Disabling dWWN .....	2-37
Implications for an MPC/MPCL Replacement .....	2-37
Implications for Drive Removal and Replacement .....	2-38
SNMP - Simple Network Management Protocol .....	2-38
Screen Characteristics .....	2-39
Auto Clean .....	2-40
Cleaning Cartridge Requirements .....	2-40
Cleaning Cartridge Usage .....	2-40
Enabling Auto Clean .....	2-41
Manually Installing Cleaning Cartridges .....	2-41
Importing Cleaning Cartridges through the CAP .....	2-42
Setting Clean Cartridge Life .....	2-43
Cleaning Cartridge Warning Count .....	2-44
Cleaning Cartridge Expiration .....	2-45
StorageTek L-Series Library Admin Entries (Optional) .....	2-45
Verifying Configuration .....	2-45
Monitoring Status Information .....	2-46
CAP Status .....	2-46
Library Status .....	2-47
Remote Users Status .....	2-48
Drive Status .....	2-48
Drive Information .....	2-49
CAP Magazine Status .....	2-49
CAP States .....	2-50
Library Personality Information .....	2-50
Cleaning Cartridge Usage Count .....	2-51
Exporting Cleaning Cartridges through the CAP .....	2-52
Importing Cleaning Cartridges through the CAP .....	2-53
Diagnostic Tests .....	2-54
Get-Put Loop Diagnostic Test .....	2-54

Mount-Dismount Loop Diagnostic Test .....	2-55
PTP Test .....	2-56
Other Diagnostic Tests .....	2-58
<b>3: Trouble Isolation Procedures .....</b>	<b>3-1</b>
TIP 0000—START .....	3-1
TIP 1000: Power—AC PDU .....	3-2
TIP 1010: Power—UPS Power .....	3-4
TIP 2000: Power—DC Power .....	3-7
TIP 3000: Operator Panel .....	3-11
TIP 4000: SCSI Interface .....	3-12
TIP 5000: Tape Drives .....	3-15
<b>4: Remote Setup .....</b>	<b>4-1</b>
SER1 Port .....	4-1
CLI (CSE) Port .....	4-1
Modem Installation .....	4-2
Modem Configuration—Switch Settings .....	4-2
Modem Configuration—Serial Device or Laptop Computer Entries .....	4-3
Testing the Modem .....	4-4
<b>5: Removal and Replacement .....</b>	<b>5-1</b>
Preparation .....	5-1
Cartridge Access Port (CAP) Components .....	5-4
CAP Motor .....	5-4
Removal .....	5-5
Replacement .....	5-6
CAP and Door Interlock Cable .....	5-7
Removal .....	5-7
Replacement .....	5-8
Fans .....	5-9
Electronics Module Fan Tray Assembly .....	5-9
Removal .....	5-10
Replacement .....	5-10
Drive Bay Exhaust Fan .....	5-11
Removal .....	5-12
Replacement .....	5-13
Hand-Camera Assembly .....	5-14
Removal .....	5-14
Replacement .....	5-17
Library SCSI Y Cable .....	5-20
Removal .....	5-21
Replacement .....	5-22

Logic Cards . . . . .	5-23
MPB Card . . . . .	5-23
Removal . . . . .	5-24
Replacement . . . . .	5-26
MPC/MPCL Card . . . . .	5-27
Removal . . . . .	5-28
Replacement . . . . .	5-30
MPM Card . . . . .	5-32
Removal . . . . .	5-33
Replacement . . . . .	5-36
MPU Card . . . . .	5-39
Removal . . . . .	5-40
Replacement . . . . .	5-41
MPV Card (CPCI Module) . . . . .	5-44
Removal . . . . .	5-45
Replacement . . . . .	5-48
MPW Card (for MPC Cards Only) . . . . .	5-52
Removal . . . . .	5-53
Replacement . . . . .	5-54
Operator Panel . . . . .	5-56
Removal . . . . .	5-57
Replacement . . . . .	5-58
Power Components . . . . .	5-59
AC Power Distribution Unit (PDU) . . . . .	5-59
Removal . . . . .	5-60
Replacement . . . . .	5-61
APC (UPS) Battery Replacement . . . . .	5-63
DC Power Supply Assembly . . . . .	5-64
Removal . . . . .	5-65
Replacement . . . . .	5-66
Tape Drive Removal/Replacement when dWWN Enabled . . . . .	5-67
Drive Removal . . . . .	5-67
Drive Replacement . . . . .	5-68
Tape Drive Components . . . . .	5-69
DLT 4000/7000E/8000 Tape Drive . . . . .	5-69
DLT Preparation . . . . .	5-69
Removal . . . . .	5-70
Replacement . . . . .	5-73
DLT Power Supply . . . . .	5-76
Removal . . . . .	5-76
Replacement . . . . .	5-79
IBM Ultrium Tape Drive . . . . .	5-81

IBM Ultrium Preparation .....	5-81
Removal .....	5-83
Replacement .....	5-85
HP Ultrium Tape Drive—HVD Version .....	5-88
HP Ultrium Preparation .....	5-88
Removal .....	5-90
Replacement .....	5-92
HP Ultrium Tape Drive—LVD Version .....	5-94
HP Ultrium Preparation .....	5-94
Removal .....	5-95
Replacement .....	5-97
Seagate Ultrium Tape Drive .....	5-100
Seagate Ultrium Preparation .....	5-100
Seagate LTO Park Command .....	5-101
Removal .....	5-102
Replacement .....	5-104
SDLT Tape Drive .....	5-106
SDLT Preparation .....	5-106
Removal .....	5-107
Replacement .....	5-109
SCSI Y Cable .....	5-112
Removal .....	5-113
Replacement .....	5-114
T9x40 Tape Drive .....	5-115
Theta Motor .....	5-116
Removal .....	5-117
Replacement .....	5-122
Z Column Components .....	5-124
Z Motor .....	5-124
Removal .....	5-125
Replacement .....	5-128
Z Flex Cable .....	5-131
Removal .....	5-132
Replacement .....	5-134
Pass-thru Port (PTP) .....	5-137
Removal .....	5-137
Replacement .....	5-139
Restoring Library Operation .....	5-140
<b>A: Theory of Operation .....</b>	<b>A-1</b>
Power System .....	A-1
Redundant AC Power Option .....	A-2

Drive Column Power .....	A-3
Drive Column—Single Power Cable .....	A-4
Drive Column—Two Power Cables .....	A-4
Drive Power Cables—Connections .....	A-4
Cooling .....	A-6
Client Indirect Operation .....	A-7
Client Direct SCSI Operation .....	A-8
SCSI HVD or LVD Considerations .....	A-8
SCSI Cable Restrictions .....	A-8
Modifications Required .....	A-9
HBA Requirements .....	A-9
Precautions .....	A-10
SCSI Low Voltage Differential Cables/Terminators .....	A-10
Fibre Channel .....	A-10
Private Arbitrated Loop .....	A-11
Public Arbitrated Loop .....	A-11
Fibre Channel Cable Considerations .....	A-12
Communication Interfaces .....	A-12
Robot .....	A-14
Theta Mechanism .....	A-16
Z Mechanism .....	A-16
Hand-Camera Assembly .....	A-17
Pass-thru Port .....	A-18
Components .....	A-18
Operation .....	A-18
Audit .....	A-19
Tape Drives .....	A-20
Ultrium Logic Cards .....	A-20
Media Statistics Table .....	A-21
Logic Cards .....	A-21
Library Interfaces .....	A-27
Client-to-CAP .....	A-28
Library-to-Client .....	A-28
Library-to-Drives .....	A-29
Library-to-LVD Interface .....	A-30
Library-to-Fibre Channel .....	A-30
Library-to-Personality Module and StorageTek L-Series Library Admin .....	A-30
Library-to-Operator Panel .....	A-31
CSE, TEST, and SER1 Ports .....	A-31
Library-to-CSE Port .....	A-31
Library-to-Test (PTP) .....	A-32
Library-to-SER1 Port .....	A-32

Library-to-SER2 Port .....	A-32
Wall Elements .....	A-32
<b>B: SNMP .....</b>	<b>B-1</b>
Overview .....	B-1
SNMP Terms .....	B-2
SNMP Commands .....	B-3
Access Control .....	B-4
Management Information Base .....	B-4
Configuration .....	B-6
Starting SNMP .....	B-7
<b>C: StorageTek L-Series Library Admin .....</b>	<b>C-1</b>
Requirements .....	C-1
Installation Instructions .....	C-2
Library Statistics .....	C-4
Counters .....	C-4
8-bit Counters .....	C-4
Drive Statistics .....	C-5
Cell Statistics .....	C-5
16-Bit Counters .....	C-5
32-Bit Counters .....	C-6
Composite Information .....	C-7
Cartridge Access Port (CAP) Usage .....	C-7
PUT Count .....	C-7
GET Counts .....	C-7
Library-Wide Drive Performance .....	C-8
Five Minute Job Rate .....	C-8
Fifteen Minute Job Rate .....	C-9
Individual Drive Performance .....	C-10
<b>Glossary .....</b>	<b>Glossary-1</b>
<b>Index .....</b>	<b>Index-1</b>
<b>Reader's Comment Form .....</b>	<b>RCF-1</b>

# Figures

---

Figure 1-1. Robotic Components	1-17
Figure 1-2. Major Electronic Components	1-18
Figure 1-3. Service Clearances	1-20
Figure 2-1. Reserved Cells	2-5
Figure 2-2. MPB Firmware Port, Master Library	2-6
Figure 2-3. Capacity Variations—1 Drive Column	2-17
Figure 2-4. Capacity Variations—2 Drive Columns	2-18
Figure 2-5. Operator Panel	2-20
Figure 2-6. Example Library Status Screen	2-46
Figure 3-1. MPC/MPCL Card Connections	3-9
Figure 5-1. L700/700e Exterior Components	5-2
Figure 5-2. CAP Motor	5-4
Figure 5-3. Interlock Cable	5-7
Figure 5-4. Electronics Module Fan Tray Assembly	5-9
Figure 5-5. Drive Bay Exhaust Fan	5-11
Figure 5-6. Hand-Camera Assembly	5-14
Figure 5-7. Library SCSI Y Cable	5-20
Figure 5-8. MPB Card	5-23
Figure 5-9. MPB Card Connections	5-25
Figure 5-10. MPC/MPCL Card	5-27
Figure 5-11. MPM Card	5-32
Figure 5-12. MPU Card	5-39
Figure 5-13. MPV (CPCI) Module	5-44
Figure 5-14. MPW Card	5-52
Figure 5-15. Operator Panel	5-56
Figure 5-16. AC Power Distribution Unit	5-59
Figure 5-17. APC (UPS) Batteries	5-63
Figure 5-18. DC Power Supply Assembly	5-64
Figure 5-19. DLT 4000/7000E/8000 Tape Drive	5-69
Figure 5-20. DLT Power Supply	5-76
Figure 5-21. IBM Ultrium Tape Drive	5-81
Figure 5-22. HP Ultrium Tape Drive—HVD Version	5-88
Figure 5-23. HP Ultrium Tape Drive—LVD Version	5-94
Figure 5-24. Seagate Ultrium Tape Drive	5-100
Figure 5-25. SDLT Tape Drive	5-106
Figure 5-26. SCSI Y Cable	5-112



Figure 5-27. Theta Motor . . . . . 5-116

Figure 5-28. Z Motor . . . . . 5-124

Figure 5-29. Z Flex Cable . . . . . 5-131

Figure 5-30. Pass-thru Port (PTP) . . . . . 5-137

Figure A-1. Redundant AC Power Option . . . . . A-3

Figure A-2. Drive Column Power Configuration Example (Two Column Power Cables) . . . . . A-5

Figure A-3. Major Electronic Components. . . . . A-13

Figure A-4. Robotic Components . . . . . A-15

Figure A-5. Hand-Camera Assembly. . . . . A-17

Figure A-6. Overall Diagram: Single Drive Column Power Cable. . . . . A-24

Figure A-7. Overall Diagram: Two Drive Column Power Cables . . . . . A-25

Figure A-8. MPC/MPCL Card Connections . . . . . A-26

Figure A-9. Terminating Power and Operation Jumpers . . . . . A-29

Figure A-10. Standalone Library Elements—One CAP, One Drive Column, . . . . . A-33

Figure A-11. Standalone Library Elements—One CAP, Two Drive Columns. . . . . A-34

Figure A-12. Standalone Library Elements—Two CAPs One Drive Column,. . . . . A-35

Figure A-13. Standalone Library Elements—Two CAPs Two Drive Columns . . . . . A-36

Figure A-14. PTP Library Elements—One Cap, One Drive Column. . . . . A-37

Figure A-15. PTP Library Elements—One CAP, Two Drive Columns . . . . . A-38

Figure A-16. PTP Library Elements—Two CAPs, One Drive Column . . . . . A-39

Figure A-17. PTP Library Elements—Two CAPs Two Drive Columns . . . . . A-40

Figure B-1. SNMP and DNS Network Block Diagram Example . . . . . B-2

Figure B-2. Management Information Base Hierarchy. . . . . B-5

Figure B-3. CLI Help and Help SNMP Commands. . . . . B-6

Figure C-1. Library Admin Screen Example . . . . . C-4

# Tables

---

Table 1-1. Library Capacity Variations	1-3
Table 1-2. Drive Combinations (per drive column)	1-4
Table 1-3. SCSI Cable Restrictions	1-5
Table 1-4. Library Models	1-5
Table 1-5. Rack Cooling Conversion Bills	1-7
Table 1-6. Redundant AC Power Option Conversion Bills	1-7
Table 1-7. Library Optional Features and Conversion Bills	1-8
Table 1-8. StorageTek L-Series Library Admin Model/Features	1-10
Table 1-9. StorageTek Framework Library Monitor Model/Features	1-11
Table 1-10. StorageTek Library Manager Model/Features	1-11
Table 1-11. StorageTek Optional Interfaces—Comparisons	1-12
Table 1-12. Drive Features	1-13
Table 1-13. Weight Variations	1-21
Table 1-14. Tape Library Power Specifications	1-22
Table 1-15. Maximum Number of Drives on Single AC Circuit	1-23
Table 1-16. L700/700e Power Cables	1-24
Table 1-17. Tape Library Environmental Specifications	1-25
Table 1-18. Required Tools	1-26
Table 2-1. Firmware Download Options	2-8
Table 2-2. Hyperterminal Connection	2-12
Table 2-3. Capacity Variations—1 Drive Column	2-16
Table 2-4. Capacity Variations—2 Drive Columns	2-16
Table 2-5. Library/Network Configuration Record	2-21
Table 2-6. Drive Configuration Selections	2-22
Table 2-7. CAP Status Messages	2-47
Table 2-8. Library Status Messages	2-47
Table 2-9. Drive Status Messages	2-48
Table 2-10. CAP Magazine Slot Status Messages	2-49
Table 2-11. CAP States	2-50
Table 2-12. Personality Module Status/Info Screen	2-50
Table 3-1. Troubleshooting the APC Uninterruptible Power Supply	3-5
Table 3-2. MPC Card Connections	3-9
Table 3-3. SCSI Device/Bus Types: Precautions	3-12
Table 4-1. CCITT Cables	4-2
Table 4-2. Modem Switch Settings	4-3
Table A-1. DC Power Supply (MPF) Specifications	A-1

Table A-2. APC Runtimes . . . . .	A-2
Table 1-3. SCSI Cable Restrictions . . . . .	A-8
Table A-4. HVD and LVD Modifications . . . . .	A-9
Table A-5. Universal LVD-specific 68-Pin MD to 68-Pin MD . . . . .	A-10
Table A-6. SCSI Terminators. . . . .	A-10
Table A-7. Fibre Channel Cables and Connectors . . . . .	A-12
Table A-8. Ultrium Tape Drive Logic Cards. . . . .	A-20
Table A-9. VOLID Reporting. . . . .	A-21
Table A-10. Logic Cards: Functions and Locations . . . . .	A-22
Table A-11. MPC/MPCL Card Connections . . . . .	A-26
Table A-12. CSE, TEST, and SER1 Port Functions . . . . .	A-31
Table B-1. SNMP Default Settings . . . . .	B-7
Table C-1. Library Admin Functions. . . . .	C-3
Table C-2. 16-Bit Counters . . . . .	C-5
Table C-3. 32-Bit Counters . . . . .	C-6
Table C-4. CAP PUT Count . . . . .	C-7
Table C-5. CAP GET Count . . . . .	C-8
Table C-6. Library-Wide Performance—Five Minute Job Rate. . . . .	C-9
Table C-7. Fifteen Minute Job Rate. . . . .	C-10
Table C-8. Individual Drive Performance. . . . .	C-11

This page intentionally left blank.

# Preface

---

This manual describes how to troubleshoot and repair an L700/700e tape library and the L700-Pass-thru Port that connects two L700e libraries. It also contains a basic theory of operation section in [Appendix A](#). This manual is intended for the exclusive use of StorageTek and authorized third party service representatives.

## ■ Organization

This manual has five chapters and three appendixes.

<a href="#">Chapter 1</a>	“ <a href="#">General Information</a> ” provides an overview of the library models and features. It lists any special tools required to service the library and shows the location of major system components.
<a href="#">Chapter 2</a>	“ <a href="#">Firmware Operation</a> ” explains the operator panel and steps required to run diagnostic tests.
<a href="#">Chapter 3</a>	“ <a href="#">Trouble Isolation Procedures</a> ” describes the procedures for troubleshooting errors that may not generate a Fault Symptom Code (FSC).
<a href="#">Chapter 4</a>	“ <a href="#">Remote Setup</a> ” provides the procedure to attach a modem to the library for remote operation by a customer services engineer.
<a href="#">Chapter 5</a>	“ <a href="#">Removal and Replacement</a> ” contains the procedures to remove and replace library components.
<a href="#">Appendix A</a>	“ <a href="#">Theory of Operation</a> ” provides the theory of library operation; subsystem block diagrams, an MPC/MPCL card layout illustration, and panel cartridge locations are also supplied.
<a href="#">Appendix B</a>	“ <a href="#">SNMP</a> ” supplies information regarding Simplified Network Management Protocol.
<a href="#">Appendix C</a>	“ <a href="#">StorageTek L-Series Library Admin</a> ” supplies information for installing and configuring the StorageTek L-Series Library Admin tool.
<a href="#">Glossary</a>	The <a href="#">Glossary</a> defines relevant terms and acronyms.
<a href="#">Index</a>	The <a href="#">Index</a> assists in locating information in this manual

## ■ Alert Messages

Alert messages call your attention to information that is especially important or that has a unique relationship to the main text or graphic.

**Note:** A note provides additional information that is of special interest. A note might point out exceptions to rules or procedures. A note usually, but not always, follows the information to which it pertains.

**CAUTION:**

**A caution informs the reader of conditions that might result in damage to hardware, corruption of data, corruption of application software, or long-term health problems in people. A caution always precedes the information to which it pertains.**

**WARNING:**

**A warning alerts the reader to conditions that might result in injury or death. A warning always precedes the information to which it pertains.**

## ■ Conventions

Typographical conventions highlight special words, phrases, and actions in this publication.

Item	Example	Description of Convention
Buttons	MENU	Font and capitalization follows label on product
Commands	Mode Select	Initial cap
Document titles	<i>System Assurance Guide</i>	Italic font
Emphasis	<i>not or must</i>	Italic font
File names	esc.txt	Monospace font
Hypertext links	<a href="#">Figure 2-1 on page 2-5</a>	Blue (prints black in hardcopy publications)
Indicators	<i>Open</i>	Font and capitalization follows label on product
Jumper names	TERMPWR	All uppercase
Keyboard keys	<Y> <Enter> or <Ctrl+Alt+Delete>	Font and capitalization follows label on product; enclosed within angle brackets
Menu names	Configuration Menu	Capitalization follows label on product
Parameters and variables	Device = xx	Italic font

<b>Item</b>	<b>Example</b>	<b>Description of Convention</b>
Path names	c:/mydirectory	Monospace font
Port or connector names	SER1	Font and capitalization follows label on product; otherwise, all uppercase
Positions for circuit breakers, jumpers, and switches	ON	Font and capitalization follows label on product; otherwise, all uppercase
Screen text (including screen captures, screen messages, and user input)	downloading	Monospace font
Switch names	Power	Font and capitalization follows label on product
URLs	<a href="http://www.storagetek.com">http://www.storagetek.com</a>	Blue (prints black in hardcopy publications)

## ■ Related Publications

L700/700e tape library publications include:

<b>L700/700e Tape Library Publications</b>	<b>Part Number</b>
<i>L700e Tape Library General Information Manual</i>	MT 4011
<i>L700e Tape Library Hardware Operator's Guide</i>	95845
<i>L700e Tape Library Illustrated Parts Catalog</i>	95847
<i>L700e Tape Library Installation Manual</i>	95843
<i>L700e Tape Library SCSI Specification Manual</i>	95869
<i>L180/700e Tape Library Ordering and Configuration Guide</i>	MT 5112

Tape drive publications include:

<b>Tape Drive Publications</b>	<b>Part Number</b>
<i>DLT 7000 Tape Drive Product Manual</i>	313134501
<i>DLT 8000 Tape Drive Product Manual</i>	DLT part 81-60118-0x
IBM® Ultrium Tape Drive Manual	CD included with drive
<i>Open Systems Tape Drives Information Manual</i>	MT 9120
Hewlett Packard Ultrium Tape Drive Manual	100089901 - CD included with drive

<b>Tape Drive Publications</b>	<b>Part Number</b>
Seagate Ultrium Tape Drive Manual	100089801 - CD included with drive
<i>Super DLT 220 Product Manual</i>	Quantum part: 81- 80000-01 - CD included with drive
<i>T9x40 Tape Drive Assurance Guide</i>	MT 5003
<i>9840 Tape Drive General Information Manual</i>	MT 4004
<i>T9x40 Tape Drive Migration Planning Guide</i>	MT 6004
<i>T9840 Tape Drive User's Reference Manual</i>	95739
<i>T9x40 Tape Drive Service Reference Manual</i>	95740
<i>T9940 Tape Drive Operator's Guide</i>	95989

Publications relating to Automated Cartridge System Library software are:

<b>ACSLs Documentation</b>	<b>Part Number</b>
<i>Automated Cartridge System Library Software: System Administrator's Guide</i>	112194201

Some ACSLS, Solaris, and AIX documentation may also be obtained at the following Internet website:

<http://www.storagetek.com/products/software/acsls/index.htm>

Publications regarding the APC (AC Uninterruptible Power Source):

<b>APC Power Supply Information</b>	<b>Part Number</b>
<i>L180/700 UPS Reference Manual</i>	96047
APC Uninterruptible Power Supply manuals and online information.	Available from APC or see <a href="http://www.apc.com">www.apc.com</a>

Publications regarding StorageTek software products:

#### **StorageTek Software Products**

The list of StorageTek software products can be found online at:

<http://www.storagetek.com/prodserv/products/software/>



The following list contains the names and part numbers of publications that provide additional information about data interfaces

<b>Other Publications</b>	<b>Part Number</b>
<i>American National Standard Dictionary for Information Processing Systems</i>	ANSI X3/TR-1-82
<i>Code for Information Interchange</i>	ANSI X3.4-1977
<i>Fibre Optics User's Guide</i>	9433
<i>Magnetic Tape Labels and File Structure for Information Interchange</i>	ANSI X3.27-1978
<i>Recorded Magnetic Tape and Cartridge for Information Interchange</i>	ANSI X3B5/87-009
<i>SCSI-2</i>	ANSI X3T9.2/86-009
<i>SCSI-3 Parallel Interface (SPI)</i>	ANSI X3T9.2/91-010R7
<i>Small System Computer Interface</i>	ISO 9316:1989

## ■ Additional Information

StorageTek offers several methods for you to obtain additional information. Please use one of these methods when you want to obtain the latest edition of this or any other StorageTek publication.

### StorageTek's External Web Site

StorageTek's external Web site provides marketing, product, event, corporate, and service information. In addition, the external Web site serves as an entry point to the Customer Resource Center (CRC) and to the e-Partner site. The external Web site is accessible to anyone with a Web browser and an Internet connection.

The URL for the StorageTek external Web site is <http://www.storagetek.com>

### Customer Resource Center

StorageTek's CRC is a Web site that enables members to resolve technical issues by searching code fixes and technical documentation. CRC membership entitles you to other proactive services, such as HIPER subscriptions, technical tips, answers to frequently asked questions, addenda to product documentation books, and online product support contact information. Customers who have a current warranty or a current maintenance service agreement may apply for membership by clicking on the **Request Password** button on the CRC home page. StorageTek employees may enter the CRC through PowerPort.

The URL for the CRC is <http://www.support.storagetek.com>.

## e-Partners Site

StorageTek's e-Partners site is a Web site that provides information about products, services, customer support, upcoming events, training programs, and sales tools to support StorageTek's e-Partners. Access to this site, beyond the e-Partners Login page, is restricted. On the e-Partners Login page, StorageTek employees and current partners who do not have access can request a login ID and password and prospective partners can apply to become StorageTek resellers.

The URL for the e-Partners site is <http://members.storagetek.com>.

## Global Services Support Tools

StorageTek's Global Services Support Tools site provides tools that aid in the sales and support of StorageTek's products and services. This is an internal Web site for StorageTek employees.

The URL for the Global Services Support Tools is <http://wwssto.stortek.com>

## Documents on CD

*Documents on CD* (3106600xx) is a compact disc that contains portable document format (PDF) files of StorageTek's tape, library, OPENstorage disk, and StorageNet publications. Contact your local Customer Services Logistics Depot to order this CD and to get onto the distribution list for this CD. The *Documents on CD* is only for StorageTek employees.

## Hardcopy Publications

You may order paper copies of publications listed on the CRC or included on the *Documents on CD*.

Service publications have *numeric* part numbers. To order paper copies of service publications, contact your local Customer Services Logistics Depot.

Marketing publications have *alphanumeric* part numbers. To order paper copies of marketing publications, do one of the following:

- Visit StorageTek's PowerPort and select alphabetical listings under "L" or select **Online Forms**. Then search for Literature Distribution. Follow the instructions on the Literature Distribution Web page.
- Send e-mail to [DistrL@louisville.stortek.com](mailto:DistrL@louisville.stortek.com).

# Safety, Fiber Optic, and ESD

---

The following pages describe common practices concerning electrical safety, ergonomics, rack installation, fiber optics, and electrostatic discharge.

## ■ Safety Precautions

### **CAUTION:**

***Potential injury: On-the-job safety is important; therefore, observe the following safety precautions while you are engaging in any maintenance activity. Failing to follow these precautions could result in serious injury.***

**Remove all conductive jewelry, such as watches and rings, before you service powered-on equipment.**

- Avoid electrical shock. Be careful when you work near power connectors and supplies.
- Power-off the equipment that is being serviced before you remove a field replaceable unit (FRU) or other component. Remember that dangerous voltages could still be present in some areas even though power is off.
- Ground all test equipment and power tools.
- Lift objects properly; read the information in [“Lifting Techniques”](#) (see below).
- Do not remove, cut, or relocate any floor tiles indiscriminately. Before you manipulate floor tiles, be sure that you understand the customer’s environment and receive the customer’s approval. Remember, each situation is different.
- Enforce good housekeeping practices in the equipment area to help prevent fire and accidents.

**Note:** Important things to investigate and to be aware of include the use of Halon® gas, under-the-floor smoke detectors, and cables to other equipment installed nearby.

## Lifting Techniques

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

- Do not twist your body to pick up something or to 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: first examine the object and then determine 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 shoulder-width apart, and place one foot a little behind the other. Keep your back straight because even light loads can significantly increase pressure on your spine when you lean forward.
- Whenever you can, grip the load with your whole hand, and use two hands.
- Carry objects at elbow height and 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. Leg muscles are some of the strongest in the body. When you squat and lift with your legs, you can lift more weight safely.
- Alternate lifting tasks with tasks that are less stressful to the same muscles. This technique ensures that your muscles have some recovery time.

## Shoulder, Elbow, Wrist, and Hand Safety

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

- Work within your safety zone—the area between shoulder level and knuckle level of your lowered hands. You face less chance of injury when you work or lift in this area.
- Keep your elbows bent to keep loads close to your body and to decrease the amount of force necessary to do the job. If you use this posture, you will put less weight and pressure on your shoulder.
- Be sure to keep your wrists straight. Avoid bending, extending, or twisting your wrists for long periods of time.
- Do not use a pinch grip to lift large or heavy loads because the way you lift also can affect the tendons in your hand. When you grasp an object between your thumb and fingers, you put a lot of tension on hand and wrist tendons. Use both hands—use one for a while, and then use the other—to give them rest.

## ■ Fiber Optic Safety

### **WARNING:**

***Eye hazard. Never look directly into a fiber-optic cable, a fiber-optic connector, or a laser transceiver module. Hazardous conditions might exist from laser power levels that are capable of causing injury to the eye.***

**Be especially careful when using optical instruments with this equipment. Such instruments might increase the likelihood of eye injury.**

The laser transceivers in fiber-optic equipment can pose dangers to personal safety. Ensure that anyone who works with this StorageTek equipment understands these dangers and follows safety procedures. Ensure that the optical ports of every laser transceiver module are terminated with an optical connector, a dust plug, or a cover.

Each fiber-optic interface in this StorageTek Fibre Channel equipment contains a laser transceiver that is a Class 1 Laser Product. Each laser transceiver has an output of less than 70  $\mu$ W and a wavelength of 850 nm. StorageTek's Class 1 Laser Products comply with EN60825-1(+A-11) and with sections 21 CFR 1040.10 and 1040.11 of the Food and Drug Administration (FDA) regulations.

The following translations are for users in Finland and Sweden who wish to identify laser safety and classification:

CLASS 1 LASER  
LUOKAN 1 LASERLAITE  
KLASSE 1 LASER APPARAT

## Laser Product Label

In accordance with safety regulations, a label on each StorageTek Fibre Channel product identifies the laser class of the product and the place and date of the manufacturer. The label appears on top of a Fibre Channel tape drive and near the Fibre Channel connectors on a Fibre Channel tape library. A copy of the label is shown here:

---

CLASS 1 LASER PRODUCT  
LASER KLASSE 1  
APPAREIL A LASER DE CLASSE 1  
COMPLIES WITH 21 CFR 1040.10 AND 1040.11

---

## Fiber-optic Cable Installation

Follow these guidelines when you install fiber-optic cables:

### 1. Cable routing:

- **Raised floor:** You may install fiber-optic cables under a raised floor. Route them away from any obstruction, such as existing cables or other equipment.
- **Cable tray or raceway:** Place the cables in position; do not pull them through the cable tray. Route the cables away from sharp corners, ceiling hangers, pipes, and construction activity.
- **Vertical rise length:** Leave the cables on the shipping spool, and lower them from above; do not pull the cables up from below. Use proper cable ties to secure the cable.
- **General:** Do not install fiber-optic cables on top of smoke detectors.

## 2. Cable management:

- Leave at least 4.6 m (15 ft) of cable at each end for future growth.
- Use strain reliefs to prevent the weight of the cable from damaging the connector.
- Review all information in this manual and in any related manuals about safely handling fiber-optic cables.

## 3. Connector protection:

- Insert connectors carefully to prevent damage to the connector or fiber.
- Leave the connector's protective cover in place until you are ready to make connections.
- Replace the connector's protective cover when the connector is disconnected.
- Clean the connector before making a connection. Make sure that there are no obstructions and that keyways are aligned.

## Fiber-optic Cable Handling

Observe these precautions when you handle fiber-optic cables:

- Do not coil the cable to less than 96 mm (3.75 in.) in diameter.
- Do not bend the cable to less than 12 mm (0.5 in.) in radius. StorageTek recommends that a cable's bend radius be no less than 20 times the diameter of the cable.
- Do not pull on the cables; carefully place them into position.
- Do not grasp the cables with pliers, grippers, or side cutters; do not attach pulling devices to the cables or connectors.
- Keep cables away from sharp edges or sharp protrusions that could cut or wear through the cable; make sure that cutouts in the equipment have protective edging.
- Protect the cable from extreme temperature conditions.
- Install the connector's protective cover whenever the connector is not connected.

## ■ Rack Safety and Precautions

### **WARNING:**

#### ***Possible personal injury:***

- **More than one person might be required to install equipment into the library's rack or to remove equipment from the library's rack.**

- **Personnel should take adequate precautions when they are moving a library that contains rack-installed equipment. The weight of some rack equipment might alter the height of the library's center of gravity. This condition might cause the library to tip during a move.**

Observe the following safety and handling precautions when you are installing equipment into the library's rack:

**CAUTION:**

***Potential equipment damage:* Do not exceed the maximum allowable weight (130 kg [300 lb]) and U-height (17U) for equipment in the rack area of this library.**

- Ensure that the equipment has UL listing (listing by Underwriters' Laboratories), CSA certification (certification by the Canadian Standards Association), and CE compliance (compliance with the European Council's directives and standards).
- Understand that the library does not supply power to the rack area. So ensure that the rack-installed equipment has an adequate power source.

**Note:** If you remove power from the library by using the library's power switch, the rack-installed equipment will remain powered-on.

- Follow the manufacturer's guidelines to position, to support, and to fasten the equipment in the rack.
- Locate the equipment so that it does not block or hinder any ventilation openings in the library's rack area. For example, do not block library or drive exhaust areas, the electronic module exhaust area, perforated metal, or other similar ventilation.
- Locate the equipment so that the library doors adequately clear the equipment when you close them.
- Install the equipment from the bottom of the rack to the top of the rack; StorageTek recommends that you place the heaviest items near the bottom of the rack.
- Ensure that any equipment that you install within the rack is adequately cooled. The library's internal ambient temperature should not exceed the recommended operating temperature. Base cooling considerations upon the power dissipation within the rack space as well as upon the ambient room conditions that are external to the library. You must provide cooling for moderate power dissipation within the rack space.
- Ensure that the equipment in the rack does not create an overcurrent condition, whether equipment is connected directly to the branch circuit or to a power distribution strip.
- Ensure that the equipment in the rack has reliable earth ground, whether equipment is connected directly to the branch circuit or to a power distribution strip.

# ■ Electrostatic Discharge (ESD) Damage Prevention

Anyone who handles ESD-sensitive components must be aware of the damage that ESD can cause to electronic components and must take the proper precautions to prevent it. Also, anyone who performs maintenance on StorageTek equipment must complete an ESD-basics course.

## **CAUTION:**

***Potential damage to equipment: Handle ESD-sensitive components only under ESD-protected conditions. To meet this requirement, always use the Field Service Grounding Kit (PN 4711) and always follow these ESD precautions and procedures when you are servicing StorageTek equipment or handling ESD-sensitive components.***

## ESD Precautions

Always take the following general precautions when you work with ESD-sensitive components:

- Wear ESD protection whenever you install, remove, maintain, or repair StorageTek equipment.
- Keep ESD-sensitive printed-circuit components in their ESD-protective packages until you have taken all ESD-preventive steps and you are ready 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 all equipment covers and close all equipment doors after you have completed the work.
- 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 you unroll it.
- Immediately place any component that you have removed into an ESD-protective package.
- Keep the grounding-kit work surface clean.

**Note:** To clean the work surface, use a mild detergent and water, and make sure that the surface is completely dry before you use it.

- Periodically check the electrical resistance of the ground cord and the wrist-strap coil cord.

**Note:** The ground cord should measure less than 1.2 M $\Omega$ , and the coil cord should measure between 0.8 and 1.2 M $\Omega$ . Repair or replace the cords if they no longer meet these requirements.



## ESD-Protection Procedure

Remember that each customer environment is different. Address all the customer's concerns before you work on any equipment.

### Prepare the Work Area

1. Before you service the equipment, unfold the grounding-kit work surface completely and place it on a convenient surface.
2. Attach one end of the ground cord to the work surface; secure the snap fastener.

**Note:** You will attach the free end in a later step.

3. Slip on an ESD wrist strap. Make sure that the strap is comfortable and makes contact with the entire circumference of your wrist.
4. Snap one end of the coil cord to the wrist band.

### Access the Equipment

5. Carefully open the doors to the equipment or remove the covers from the equipment. Do not touch any internal components.

#### **CAUTION:**

**Be sure that you are properly grounded before you touch any internal components.**

6. Attach the free end of the coil cord to the most appropriate place:
  - a. If you are working on components from a small piece of equipment, attach the free end of the coil cord to the grounding-kit work surface. In addition, be sure that you touch an unpainted metal surface on the equipment before you touch an internal component.
  - b. If you are working on components from a large piece of equipment, attach the free end of the coil cord to a grounding jack or to an unpainted metal surface inside the equipment.

### Replace Components

7. Remove the defective component and place it on the work surface.
8. Remove the replacement component from its ESD-protective package, and install the component in the equipment.
9. Place the defective component in the ESD-protective package.

### Clean Up

10. Disconnect the ground cords from the equipment.

11. Reinstall all equipment covers and close all equipment doors.
12. Disconnect the coil cord from your wrist, and, if necessary, disconnect the ground cord from the work surface.
13. Properly store the work surface and the other Field Service Grounding Kit items.

## ■ L700/700e Door Interlock

A safety interlock (located behind the left front door) is provided on the tape library. When the left front door is opened, the interlock immediately generates a servo power interrupt (SPI) that disables all library motors. This prevents motors from operating while the library door is open.

For libraries connected with a pass-thru port (PTP), the door interlock switches for both libraries have been modified. The new switches detect an opened door in either library.

## ■ L700/700e Servo Power Interrupt

An additional safety feature is the MPC/MPCL card generated servo power interrupt. If a library motor is determined to be out-of-range, the processor card will generate a SPI to turn off drive voltage to the faulty motor. This prevents a servo runaway condition until the cause of the problem can be determined.

---

This chapter presents an overview of the library models and features. It lists any special tools required to service the library and shows the location of major system components.

## ■ Overview

The L700/700e Tape Library is a fully automated tape cartridge storage and retrieval subsystem. The new L700e frame is virtually identical with the earlier standard frame, but L700e frames will accept the L700-Pass-thru Port (PTP), which can transport up to two cartridges at a time between two libraries. Depending on model and features selected, it can store from 156 to 678 tape cartridges. With an L700-PTP installed between two libraries, both libraries can share from 300 to 1,344 cartridges. The total numbers do not include cartridges in the cartridge access port (CAP) or the reserved cells.

## MPC and MPCL Cards

The controller card for the library is either the MPC or MPCL card.

The original MPC card has recently been re-designed and is designated the “MPCL.” The MPCL will be installed on all new L180/700e frames starting 4Q02. The MPCL card provides a native LVD interface, replacing the optional MPV and MPW cards that are currently used on MPC cards.

The MPCL, while set at the factory for High Voltage Differential (HVD) operation, can be modified to operate on a Low Voltage Differential (LVD) interface by:

1. Moving the jumper located at J16 on the card from the default position (HVD) to the LVD/SE position (see [Figure A-8 on page A-26](#) and “[Library-to-Client](#)” on [page A-28](#)).
2. Ensuring that feature kit LV03, which contains the proper cables and terminator is installed.

**Note:** The MPCL card cannot operate with any firmware level below 3.02.

MPC card spares will be available indefinitely. You should replace an MPC card with an MPC card and replace MPCL cards with MPCL cards. The Feature LV02, conversion bill number 101368 (installation of the card cage, MPV backplane, and MPW logic card attached to the MPC card) to operate a library containing an MPC card on an LVD interface, will continue to be offered.

MPC card spares will be available indefinitely. You should replace an MPC card with an MPC card and replace MPCL cards with MPCL cards.

## Library Interfaces

The L700e can operate on the following interfaces:

- High Voltage Differential (HVD)
- SCSI Low Voltage Differential (LVD)—requires the addition of MPV and MPW cards for MPC cards only; new MPCL cards, however, can operate as native LVD/SE.
- Single-ended SCSI.
- Fibre Channel with the addition of MPU and MPV cards

## Drive Types

The following drives may be installed within the L700e:

- T9x40 – HVD SCSI or Fibre Channel
- T9840B – HVD SCSI, Fibre Channel, or ESCON<sup>1</sup>
- DLT 7000 or DLT 8000 – HVD SCSI only
- The SDLT 320 model—Backward Read Compatibility (BRC – ability to read previously written tapes on DLTIV media)
- IBM Ultrium
  - Gen1– Native LVD, Fibre Channel or, with a converter card, HVD<sup>2</sup>
  - Gen2—Fibre Channel<sup>3</sup>
- Hewlett Packard Ultrium:
  - Gen1—Native LVD or, with a converter card, HVD
  - Gen2<sup>4</sup>—Native LVD only
- Seagate Ultrium – LVD or HVD (determined by model number)

### CAUTION:

**System fault: For either HVD or LVD operation, the server must have a corresponding (matching) host bus adapter.**

SCSI drives and media can be intermixed.

The exchange rate for moving tapes from cell to cell is 450 cartridges per hour.

[Table 1-1 on page 1-3](#) lists available tape library capacity variations.

---

1.The StorageTek T9840B drive is available for ESCON operation; library firmware must be version 3.01 or later. Host operating systems requirements are listed in “ESCON” on [page 1-15](#).

2.For more information regarding Ultrium drives, refer to the *Open Systems Tape Drives Information Manual*, part MT 9120.

3.Gen2 IBM Fibre Channel drives require Firmware Version 3.04.

4.The Gen2 HP Ultrium drive support is available with Firmware Version 3.03.

**Table 1-1. Library Capacity Variations**

Expansion Frame	Second Drive Column	Drives Installed (Maximum)	Panel 2 Access	Total Data Cartridge Cells <sup>1</sup> .	Reserved Cells <sup>2</sup> .	Total User Cells
Yes (Full)	No	10 DLT/Ultrium, or 6 T9x40 + 1 DLT/Ultrium	Entire	678	12	690
	Yes	20 DLT/Ultrium or 12 T9x40 + 2 DLT/Ultrium	Entire	618	12	630
No (2/3)	No	10 DLT/Ultrium or 6 T9x40 + 1 DLT/ Ultrium	Entire	384	12	396
	Yes	20 DLT/Ultrium or 12 T9x40 + 2 DLT/Ultrium	Entire	324	12	336
No (1/3)	No	10 DLT/Ultrium or 6 T9x40 + 1 DLT/ Ultrium	Partial	216	12	228
	Yes	20 DLT/Ultrium or 12 T9x40 + 2 DLT/Ultrium	Partial	156	12	168

**Notes:** <sup>1</sup> These numbers do not include cells in the CAP or the reserved area.

The figures will be doubled (minus 12 cells for the PTP array) for libraries sharing a PTP.

<sup>2</sup> The reserved cells are composed of one swap cell and 11 cleaning and/or diagnostic cartridge slots. They are shown in [Figure 2-1 on page 2-5](#).

A standard L700/700e library consists of:

- A tape library that stores 156 to 678 tape cartridges.
- A standard 20 cartridge CAP that contains four removable magazines; each magazine holds 5 cartridges each. The operator can pivot the magazines to insert or remove one or more tape cartridges. Alternately, the operator can remove entire magazines to insert/remove up to 20 cartridges per CAP at a time.

- One to 10 Digital Linear Tape (DLT) or Ultrium drives, one to 6 T9x40 drives, one to 6 T9x40 drives plus one DLT or Ultrium drive, or a mixture of drives. Possible drive combinations are listed in [Table 1-2](#).

**Table 1-2. Drive Combinations (per drive column)**

T9x40	DLT/Ultrium
0	10
1	8
2	7
3	5
4	4
5	2
6	1

**CAUTION:**

**Possible data loss:** StorageTek does not advise mixing DLT 7000 and DLT 8000 drives in the same library. If a DLT 7000 cartridge is inserted into a DLT 8000 drive, the tape can be read and written in 7000 mode.

**If a DLT 8000 cartridge is inserted into a DLT 7000 drive, the drive will indicate “Medium Error/Calibration Error (03/8000)” if a read command is issued and, as with most tape drives, will write over any data present on the tape if a write command is issued at load point.**

The in-motion software resides within the host. It initiates all cartridge motion, controls CAP operations, and catalogs all cartridge locations. Communication between the library and client occurs over the SCSI bus or Fibre Channel.

The library provides two client connections (single-ended or differential) for SCSI operation and one client connection for Fibre Channel operation.

## ■ SCSI Cable Considerations

**Note:** The library and drives support *only* SCSI Type-3 connectors. If you use SCSI Type 1 or 2 cable connectors, you must order a SCSI-1 or SCSI-2-to-SCSI-3 adapter to correctly mate with the components.

Table 1-3 on page 1-5 lists additional restrictions for SCSI connections that you should keep in mind.

**Table 1-3. SCSI Cable Restrictions**

Application	Length Restriction
Single-Ended	Stub length: 0.1 m (4 in.) 5 to 10 Mb data transfer rate: 3 m (10 ft) 1 to 5 Mb data transfer rate: 6 m (20 ft)
Differential	Stub length: 0.2 m (10 in.) 1 to 10 Mb data transfer rate: 25 m (82 ft)
Low Voltage Differential	Stub length: 0.1 m (3.9 in.) 108 GB data transfer rate: 12 m (39.37 ft)

## ■ Models

Table 1-4 lists the various models of the L700/700e Tape Library.

**Table 1-4. Library Models**

Model	Drive Columns	Description*
L700-700	1	678 cartridge slots, expansion frame, Panel 2 and Panel 3 access
	2	618 cartridge slots, expansion frame, Panel 2 and Panel 3 access
L700-400	1	384 cartridge slots, no expansion frame, entire panel 2 access
	2	324 cartridge slots, no expansion frame, entire panel 2 access
L700-300	1	216 cartridge slots, no expansion frame, partial Panel 2 access
	2	156 cartridge slots, no expansion frame, partial Panel 2 access

**Table 1-4. Library Models (Continued)**

Model	Drive Columns	Description*
L700-e70	1	678 data cartridge cells, expansion frame, entire Panel 2 and Panel 3 access
	2	618 data cartridge cells, expansion frame, entire Panel 2 and Panel 3 access
L700-e40	1	384 data cartridge cells, no expansion frame, entire Panel 2 access
	2	324 data cartridge cells, no expansion frame, entire Panel 2 access
L700-e30	1	216 data cartridge cells, no expansion frame, partial Panel 2 access
	2	156 data cartridge cells, no expansion frame, partial Panel 2 access

**Note:** The cartridge cell numbers do not include the cells in the CAP or the reserved area. The reserved area is shown in [Figure 2-1 on page 2-5](#).

## ■ 13U Rack Area

**Note:** Refer to “[Electrostatic Discharge \(ESD\) Damage Prevention](#)” on page xxx for requirements in this area.

The internal 13U rack area (behind the right front door) can be used by customers for additional equipment. You must advise the customer that:

- The total maximum weight of equipment installed in this location cannot exceed 136 Kg (300 lbs).
- The ventilation openings in the rear of the cabinet must have at least 100 mm (4 in.) clearance for proper air flow.

**CAUTION:**

***Heat within rack area:* Cooling considerations should be made based upon the power dissipation within the rack space, as well as the external library room ambient conditions. Cooling must be provided for moderate power dissipation within the rack space.**

**The rack area is not recommended for high power dissipation components such as multiprocessor servers or disk arrays.**



## Rack Cooling

Depending on the type and amount of equipment in the rack area, a cooling unit may be required. The decision is based upon the charts in the *L700 Tape Library Systems Assurance Guide*, part MT5008.

A cooling unit is *required* if you are installing the American Power Conversion (APC) redundant AC power option.

Conversion bill numbers for the cooling unit, are listed below.

**Note:** A separate power cable must also be ordered for the cooling unit.

**Table 1-5. Rack Cooling Conversion Bills**

Conversion Bill	Description
101323	Domestic fan, rack cooling area
101323	Japan fan, rack cooling area
101324	International fan, rack cooling area

## APC Power Backup System

The APC redundant AC power option consists of two batteries, a power monitor switch, and power strip. If this system is installed in the library, a cooling feature (mentioned above) is also required.

Conversion bill numbers for the redundant AC power option are listed below.

**Table 1-6. Redundant AC Power Option Conversion Bills**

Conversion Bill	Description
101410	Domestic rack mounted APC bundle. (See note 1.)
101411	International rack mounted APC bundle. (See note 2.)

**Note:**

1. This bundle includes L5-30 (locking, 120 VAC, 30 A) plugs. The customer must provide two L5-30R receptacles.
2. This bundle includes Hubbell 316P6W plugs. The customer must provide two Hubbell 316R6W receptacles.

## Matrix Switch

This switch uses Matrix to emulate the operator panels of the T9840B drives. If you are installing the Maintenance Switch for Matrix application with T9840B drives, ferrite beads must be installed on the Ethernet cables at the switch and at each drive. Refer to the *T9x40 Tape Drive Installation Manual*, part 95879, for specific instructions.

## ■ Optional Library Features

Optional features for the library are listed in the table below.

**Note:** A library power cable *must* be ordered. See [Table 1-16 on page 1-24](#).

**Table 1-7. Library Optional Features and Conversion Bills**

Feature/Model	Conversion Bill	Description
0PDU		No additional power distribution unit
1PDU	61699	Optional power distribution unit (PDU)
RMPS	61701	Second (backup) DC power supply
2NDT	61697	Second drive column
CC40	61705	Second 20-cell CAP
DFAN <sup>1</sup> .	101323	Rack-mounted cooling (Domestic - 115 VAC)
DPWR	101410	Redundant AC power option (Domestic rack mounted UPS and switch - 115 VAC)—DFAN feature must also be ordered.
EFAN <sup>2</sup> .	101324	Rack-mounted cooling
EPWR	101411	Redundant AC power option (European rack mounted UPS and switch - 240 VAC)—EFAN feature must also be ordered.
EXDR	61707	Expansion frame (294 cartridge slots)
IF01	61703	For libraries using firmware lower than version 3.02: Compact PCI bus expansion (MPV card) and 1 GB Fibre Channel card (MPU card – SC connectors)
IFC2	101672	For libraries using firmware version 3.02 or later: Compact PCI bus expansion (MPV card) and 2 GB Fibre Channel card (MPU2 card – LC connectors)
		2 GB Fibre Channel card (MPU2 card) only: requires MPC/MPCL card at firmware version 3.02 or later and MPV card.
JFAN <sup>1</sup> .	101323	Rack-mounted cooling (Japan only - 90 VAC)

**Table 1-7. Library Optional Features and Conversion Bills (Continued)**

Feature/Model	Conversion Bill	Description
LV02	101368	Low Voltage Differential (LVD) operation for libraries with <i>MPC card only</i> (MPW and MPV logic cards)
LV04	101662	LVD kit, with cable and terminator, for LVD/SE operation with <i>MPCL cards only</i> .
LS4X		StorageTek L-Series Library Admin (Model HRZN-002)
Upgrade from L700-300 to L700-400 or L700-e30 to L700-e40	61978	Access to all cells on Panel 2

**Note:** 1. This feature must be ordered when UPS and switch feature (DPWR) is ordered. The following power cable is included with this feature: part 10083242, 2.3 m (7.5 ft), NEMA 5-15. If your machine serial number is 0001—5676, you must order the replacement door, Field Bill 101327.

2. This feature must be ordered when UPS and switch feature (EPWR) is ordered. The following power cable is included with this feature: part 10083530, 3 m (9.8 ft), IEC 60320, C14. If your machine serial number is 0001—5676, you must order the replacement door, Field Bill 101327.

3. For LVD library operation on MPCL cards, this feature is unnecessary. The MPCL card is capable of native operation on an LVD/SE interface by setting the jumper at J16 on the MPCL card to “LVD/SE.”

For any library that operates LVD:

1. The single, shielded cable (part 3136668xx) with a feed-through terminator must be installed between the MPC/MPCL card single-ended connector and the bulkhead.
2. The library must be the last device on a SCSI bus.

## ■ StorageTek Optional Interfaces

Several optional interfaces are available for the library. These are described in the next three sections.

### StorageTek L-Series Library Admin

The optional Web interface to the L700e library is Model HRZNLSA, Feature code LS4X. Its configuration and operation are outlined in [Chapter 2, “Firmware Operation.”](#)

The StorageTek L-Series Library Admin lets a library’s user configure, operate, and monitor the library through a workstation or PC that is running a Netscape or Microsoft browser. The monitor must first be enabled and configured on the library. Installation and configuration instructions appear in the documentation that ships with the StorageTek L-Series Library Admin components. See [Table 1-8](#).

**Table 1-8. StorageTek L-Series Library Admin Model/Features**

Description	Model	Description	Quantity
StorageTek L-Series Library Admin for L700/700e	HRZNLSA	CDRM	N/A
		LS4X (1 per tape library)	

### StorageTek Framework Library Monitor

StorageTek Framework Library Monitor provides monitoring of several SCSI-attached libraries from within a system management framework on standard UNIX and Windows NT systems. It monitors the tape library associated with all data backup, recovery, hierarchal storage management, or vertical application jobs across a SCSI bus.

Its model number is HRZN001, Feature code FS3X. Installation and configuration instructions appear in the documentation that ships with the product. See [Table 1-11 on page 1-12](#).

**Table 1-9. StorageTek Framework Library Monitor Model/Features**

Description	Model	Required Feature	Quantity
StorageTek Framework Library Monitor	HRZN001	CDRM	N/A
FS4X (1 per tape library)			
At least one of the following framework features (corresponding to the framework the customer has installed) must be ordered also:			
		FW01 (CA Unicenter)	
		FW02 (HP OpenView)	
		FW03 (Tivoli NetView)	
		FW04 (Other)*	
<b>Note:</b> The feature FW04 (Other) is for those customers who have their own SNMP application and wish to perform their own SNMP integration with the library's SNMP agent.			

## StorageTek Library Manager

StorageTek Library Manager (Product HRZN003) provides sharing and common robotics control for SCSI-attached libraries. It is also required for PTP operation. See [Table 1-11 on page 1-12](#)

**Table 1-10. StorageTek Library Manager Model/Features**

Product	Model	Feature	Quantity
StorageTek Library Manager	HRZN003	CDRM	N/A
FS4X (1 per tape library)			
The features below correspond to the customer's platform.			
		WN2K (Windows 2000)	
		NT100 (Windows NT)	
		SLRS (Solaris)	
		LBAT (Library Attach)	
<b>Note:</b> Library Attach is required for PTP operation and for Windows NT/2000 platforms. ISVs use this product as the NT/2000 Client Software Component to interface with ACSLS, Library Manager, and Library Station.			

**Table 1-11. StorageTek Optional Interfaces—Comparisons**

Description	Framework Monitor	L-Series Library Admin	Library Manager
SNMP monitoring from management framework	X		
Launch L-Series Admin from framework	X		
Detailed monitoring and status of individual libraries		X	
Event handling	X	X	X
Library sharing among applications			X
Browser-based GUI		X	
Tape operations: enter, eject, mount, dismount, and query		X	X
Library management: reporting, state and status, configuration, startup, and shutdown.			X
PTP operation			X*
<b>Note:</b> Version 2.0 or higher required.			

## ■ Tape Drive Features

Table 1-12 lists tape drive features.

**Table 1-12. Drive Features**

Drive	Model Number	Feature Code	Interface	Drive Tray
DLT 7000E	977E-001	2010	Single-ended	TX40
DLT 7000E	977E-001	2012	HVD	TX40
DLT 8000	9788-001	2012	HVD	TX40
SDLT 220	SDLT-BR1	BRHV	HVD	TX40
SDLT 220	SDLT-BR1	BRLV	LVD	TX40
SDLT 320	SDLT-321	BRHV	HVD	TX40
SDLT 320	SDLT-321	BRLV	LVD	TX40
Gen1 HP Ultrium - HVD	TLTOP01 <sup>1</sup>	HPHV	HVD <sup>2</sup>	3
Gen1 HP Ultrium - LVD	TLTOP01 <sup>1</sup>	HPLV	LVD/SE	
Gen1 IBM Ultrium - HVD	TLTOP01 <sup>1</sup>	IBHV	HVD <sup>2</sup>	3
Gen1 IBM Ultrium - LVD	TLTOP01 <sup>1</sup>	IBLV	LVD/SE	
Gen1 IBM Ultrium - Fibre Channel	TLTOP01 <sup>1</sup>	IBFC	Fibre Channel	
Gen1 Seagate Ultrium - HVD	TLTOP01 <sup>1</sup>	SGHV	HVD	
Gen1 Seagate Ultrium - LVD	TLTOP01 <sup>1</sup>	SGLV	LVD/SE	
Gen2 HP Ultrium <sup>3</sup> - LVD	LTO2001 <sup>4</sup>	HPLV	LVD/SE	3
Gen2 IBM Ultrium - Fibre Channel	LTO2001 <sup>4</sup>	IBFC	Fibre Channel	3

**Table 1-12. Drive Features (Continued)**

Drive	Model Number	Feature Code	Interface	Drive Tray
T9x40	5	5	HVD	TX40
T9x40	5	5	Fibre Channel	TX40
T9840B	5	5	ESCON <sup>6</sup>	TX40

**Note:**

1. Product design choices are: STK0, HEWY, HTCH, SUN0, and NEC0.
2. For HVD operation, the drive tray may contain a converter card.
3. Drive tray will be determined by drive type availability.
4. Gen2 Ultrium drives:
  - a. For SCSI operation, are LVD interface only; HP models require library firmware 3.03 or later.
  - b. For Fibre Channel operation, require library firmware 3.04 or later
  - c. Product designs are: STK0 and SUN0
5. For T9x40 feature numbers, consult the *T9x40 Tape Drive System Assurance Guide*, Part Number MT5003.
6. For ESCON operation, library firmware must be edition 3.01 or later.



## ESCON

ESCON operation is now available for the T9840B drive *only*; it requires certain considerations that must be taken into account for correct operation.

- Library firmware must be version 3.01 or later
- Client Server Component (CSC) software, version 4.1 or later, must be resident within the host's operating system
- ACSLS (Unix-based server) software, version 6.0.1 or later must be resident within the server's operating system.

Cables and configuration are explained in the *T9x40 Tape Drive Installation Manual*, part 95879.

## Gen2 Ultrium SCSI Drives

Support for Hewlett Packard Gen2 Ultrium (LTO) SCSI drives is provided with library firmware version 3.03 and later.

Gen2 drive/tape specifics include:

1. Use of standard Ultrium cartridges
2. Ability to read/write to Gen1 tape media
3. For SCSI operation, Gen2 drives are only available with an LVD interface
4. A new model code for Gen2 drives—LTO2001 and new feature code—HPLV
5. Cartridge memory remains the same (4 KB) for Gen2 tapes
6. Cartridge Media ID for Gen2 drives is “L2” (200 GB)

The major improvements seen with the Gen2 drives are:

- Increased native capacity of 200 GB or up to 400 GB compressed
- Data transfer rate of 40–80 MB/sec

## Gen2 Ultrium Fibre Channel Drives

Support for IBM Gen2 Ultrium Fibre Channel drives is provided with firmware version 3.04 and later.

Gen2 Fibre Channel specifics include:

1. Use of standard Ultrium cartridges
2. Ability to read/write to Gen1 tape media
3. A new model code for Gen2 drives—LTO2001 and new feature code—IBFC
4. Cartridge Media ID for Gen2 drives is “L2” (200 GB)

The major improvements seen with the Gen2 drives are:

- Increased native capacity of 200 GB or up to 400 GB compressed
- Data transfer rate of 40–80 MB/sec

## ■ Robotic and Major Electronic Components

The library contains a robot, arrays of cells for storing cartridges, DLT/T9x40/Ultrium drives, and a CAP for importing cartridges into or exporting cartridges from the library.

Host commands activate the robot. The library translates the host command into servo commands to direct each motor within the library.

The robot contains three major components:

1. Theta motor (controls lateral movement)
2. Z column motor (controls vertical movement)
3. Hand (controls cartridge movement to/from cells, drives, and CAP)

These components are shown in [Figure 1-1 on page 1-17](#). An illustration of the major electronic components is shown in [Figure 1-2 on page 1-18](#).

The robot moves cartridges from the storage cells by rotating the Z column, moving the hand up and down the Z column, and reaching into a storage cell to grip a tape cartridge.

The robot stores tape cartridges in cell arrays that hold six tape cartridges per array.

The robot also transfers cartridges to/from the CAP and PTP.

The cell arrays are stacked in columns; the columns are arranged in a circle around the robot.

## ■ Pass-thru Port (L700-PTP)

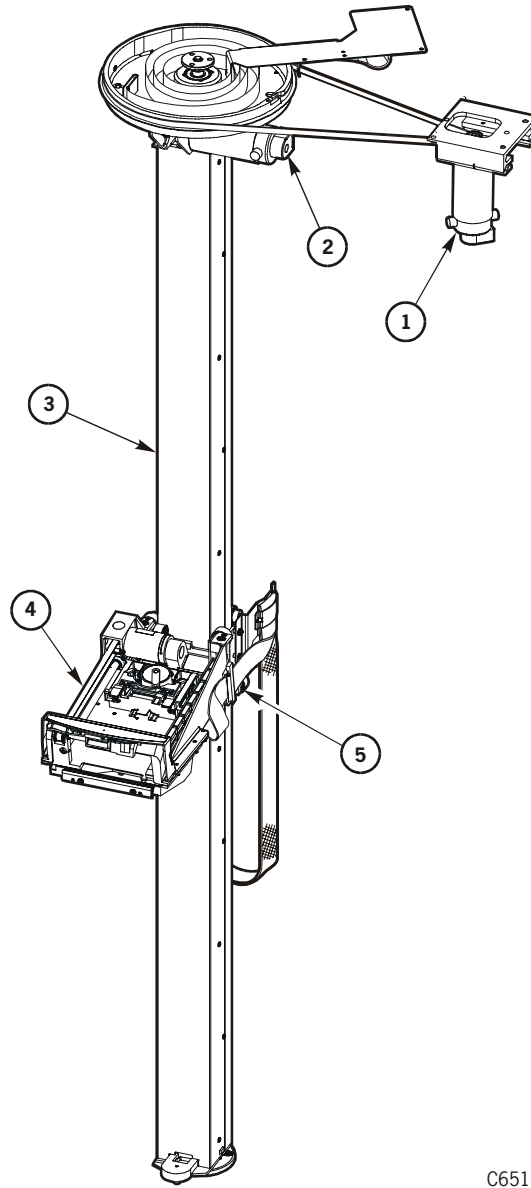
The optional pass-thru port (PTP) allows the transfer of up to two cartridges at a time between two libraries. The library containing the cartridge to be passed is referred to as the “source” library; the library to which the cartridge is passed is referred to as the “destination” library.

The PTP satisfies the operating system’s mount request by transferring cartridges— from a library that has all drives allocated to jobs—to the other library that has an idle drive.

The PTP can only be installed between two L700e models.

Figure 1-1. Robotic Components (C65173)

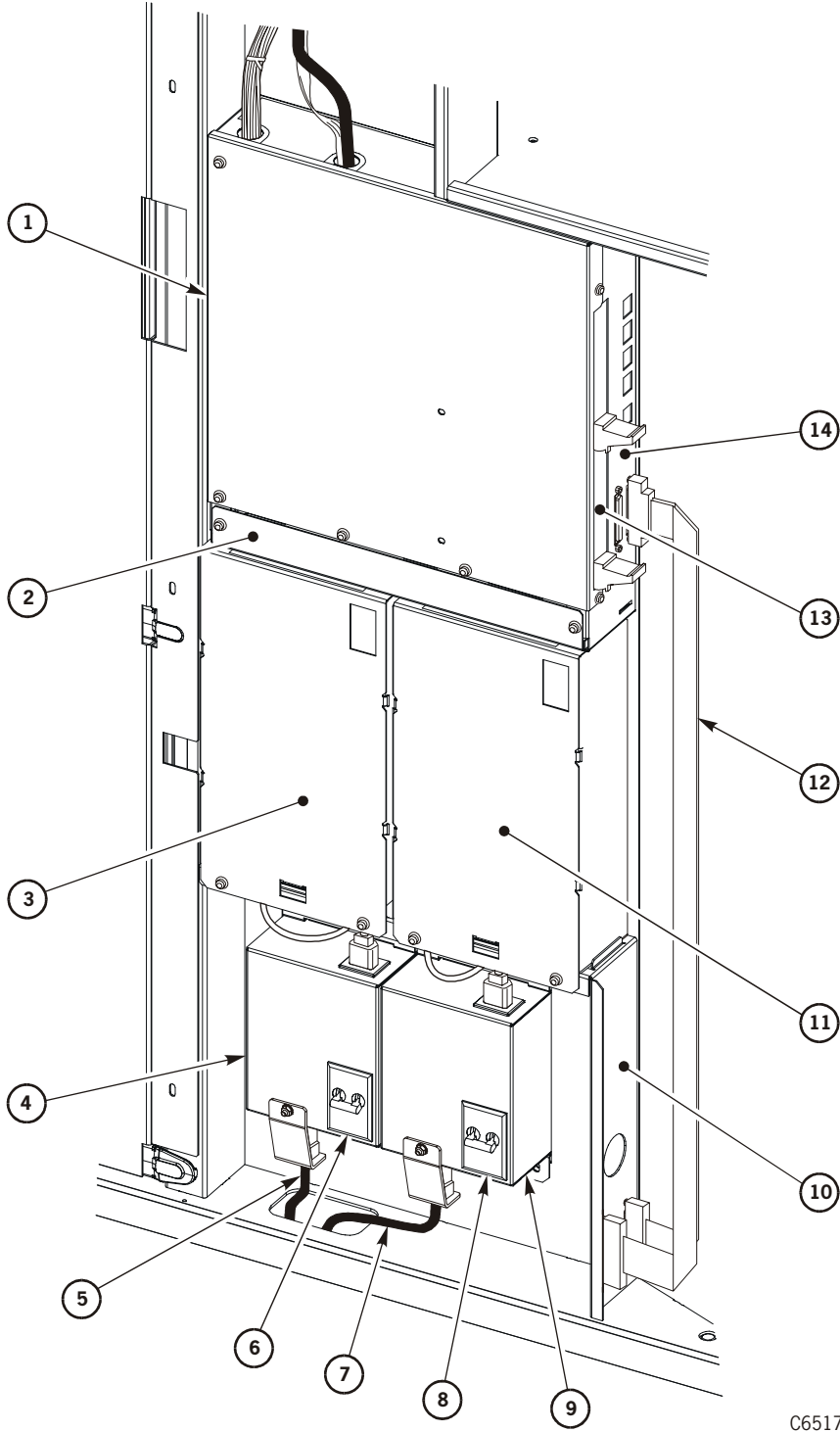
---



C65173

1. Theta motor
  2. Z motor
  3. Z column
  4. Hand-camera assembly
  5. Z carriage
-

Figure 1-2. Major Electronic Components (C65174)



**Figure 1-2. Major Electronic Components (Continued)** (C65174)

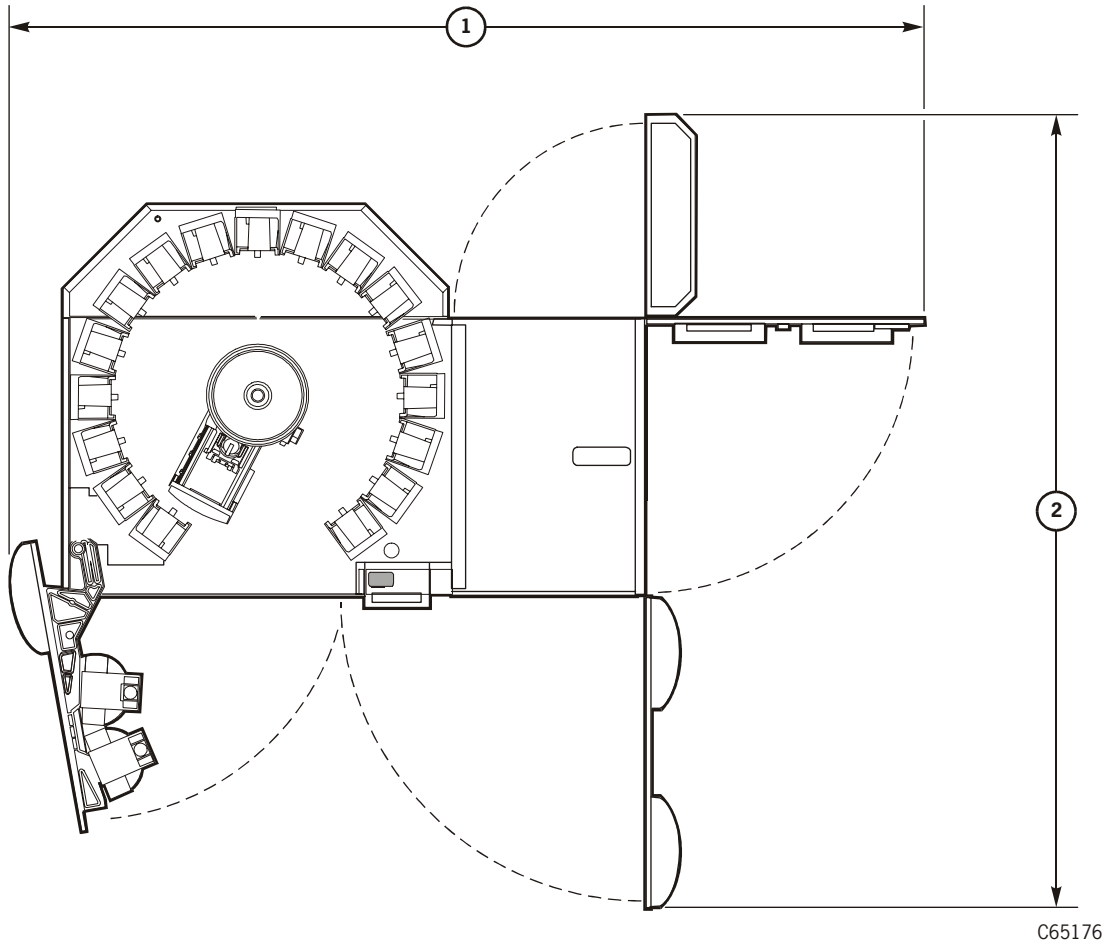
---

1. MPC/MPCL and associated logic cards
  2. Fan tray assembly
  3. Standard DC power supply
  4. Standard AC power distribution unit (PDU)
  5. AC power cable (Standard PDU)
  6. Circuit breaker (Standard PDU)
  7. Optional second AC power cable
  8. Optional second PDU circuit breaker
  9. Optional AC PDU
  10. Bulkhead
  11. Optional second DC power supply
  12. Library-to-client SCSI control cables
  13. Fibre Channel (MPC/MPCL), SCSI SE (MPC only), or LVD/SE SCSI connector (MPCL only)
  14. MPC/MPCL card
-

## ■ Service Clearances

The service clearances for the library are shown in [Figure 1-3](#).

**Figure 1-3. Service Clearances (C65176)**



1. Access door and right side door open: 2.3 m (7.6 ft)
2. Access door and right front door open: 2.1 m (6.9 ft)

## ■ Weight Variations

Table 1-13 lists the approximate weight variations for the library and drives.

**Table 1-13. Weight Variations**

<b>L700-E40</b>	<b>No Drives</b>	<b>10 DLT or Ultrium Drives</b>	<b>20 DLT or Ultrium Drives</b>	<b>12 T9x40 Drives</b>
Weight w/covers	345 kg (761 lbs)	398 kg (941 lbs)	451 kg (995 lbs)	408 kg (901 lbs)
Shipping weight	503 kg (1109 lbs)	See drive manual	See drive manual	See drive manual
Weight (w/ expansion frame)	413 kg (911 lbs)	466 kg (1,027 lbs)	519 kg (1,144 lbs)	476 kg (1,049 lbs)
Weight (w/ expansion frame and tapes)	504 kg (1,111 lbs)	579 kg (1,227 lbs)	610 kg (1,344 lbs)	567kg (1,249 lbs)
Pass-thru Port	Weight with covers: 43 kg (92 lbs)  Shipping weight: 97.5 kg (215 lbs)			

## ■ Power Information

This section lists the power specifications, site power considerations, and power cables for the library.

### Library Power Specifications

Power specifications are listed in [Table 1-14](#).

**Table 1-14. Tape Library Power Specifications**

Power cable	<p><b>U.S./Canada:</b> 100 to 120 VAC UL/CSA power cable</p> <p><b>International:</b> 200 to 240 VAC HAR power cable</p>
Input voltage range	100 to 120 VAC / 200 to 240 VAC
Input current	<p>Tape library: 1.0 A at 120 VAC (0.5 A at 240 VAC) DLT 7000—DLT 8000: Refer to DLT manuals. T9x40: Refer to T9840/T9940 manuals. Ultrium drives: Refer to specific manufacturer's manuals</p>
Power configuration	<p><b>U.S./Canada:</b> Single phase 100 – 120 VAC, 50 to 60 Hz, 15 A Service, 3 wire</p> <p><b>International:</b> Single phase 200 – 240 VAC, 50 – 60 Hz, 10 A Service, 3 wire</p>
Power consumption	<p>Tape library: 120 W DLT 7000—DLT 8000: Refer to DLT manuals T9x40: Refer to T9840/T9940 manuals. Ultrium drives: Refer to specific manufacturer's manuals</p>
Maximum heat output	<p>Tape library only: 410 Btu/hr DLT 7000—DLT 8000: Refer to DLT manuals. T9x40: Refer to T9840/T9940 manuals. Ultrium drives: Refer to specific manufacturer's manuals</p>

### Site Power Considerations

[Table 1-15 on page 1-23](#) lists the maximum number of tape drives that may be installed on a single AC circuit. Maximum configuration of non-PFC drives requires two AC circuits. Please note the differences between the Power Factor Correction (PFC) and non-PFC drive configurations.



Use [Table 1-15](#) to determine:

1. The number of customer drives
2. Whether the drives require locking or non-locking plugs
3. If more than 10 DLT/Ultrium drives or six T9x40 drives are to be installed (Two power cables required)
4. Which AC circuit the customer must supply

**Table 1-15. Maximum Number of Drives on Single AC Circuit**

Voltage	120 VAC <sup>1</sup>				220 VAC <sup>1</sup>			
	15 A		20 A		10 or 15 A (International)		15 A or 20 A	
Phase	Single Phase		Single Phase		Single Phase		Two Phase	
Power Cord Rating <sup>2</sup>	15 A		15 A or 20 A		10 or 15 A (International)		15 A	
Plug Style	Non-locking	Locking <sup>3</sup>	Non-locking	Locking <sup>3</sup>	Non-locking	Locking <sup>3</sup>	Non-locking	Locking <sup>3</sup>
	Maximum Number of Drives				Maximum Number of Drives			
T9x40	12	12	12	12	9	12	9	12
DLT w/ non-PFC	10	10	10	13	5	16	5	20
DLT w/ PFC <sup>4</sup>	16	16	20	20	20	20	20	20

**Notes:** <sup>1</sup> Numbers in this table include library robotics requirements. It is recommended that site power be sized to accommodate expansion to the maximum number of tape drives.

<sup>2</sup> Two power cords are required if over 10 DLT or six T9x40 drives are installed.

<sup>3</sup> Use locking plugs for non-power factor corrected (non-PFC) DLTs mixed with T9x40s or PFC DLTs.

<sup>4</sup> PFC power supplies have less leakage current and lower peak current demand on the AC input. PFC supplies are currently not available.

## Power Cable Part Numbers

The customer must order the power cable and supply the correct receptacle.

Power cables for the tape library are listed in [Table 1-16](#).

**Table 1-16. L700/700e Power Cables**

Input Voltage	Country	If the Library Contains...		
		Only T9x40 drives, newer DLT Drives, Ultrium Drives, or a mixture of T9x40 and newer drives	Older DLT Drives, (with non-PFC power supplies)	Optional Redundant AC power option
100–127 VAC 15 A	U.S./Canada	Nema 5–15P 10083634	Nema 5–15P 10083634	The customer must provide an L5-30R receptacle.
	Japan	JIS 8303 10083649	JIS 8303 10083649	
200–240 VAC 10 or 15 A	Australia	AS 3112 10083650	Locking <sup>1</sup> IEC 60309 10083635	The customer must provide two Hubbell 316R6W receptacles.
	Europe <sup>2</sup>	CEE 7/7 10083646	Locking IEC 60309 10083635	
	Italy	CEI.23 10083651	Locking IEC 60309 10083635	
	South Africa	BS 546 or BS 1363 10083655	Locking IEC 60309 10083635	
	South Korea	KS 8305 10083656	Locking IEC 60309 10083635	
	United Kingdom	BS 1363 10083653	Locking <sup>1</sup> IEC 60309 10083635	

Table 1-16. L700/700e Power Cables (Continued)

Input Voltage	Country	If the Library Contains...		
		Only T9x40 drives, newer DLT Drives, Ultrium Drives, or a mixture of T9x40 and newer drives	Older DLT Drives, (with non-PFC power supplies)	Optional Redundant AC power option
200–240 VAC 10 or 15 A	U.S./ Canada	NEMA 6–15 10083644	Locking IEC 60309 410573502 <i>or</i> NEMA L6– 15P 10083645	The customer must provide two Hubbell 316R6W receptacles.

**Notes:** <sup>1</sup> Use locking plugs for DLTs or DLTs mixed with T9x40s.

<sup>2</sup> Europe includes Germany, Norway, Sweden, Denmark, Finland, the Netherlands, Belgium, France, and Switzerland.

## Library Environmental Specifications

Environmental specifications for the library are listed in [Table 1-17](#).

Table 1-17. Tape Library Environmental Specifications

<b>Temperature</b>	
Operating	15° to 32°C (59° to 90°F)
Storage	10° to 40°C (50° to 104°F)
Shipping	-40° to 60°C (-40° to 140°F)
<b>Relative Humidity</b>	
Operating	20% to 80% (non condensing)
Storage	10% to 95% (non condensing)
Shipping	10% to 95% (non condensing)
<b>Wet Bulb Maximum</b>	
Operating	29.2°C (84.5°F)
Storage	35°C (95°F)
Shipping	35°C (95°F)
<b>Altitude</b>	
Operating	0 to 3.05 km (0 to 10,000 ft)
Storage	0 to 3.05 km (0 to 10,000 ft)
Shipping	0 to 15.24 km (0 to 50,000 ft)

## ■ Maintenance Tools

The required and optional L700/700e maintenance tools are listed in [Table 1-18](#).

### Required Tools

You need the following tools to repair and test check library operations.

**Table 1-18. Required Tools**

Equipment/Tool	Part	Purpose
ESD grounding kit	4711	Provides circuit protection from ESD when handling logic cards or other ESD sensitive components.
StorageTek tool kit	4019	Assorted tools for maintenance services.
Key to front door	3102933xx	Used to open library front door.

### Optional Tools

A detached maintenance device, in the form of a laptop computer, is required to:

- Load firmware for the library and its DLT/T9x40/Ultrium drives.
- Access the fault symptom code (FSC) dictionary. The file name for the dictionary is `fsc`. The FSC dictionary describes a tape library event and lists components that most likely caused the error.
- Connect remotely (through a modem or external cable) to the tape library.

You will also need:

- A small ladder to remove and replace the PTP assembly
- The cover removal tool (part 310229501, included with the PTP installation kit) to remove and replace the MPB controller card.

---

This section explains the firmware operation of the library, its configuration process, and diagnostic test execution.

## ■ IPL Sequence

An IPL occurs when the library powers on or the **RESET** button is pressed. The IPL process consists of functional firmware loading.

## ■ Functional Firmware Loading

After the processor and associated hardware is operational, the functional firmware becomes active in processor memory. Control is turned over to embedded firmware and initialization of robotic mechanisms begins.

## ■ Initialization Process

The MPC/MPCL card directs the initialization process, which consists of the following:

- Initialization and calibration of robotic mechanisms
- Calibration of the vision system
- Motion testing
- Hand-camera assembly testing
- An audit of tapes within the library
- Drive targeting and check for “in flux” condition on DLT drives
- Audit of reserve cells
- Load handle cycling (for DLT drives)

These steps are explained in the sections below.

## Initialize and Calibrate Mechanisms

Robotic mechanism parameters are loaded into processor memory and calibration routines are executed. The initialization process requires a maximum of five minutes. Monitored in this sequence are:

- Reach safe position—the reach mechanism fully retracts and the reach safe sensor *must* be detected before any theta or Z motion is initiated. This prevents possible damage to the hand-camera assembly or a customer tape.

- Z motor calibration—the Z mechanism moves from end-stop to end-stop. The distance and time for this motion is compared against the mechanism parameters within the firmware.
- Theta motor calibration—the theta mechanism moves from theta-stop to theta-stop. The distance and time for this motion is compared against the mechanism parameters within the firmware.

As there are three capacity variations for the library (1/3, 2/3, and full), the library size is also determined during this step.

## Vision Calibration

After calibration of the robotic motors, the robot moves to the vision calibration decal (below drive column 0 at Panel 0). Thresholds for the line scan camera are:

- Target—readability and accuracy of the target image for locating array positions
- Bar code—readability and accuracy of bar code information

**Note:** The camera is operational:

- During initialization
- During audit
- When tapes are imported into a CAP

During normal operation, the camera is turned off and tapes are located by referencing the VOLSER and cell location within the MPC/MPCL card memory.

## Hand-Camera Assembly Testing

Calibration and testing of the hand-camera assembly is accomplished near the vision calibration decal. The proximity sensor is aimed at the decal and tested to be “on.” The hand is then moved away from the decal and the sensor is tested to be “off.”

The gripper mechanism is extended to test for proper opening and closing.

## Pass-thru Port Initialization

The MPC/MPCL card will detect if an MPB card is installed. If so, the PTP is automatically configured (this can be seen by the operator panel displaying L700e instead of L700). The PTP will initialize by moving from end stop-to-end stop.

## Audit

The audit process requires a maximum of five minutes.

### Audit Definition

An audit is the process of checking each cell within a library. If a cell contains a tape, the camera reads the VOLSER and transfers this data to the MPC/MPCL card. The MPC/MPCL card calculates the robotic position of the hand-camera assembly (by referencing the theta and Z positions) and catalogs the tape location by:

- VOLSER
- SCSI element number or Panel, row, column

If a customer cell is empty, the location is recorded as “cell empty.” The reserved cells (explained below) are checked for cleaning cartridges (which will automatically configure the auto clean option) and for diagnostic test cartridges.

When all customer and reserved cell locations are read and cataloged, the library audit is complete. *However*, the library audit information must be requested by the client system to update its tape volume database. This update only requires the MPC/MPCL card to download the audit information to the client; no robotic audit is required.

This two-step process—library audit and host update—ensures that both the library and client have current (and identical) listings of the library contents.

**Note:** Cartridges left in drives will not be audited. However, volume information is retained for drives loaded by the library.

### Audit Conditions

An audit begins when:

- You power-on the library
- You open and close the library access door
- A system request to audit is entered at the host console

## Drive Targeting

For targeting, the robot moves to each drive and calculates the position of the drive’s target. This ensures accurate and quick loading of tapes during machine operation. For DLT drives, the load handles are checked for “in flux” conditions. Any handles found to be in flux will be lowered by the MPC/MPCL library controller.

## Audit of Reserved Cells

The robot audits the 12 cells of the reserved area, located below CAP B (for libraries with two CAPs) or below the front viewing window (for libraries with one CAP). This area is explained below. If there are no DLT drives within the library, this is the final initialization step.

## Load Handle Cycling

If DLT drives are present and they require cycling of the load handles, all handles are raised to the loading position.

## ■ Reserved Cells

The reserved cells, located within the library's left access door, are composed of two types: a single, in-transit cell and diagnostic/cleaning cells. These are described below.

### In-transit Cell

In [Figure 2-1 on page 2-5](#), the top cell is reserved for in-transit cartridges and used as a drop-off cell. Do *not* place a cartridge into this cell. This cell has two functions:

1. It allows the robot to swap tapes within the library.
2. Under the following conditions, it may also be used as a drop-off cell if the robot has a cartridge in the hand/camera assembly and the library loses power:
  - the cartridge cannot be returned to its source cell
  - the cartridge cannot be placed into its destination cell
  - during such a power-off condition, the cartridge will *never* be placed into a drive

When power is restored, the robot automatically places this cartridge into the drop-off cell as part of the robotic initialization sequence.

### Diagnostic/Cleaning Cells

Depending on your customer's system operation, they may place any type of cleaning or diagnostic cartridge into the other 11 cells. Alternately, these 11 cells may be left empty. See the Caution below.

#### **CAUTION:**

**Do *not* place production tapes into these cells. The reserved cells are limited to cleaning and diagnostic cartridges only.**

**Ask the customer if the auto cleaning option is desired. If client software supports this option, you may place cleaning tapes in the lower 11 cells. When the robot detects cleaning cartridges, the library will automatically configure auto cleaning.**

**If auto cleaning is not desired, do not place cleaning tapes in these cells.**

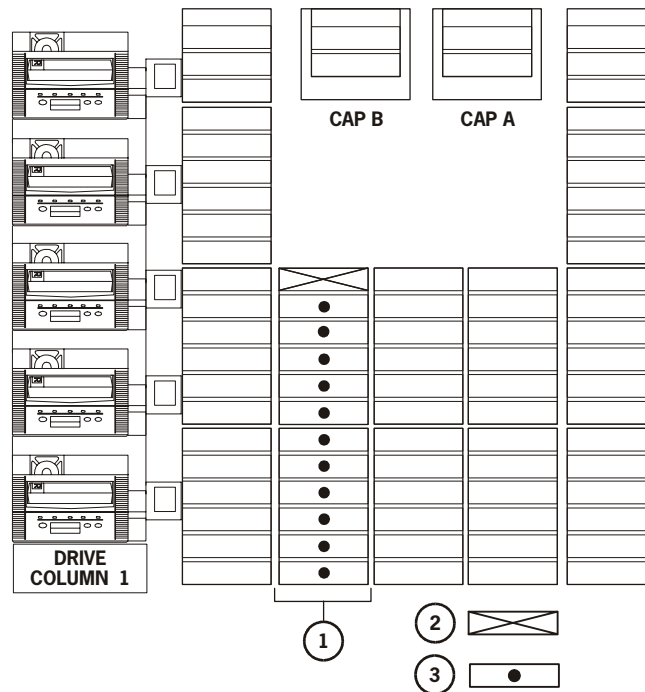
To manually install diagnostic and cleaning cartridges:

**Note:** Diagnostic cartridges *must* be installed manually; cleaning cartridges may be installed manually or may be imported through the CAP.



1. Open both the right and left front doors of the library.
2. Be sure the top reserved cell is empty.
3. Insert the desired cleaning/diagnostic cartridges into any of the other 11 cells.

**Figure 2-1. Reserved Cells (C65038)**



C65038

1. In-transit cell (Leave empty)
2. Location of reserved cells
3. Diagnostic/Cleaning cartridges

## ■ Updating Firmware

Library firmware is factory-installed on all new machines. It resides within a Flash PROM chip on the MPC/MPCL controller card for the L700e library and within the MPB Pass-thru Port (PTP) controller card for the PTP.

### **CAUTION:**

**Possible component damage:** Updating firmware for libraries connected by a PTP requires a special process. If this process is not followed, you could damage the MPC/MPCL and MPB cards.

## Pass-thru Port

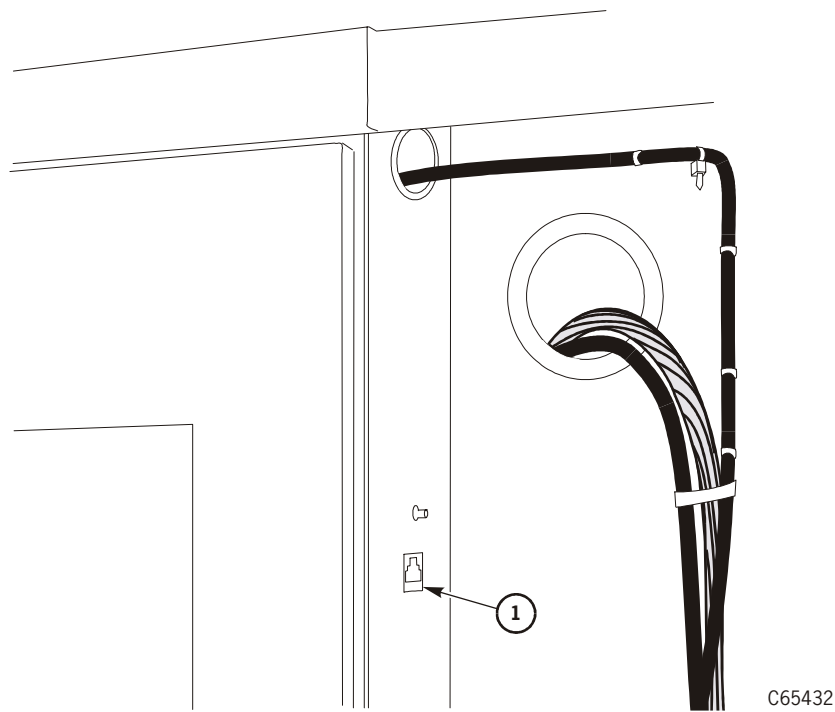
Carefully read the procedures below and consult the “readme” file that accompanies the firmware before downloading firmware to libraries connected by a PTP. If not followed, you could damage the MPC/MPCL card. Each library monitors the other library’s door switch—if one library door is opened during the firmware download, this will cause an interruption to the procedure and cause damage to the MPC/MPCL card.

**CAUTION:**

**Controller card damage:** The location of the command line interface (CLI) port has changed with edition 3.00 and later firmware. It is now designated the CSE port (J30) on the MPC/MPCL card.

To load only the MPB firmware, you must use the CLI port (designated as the CSE port) in the Master library’s door frame. If you are unfamiliar with the location of this port, open the right door on the Master library. See [Figure 2-2](#) for the location.

Figure 2-2. MPB Firmware Port, Master Library (C65432)



1. CSE (CLI) port for MPB firmware

You can download MPC/MPCL and MPB firmware from the Customer Resource Center (CRC) Web site at <http://www.support.storagetek.com/>. Click “Tape Storage,” then “L700,” and finally “Code.” Select the file you need based upon:

- Whether you are updating the MPC/MPCL or MPB firmware

- The download procedure you wish to use

## Download Methods

There are four methods you can use to download firmware.

1. SCSI Write Buffer command—directions for this method can found on the CRC Web site:
  - Log-in to the CRC
  - Select “Product Information”
  - Select “Current Products”
  - At “Choose a Product Family,” scroll down, select “Tape and Tape Automation,” and click Next
  - Select “L700 Tape Library”
  - Select the *L700/180 Tape Libraries Interface Reference Manual*
  - Refer to the information in the Write Buffer command (3Bh)
2. SCSI toolbox—consult the SCSI Toolbox manual on the CRC Web site for directions:
  - Under Support Tools, click “CS Tools.”
  - Then “Docs”
  - Then “SCSI/Fibre Toolbox User’s Guide.”
3. StorageTek L-Series Library Admin—refer to the CRC Web site for “StorageTek L-Series Library Admin” purchasing and ordering information for this feature.
4. L700e command line interface (CLI) ports for the MPC/MPCL (see [Figure A-8 on page A-26](#) and [Table A-11 on page A-26](#)) or MPB card (located in the door frame of the master PTP library).

Methods 1 through 3 allow loading of MPB firmware through the MPC/MPCL card *only*. Method 4 is the *only* method that can be used to directly load MPB firmware.

## Download File Types

Before using one of the methods described in the section above, determine which firmware file type you wish to download:

- For MPC/MPCL firmware only, use the **mpcxyyzz.prm** file.
- For MPB firmware only, use the **mpbxyyzz.prm** file; this file is loaded through the CSE port (CLI) that is located in the door frame of the Master PTP library. This port is for the MPB card only and firmware editions 3.00 or later.
- For both the MPC/MPCL and MPB cards, use the **mpcxyyzzmpbxyyzz.prm** file. This loads the MPC/MPCL firmware first, then the MBP firmware.

Consult [Table 2-1 on page 2-8](#) for your download options.

**Table 2-1. Firmware Download Options**

From Version <sup>1</sup>	To Version			
	MPC 2.xx (Version 1 header)	MPC 3.00 and 3.01 (Version 1 header)	MPC 3.02 or later (Version 2 header)	MPC 3.xx <i>and</i> MPB 1.xx file (Version 2 header)
MPC 2.xx	Lib Admin, SCSI, and MPC CLI port using MPC release.prm file	Lib Admin, SCSI, and MPC CLI port using <b>mpcxyyzz.prm</b> file <sup>2</sup>	Lib Admin, SCSI, and MPC CLI port using <b>mpcxyyzz.prm</b> file	N/A
MPC 3.xx	Lib Admin, SCSI, and MPC CLI port using MPC release.prm file	Lib Admin, SCSI, and MPC CLI port using <b>mpcxyyzz.prm</b> file <sup>2</sup>	Lib Admin, SCSI, and MPC/MPCL CLI port using <b>mpcxyyzz.prm</b> file <sup>2</sup>	Lib Admin, SCSI, and MPC/MPCL CLI port using <b>mpcxyyzzmpbxyyzz.prm</b> file <sup>3</sup>

**Notes:**

1. 2.xx release.prm files used a Level 1 download header. For compatibility, 3.00 and 3.01 firmware use a Level 1 header also. Version 2.xx to 3.02 allow both Version 1 and 2 headers to be loaded into an MPC card. This allows 2.xx firmware to load 3.00 firmware. Version 3.00 or later firmware can accept either a Level 1 or 2 download header.  
Starting with 3.00 and later, a Version 2 header will be used to ensure the correct loading of files into the MPC card. The MPCL card allows only a Version 2 header file to be loaded and thus requires 3.02 or later firmware.
2. Where **mpc** or **mpb** are the card designators and “xyyzz” is the firmware revision: “x” denotes the major revision number, “yy” is the minor revision number, and “zz” is the build number. For example, MPC revision 3.01.24 would be represented as **mpc30124.prm**.
3. An **mpcxyyzzmpbxyyzz.prm** file can only be loaded into an L700e library pair joined by a PTP. If a PTP is not present and functional, the download will fail.

## Recommended Download Sequences

Since downloading firmware to multiple processor cards in new, the recommendations and cautions are made below.

**CAUTION:**

***Controller card damage:* Be sure that all activity in both libraries is quiesced before starting either procedure or controller card damage will occur. Do *not* open and close a library’s access door during the procedure. Do *not* press the operator panel’s RESET button on either library until the operator panel indicates to do so.**

## Separate Controller Card Method

One method is to load firmware to the MPB card first, then the Master's MPC/MPCL card, and finally the Standby's MPC/MPCL card.

For two L700e libraries with a PTP installed:

1. Download the MPB firmware first, then the MPC/MPCL firmware:
  - a. Load the MPB card firmware (**mpbxyyzz.prm** file) first through the MPB CLI port.
  - b. In the *Master* library, load the MPC/MPCL firmware (**mpcxyyzz.prm** file) through the CSE port on the MPC/MPCL card.

**Note:** Do *not* IPL the Master library at this point.

- c. In the *Standby* library, load the MPC/MPCL firmware (**mpcxyyzz.prm** file) through the CSE port on the MPC/MPCL card.
- d. After firmware loading in both libraries is completed, press RESET on both library operator panels.

## Combined Controller Card Method

A second method is to load firmware to the MPB and Master library's MPC/MPCL card first, then load the firmware to the Standby library's MPC/MPCL card.

For two L700e libraries with a PTP installed:

1. Load the Master MPC/MPCL card and the MPB card using the **mpcxyyzzmpbxyyzz.prm** file.
2. Load the Standby MPC/MPCL card using the **mpcxyyzz.prm** file.

## Firmware Editions

After copying the firmware to your personal computer (PC), you must also have the following to download the firmware to the MPC/MPCL card:

- An RJ45 cable (part 4108289xx)
- An RJ45—DB9 adapter (part 10410823) or CSE DOS Diagnostic cable (part 24100134).

## Firmware 2.xx

With 2.xx firmware, there are two ways to download MPC/MPCL firmware:

1. The DOS method—requires approximately 20 minutes.
2. The Hyperterminal method—requires only eight minutes.

The Hyperterminal method is the preferred method since it requires less download time and also because it will be the only method available for many future libraries.

## Firmware 3.00 and Later Download Times

With firmware edition 3.00 or later, you can *only* use the Hyperterminal method to download firmware to the library.

Download times vary, depending upon which controller card is being upgraded:

- MPC/MPCL only (**mpcxyyzz.prm** file) requires eight minutes
- MPB only (**mpbxyyzz.prm** file) requires three minutes
- MPC/MPCL and MPB (**mpcxyyzzmpbxyyzz.prm** file) requires 33 minutes

## CLI Port - DOS Method

To download the firmware:

1. Connect the RJ45 serial cable to the CSE port on the MPC/MPCL card.
2. Open a DOS window on your PC.
3. Create a directory on the C drive (`mk dir`).
4. Insert the firmware diskette into the personal computer.
5. Change to the directory on the diskette drive (`cd directory name`).
6. Copy the `flash97.exe` program *and* the firmware file `release.prm` to the directory you created on the C drive (`copy flash.exe c:/directory name` and `copy release.prm c:/directory name`).
7. From the directory on your personal computer, type in:  

```
flash97 release.prm
```
8. When prompted, enter the port number being used on the personal computer (generally port 1) and press <Enter> (or return).

### CAUTION:

***Equipment Damage: Do not attempt to do perform any operations on the personal computer or library until the operator panel displays DOWNLOAD COMPLETE. Damage to the MPC/MPCL or MPB processor cards may occur if you do not wait for the process to complete.***

9. After several seconds, the personal computer will display and update the number of bytes being sent. The download takes about 20 minutes.
10. The L700e operator panel will display DOWNLOADING.

11. After the personal computer displays FILE TRANSFER COMPLETED SUCCESSFULLY, the operator panel will display DOWNLOAD COMPLETE. *Wait for this sequence to complete.*
12. Activate the firmware by pressing the RESET button on the operator panel.

**Note:** The fault symptom code (FSC) dictionary is also contained on this firmware diskette. The file name is `fsc.txt` and, when proper security safeguards are followed, this file may also be copied to a file on your personal computer.

## CLI Port - Hyperteminal Method

**Note:** This method is *only* valid with firmware version 2.20 and later and the only method for 3.00 and later firmware.

### CAUTION:

**Controller damage:** To use this method for a single library, the library must be fully initialized and the access door must be closed.

**Controller damage:** To use this method for a PTP library, both libraries must be fully initialized and both access doors must be closed.

It is best to read through this procedure first before attempting it since there is a *two minute time limit* after step 5.

To download the firmware:

1. Copy the `release.prm` firmware file to the directory you created on the C drive (copy `release.prm` or `abcxyzz.prm` `c:/directory name`)
2. Attach your PC to the Command Line Interface (CLI) port:
  - Labeled CSE on the MPC/MPCL card
  - Labeled CSE on the door frame of the Master library for the MPB *only*).
3. From your PC:
  - a. For older machines, go to Start → Programs → Accessories → Hyperterminal and open a Hyperterminal session.
  - b. For WIN2000 machines, go to Start → Programs → Accessories → Communications → Hyperterminal and open a Hyperterminal session.

4. Within the `file` properties, configure the connection as follows:

**Table 2-2. Hyperterminal Connection**

Older PCs	WIN2000 PCs
Baud rate = 38,400	Baud rate = 38,400
Data bits = 8	Data bits = 8
Parity bit = None	Parity bit = None
Stop bit = 1	Stop bit = 1
Direct to comm flow = none	Hardware flow control = xon/xoff

Click on **OK**.

5. In the Hyperterminal window, click on **ENTER**.

The `CLI>` prompt will appear.

6. Type in: `download` and press the `Enter` key.

A message will appear stating that you have *two minutes* to begin sending the new firmware version.

7. At the top of the window, find the **TRANSFER** button and point to **SEND FILE**.

A box will appear, allowing you to browse to the file location of the firmware you copied in step 1.

8. Double click on `release.prm`.

The `SEND FILE` box will appear, showing the pathname and the protocol chosen. Protocol should be set to `Z-MODEM`.

9. Click on **SEND**.

The status window for the transfer will appear.

**CAUTION:**

***Equipment Damage:* Do not attempt to perform any operations on the personal computer or libraries until both operator panels display `DOWNLOAD COMPLETE`. Damage to the MPC/MPCL or MPB processor card may occur if you do not wait for the process to complete.**

**If, for any reason, the download does not complete successfully, ensure that the `xon/xoff` setting is valid for the current Hyperterminal session, then retry the download immediately. Do *not* reset, power cycle, or open a library access door.**

10. *Wait* for the following prompt: `Reboot 'yes' ?`



**Notes:** If you have downloaded firmware only to the MPB card, it will reboot automatically and will not prompt you to reboot.

If you downloaded the **mpcxyzzmpbxyzz.prm** file, the Master library must be reset or power cycled before the MPB firmware is activated.

Respond with **'yes'** to reboot the machine and activate the firmware. (Or you may power cycle or IPL the library to activate the firmware.)

If you do not reboot, power cycle, or IPL the library to activate the new firmware, the old firmware version will remain active. When the next reboot, power cycle, or IPL occurs, the new firmware will become active.

When the reboot is complete, verify that the version is correctly listed on the operator panel.

The fault symptom code (FSC) dictionary is also contained on this firmware diskette. The file name is "fsc" and, when proper security safeguards are followed, this file may also be copied to a file on your personal computer.

## ■ Emergency Code Load Instructions

If the functional firmware load has failed, corrupting the MPC/MPCL card's function, the mini-boot firmware may cause one of two messages to be displayed on the operator panel:

1. DOWNLOAD WAITING FOR CONNECTION
2. USING ZMODEM CSE PORT 38400 DOWNLOAD WAITING FOR CONNECTION

If no display is present, the MPC/MPCL card must be replaced

If either of the first two messages above are displayed, follow the directions in the corresponding sections below to download firmware into the MPC/MPCL card.

### “Download Waiting for Connection” Message

When preparing to download firmware, if the operator panel displays **DOWNLOAD WAITING FOR CONNECTION**, the MPC/MPCL card contains the flash97 boot file. To upgrade the card:

1. Using flash97, load the 2.36 L700/180 **release.prm** file
2. Using hyperterminal and Z-modem protocol:
  - a. load the latest **mpcxxxxx.prm** functional firmware file
  - b. load the **mpcbootxxxxx.prm** mini-boot firmware file

## “Using Z-modem CSE Port 38400 Download Waiting for Connection” Message

When preparing to download firmware and the operator panel displays Using Z-MODEM CSE PORT 38400DOWNLOAD WAITING FOR CONNECTION, upgrade the card by:

1. Using Hyperterminal and Z-modem protocol, load the latest **mpcxxxxx.prm** functional firmware file. While the file is loading:
  - a. If the operator panel displays CODE LOAD IN PROGRESS, then a 30200 or later mini-boot file is installed on the card and there is no need to perform step 2 of this procedure.
  - b. If CODE LOAD IN PROGRESS, is *not* displayed, proceed to step 2 of this procedure.
2. Using Hyperterminal and Z-modem protocol, load the latest **mpcbootxxxxx.prm** file

## ■ Configuration

The following sections describe both methods of entering configuration information. [Figure 2-3 on page 2-17](#) and [Figure 2-4 on page 2-18](#) show the capacity variations and configuration options available.

The tape library and its associated tape drives must be configured:

- At installation time
- When the MPC/MPCL logic card is replaced.
- When a tape drive is added or deleted from the library

You configure the tape library and its associated drives through the use of the operator panel.

Configuration data is used by the library firmware for host connection, tape library capacity, panel types, and for the number and types of drives.

## ■ L700/700e Capacity Variations

The capacity variations available for the L700/700e are listed in the tables below.

Figure 2-3 on page 2-17 and Figure 2-4 on page 2-18, illustrate these configuration options.

**Note:** These variations are automatically configured at IPL time. The firmware configures the size of the library by the positions of the theta stops.

For libraries joined by a PTP, you must subtract six cells from each library; a six-cell array is removed from each library for PTP operation.

Refer to [Appendix A, “Theory of Operation,”](#) for cell (element) locations.

**Table 2-3. Capacity Variations—1 Drive Column**

Standalone Library		Single Library with PTP*	
Size	Capacity	Size	Capacity
1/3 (①)	216 cells	1/3 (①)	210 cells
2/3 (②)	384 cells	2/3 (②)	378 cells
Full (③)	678 cells	Full (③)	672 cells

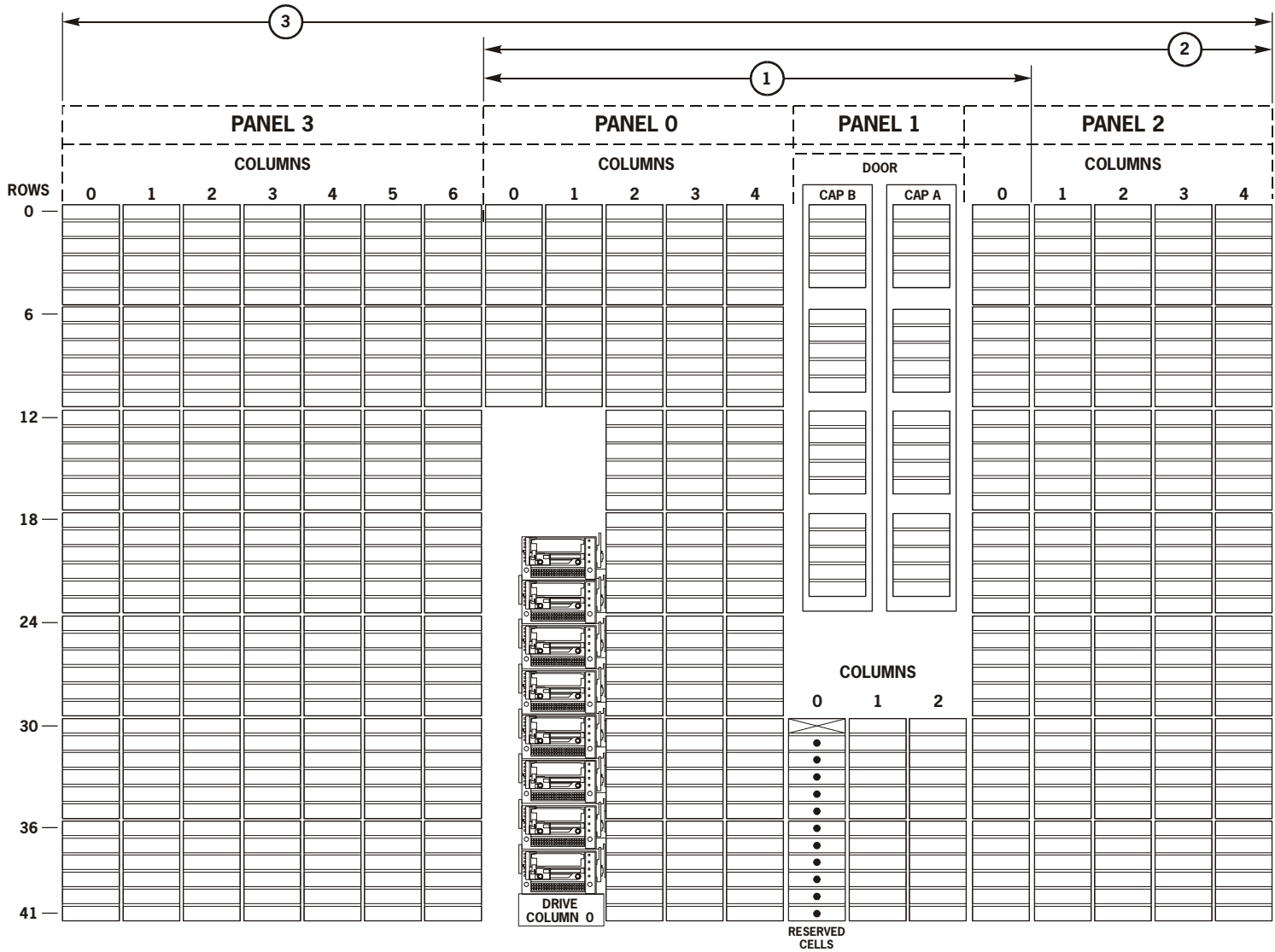
**Note:** These are the capacities of *each* PTP library; double these numbers for the combined total.

**Table 2-4. Capacity Variations—2 Drive Columns**

Standalone Library		Single Library with PTP*	
Size	Capacity	Size	Capacity
1/3 (①)	156	1/3 (①)	150
2/3 (②)	324	2/3 (②)	318
Full (③)	618	Full (③)	612

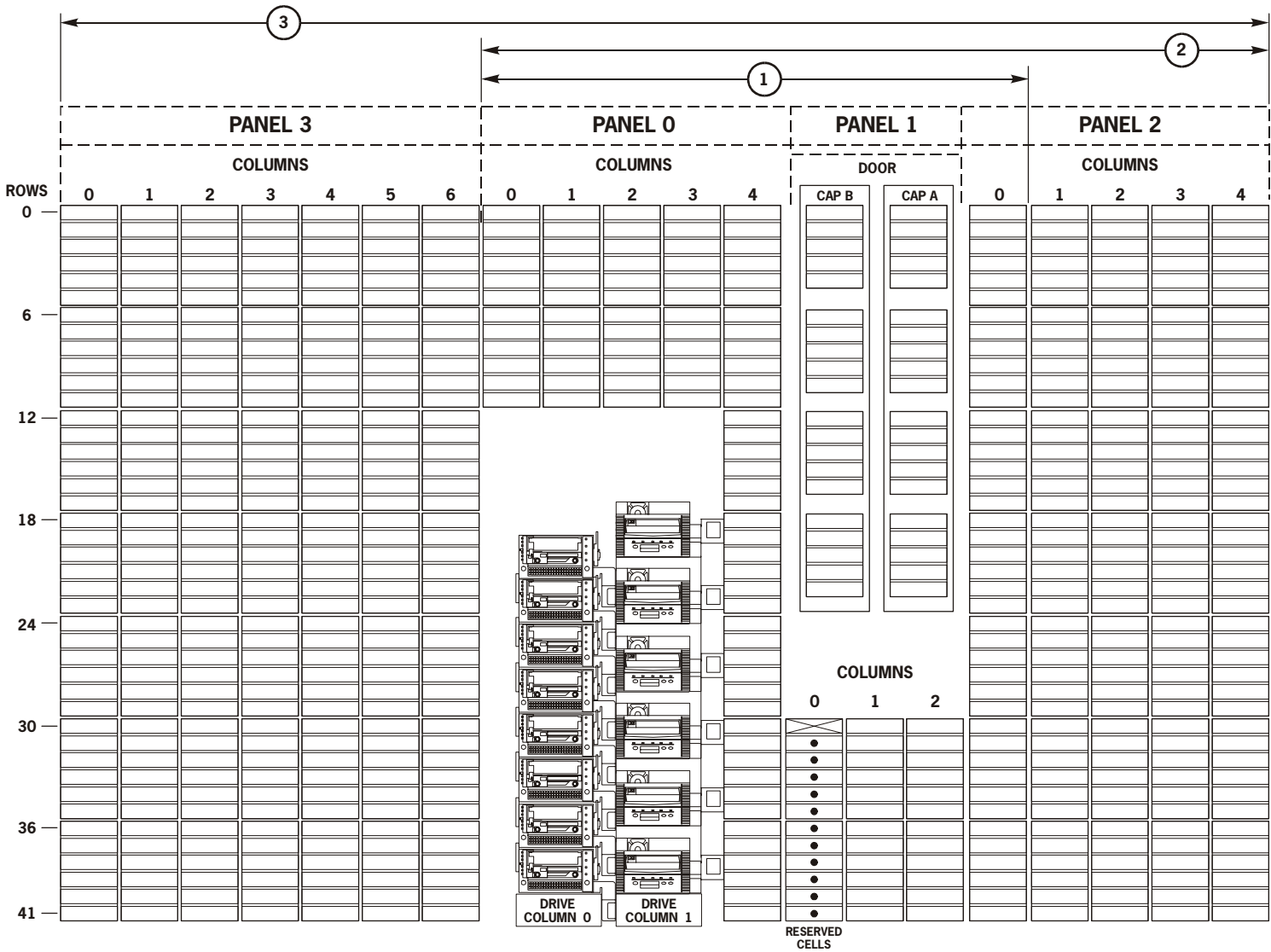
**Note:** These are the capacities of *each* PTP library; double these numbers for the combined total.

Figure 2-3. Capacity Variations—1 Drive Column (C65089)



C65089

Figure 2-4. Capacity Variations—2 Drive Columns (C65090)



C65090

## ■ Operator Panel Entry

You can enter all configuration data through the operator panel. If you have installed the StorageTek L-Series Library Admin, you can also enter some configuration data through a workstation or a PC that contains a Netscape or Microsoft browser. For more information, access the online help files for the StorageTek L-Series Library Admin.

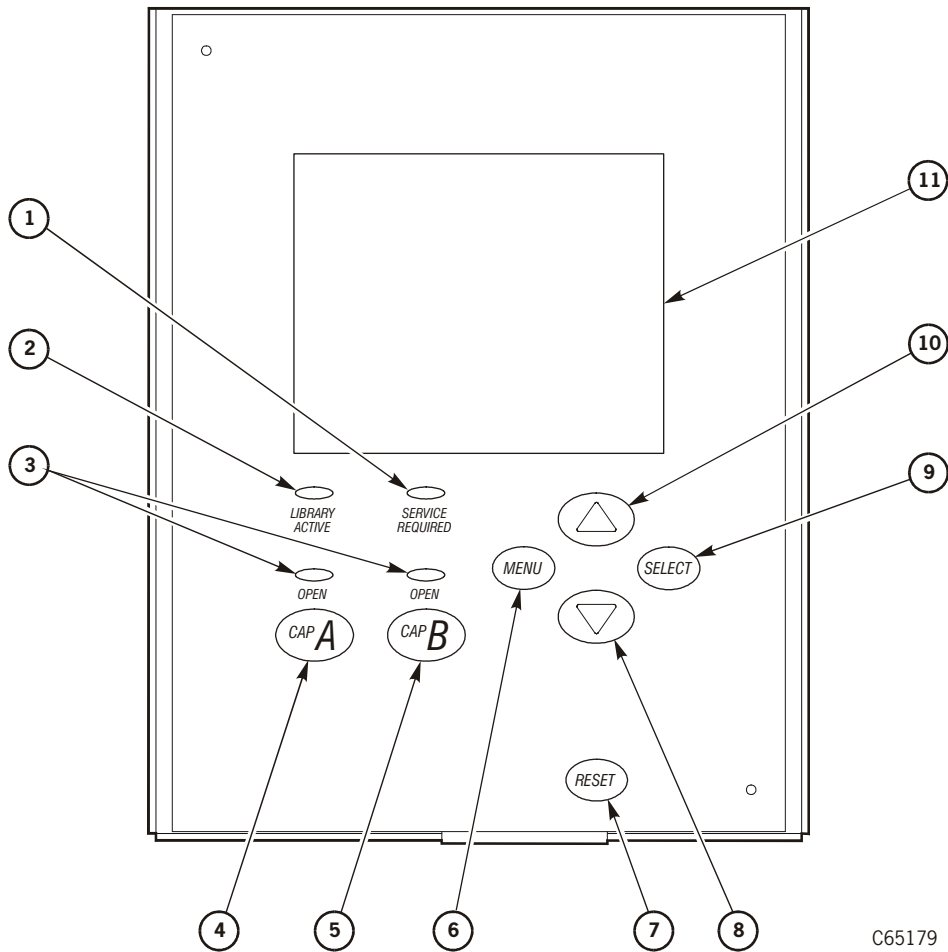
The following sections describe the operator panel procedure.

### Operator Panel Navigation

This operator panel function buttons are explained below. Refer to [Figure 2-5 on page 2-20](#) for an illustration of the operator panel. The buttons you will use for configuration are:

- Up arrow—moves the cursor up the display or scrolls up the display
- Down arrow—moves the cursor down the display or scrolls down the display
- **SELECT**—selects the item in the menu
- **MENU**—initially places you into the Main Menu screen or, if you are already within a sub-menu, returns you to a previously selected screen

Figure 2-5. Operator Panel (C65179)



C65179

1. *SERVICE REQUIRED* indicator: On steadily = library inoperative; blinking = fan failure
2. *LIBRARY ACTIVE* indicator
3. CAP A/B Open indicator
4. CAP A open/close button
5. CAP B open/close button
6. MENU button
7. RESET button
8. Scroll down button
9. SELECT button
10. Scroll up button
11. Menu display screen

## Library Information

Before starting the configuration procedure, read the explanations in this chapter, determine your selections, and write your configuration information into [Table 2-5](#) and [Table 2-6](#) on page 2-22.



**CAUTION:**  
**System Degradation:** Make sure that the library and associated drives are offline to the system before starting configuration.

## Configuration Tables

Fill in the tables below with the options you selected for the library and drive configurations.

Table 2-5. Library/Network Configuration Record

<i>Configuration Option</i>	<i>Selection</i>
Auto Clean enabled or disabled	
T9840 cleaning cartridge warning count	
T9940 cleaning cartridge warning count	
DLT cleaning cartridge warning count	
Hewlett Packard Ultrium cleaning cartridge warning count	
IBM Ultrium cleaning cartridge warning count	
Seagate Ultrium cleaning cartridge warning count	
Date	
Ethernet address	Not configurable: pre-set at the factory
Fast Load enabled or disabled	
IP address	
Library capacity	Automatically configured during IPL
Library name	
Library SCSI ID	
Library SCSI type	Automatically configured during IPL
Library Worldwide ID	Not configurable: pre-set at the factory
Network gateway address	
Pass-thru Port	Automatically configured during IPL. Libraries connected with a PTP will display L700E on the operator panel.
Port 0 Address (library)	

**Table 2-5. Library/Network Configuration Record (Continued)**

<b>Port 0 Worldwide ID (library)</b>	Not configurable: pre-set at the factory
<b>Subnet netmask address</b>	
<b>Domain Name Service (DNS)</b>	Configured only if SNMP maps library names to IP addresses
<b>Dynamic Worldwide Name</b>	Configured to enable dynamic rather than static names
<b>Simplified Network Management Protocol (SNMP)</b>	Configured after general configuration is completed; see <a href="#">Appendix B, “SNMP”</a>
<b>Time</b>	
<b>Web password</b>	

**Table 2-6. Drive Configuration Selections**

<b>Drive #</b>	<b>SCSI or Fiber ID*</b>	<b>On or Off Bus</b>	<b>Drive #</b>	<b>SCSI ID or Fiber ID*</b>	<b>On or Off Bus</b>

**Note:** You cannot set any configuration data at the operator panel for T9x40 drives running on Fibre Channel. You may, however, set an LTO Fibre Channel drive’s address to either a hard address of 0 or allow the arbitrated loop ID to be set automatically.

## Library Entries

Four entries are required for a library—other entries will vary with your options:

1. Library SCSI ID or Fibre Channel Port 0 address
2. Drive Fast Load enable/disable

3. Date

4. Time

**Note:** The procedures below assume that you will make all entries during one, operator panel entry session. Each item is saved as it is changed, *except* for the library's SCSI ID or Fibre Channel Port 0 address: to save a revised library SCSI ID, you must reset the library by pressing the **RESET** button.

## Setting the Library's SCSI ID

If the control path for the library is SCSI, you must enter the library's SCSI ID at the operator panel from the Lib SCSI I/F Config Menu.

**Note:** The information below explains special circumstances for selecting a SCSI ID (address) for the library:

- When configuring the library to a Unix-based workstation, StorageTek recommends that you use a dedicated SCSI client host bus adapter (HBA):
  - For wide SCSI adapters, you may assign any address from 0 to 14 for the library.
  - For narrow SCSI adapters, the range of addresses is 0 to 6.
- If you choose to use the embedded system bus on the SPARC station, select address 6, 5, 2, or 0 for the library; the remaining targets are reserved for Sun peripherals.
- For IBM RISC System/6000 machines, available addresses on the embedded system bus are 6, 5, 3, and 2.
- If the customer is using Automated Cartridge System Library Software (ACSLs), its level must be Version 5.3.2 or later
- If the library contains a PTP, the ACSLS level must be Version 6.0 or later and contain the special program enhancement for PTP operation.
- If the library contains T9840B drives running on ESCON channels, the ACSLS level must be Version 6.0.1 or later.

To set the library's SCSI ID:

1. From the online status screen, press the **MENU** button.

The Main Menu will display.

2. Press the down arrow button until the cursor underscores **CONFIGURATION**.

3. Press the **SELECT** button.

The Main Configuration Menu will appear and the cursor will line up with **LIBRARY CONFIG**.

4. Press the **SELECT** button .

The Lib Config Menu will appear and the cursor will line up with LIB SCSI I/F CONFIG.

5. Press the **SELECT** button.

The Lib SCSI I/F Config Menu will appear. (This menu also displays the type of SCSI interface: differential or single-ended.)

6. Press the arrow buttons until the cursor underscores SCSI ID.

7. Press the **SELECT** button.

The Set Lib SCSI ID Menu will appear.

8. Press the up and down arrow buttons to select the correct ID.

9. Press the **SELECT** button to save the changes. (You may press the **MENU** button to abort.)

10. If the library SCSI ID is the only configuration value you wish to set at this time, press the **RESET** button. If you wish to set other configuration values before you reset the library, continue with the next section.

## Setting the Library Fibre Channel Port 0 Address

If the control path for the library is Fibre Channel, you must set the Library's Fibre Channel Port 0 address. The library Fibre Channel Port 0 address locates the library's Port 0 on the Fibre Channel loop. Set the library Fibre Channel Port 0 address from the Lib Fibre I/F Config Menu.

**Note:** Before you enter a Port 0 address, you must first set the library's Fibre Channel hard address option to *enabled*.

If you configure the library for soft addressing, you are allowing the network's software to configure the Port 0 address. For this addressing approach, you must set the Fibre Channel hard address option to *disabled*.

The default for the hard address option is *disabled*.

Consult with the system administrator before selecting the library's Port 0 addressing option.

Set the library Fibre Channel Port 0 address from the Lib Fibre I/F Config Menu.

To set the library Fibre Channel Port 0 address:

1. From the online status screen, press the **MENU** button.

The Main Menu will display.

2. Press the down arrow button until the cursor underscores CONFIGURATION.

3. Press the **SELECT** button.

The Main Configuration Menu will appear and the cursor will line up with **LIBRARY CONFIG**.

4. Press the **SELECT** button .

The Lib Config Menu will appear and the cursor will line up with **LIB FIBRE I/F CONFIG**.

5. Press the **SELECT** button.

The Lib Fibre I/F Config Menu will appear and the cursor will line up with **PORT 0 CONFIGURATION**. This menu also displays the library's worldwide ID (the node ID) and the Port 0 worldwide ID (the port ID). These two IDs are set at the factory and cannot be changed. Each ID is 64 bits and uses the IEEE registered format.

6. Press the **SELECT** button.

The Fibre Port 0 Configuration menu will appear.

If you want to allow the network's software set the library Port 0 address, set the hard address option to **DISABLED** by:

- a. Pressing the arrow buttons until the cursor underscores **AUTO ADDRESS**.
- b. Pressing the **SELECT** button. The Port Hard Address Edit Menu.
- c. Pressing the up and down arrow buttons to select **DISABLED**.
- d. Pressing the **SELECT** button to save the selected option.

**Note:** The default for the hard address option is **DISABLED**.

If you want to set the library Port 0 address, you must set the **HARD ADDRESS** option to **ENABLED**, enter a port address by:

- a. Selecting **ADDRESS** from the Fibre Port 0 Configuration menu. The Port Address menu will display.
- b. Pressing the up and down arrow buttons to select a digit for each field in the three-field address. Permissible addresses are 001 through 125.
- c. Pressing the **SELECT** button to save the address.

7. If the library Fibre Channel Port 0 address is the only configuration value you wish to set at this time, press the **RESET** button. If you wish to set other configuration values before you reset the library, continue with the next section.

## Port 0 Worldwide ID

When a library has a Fibre Channel interface, the Port 0 worldwide ID identifies the library's Port 0 (that is, the lower MPU card) on the Fibre Channel system.

The ID is automatically displayed when you access the Fibre Channel Interface Configuration Menu. It cannot be changed.

## Library Worldwide ID

When a library has a Fibre Channel interface, the library's worldwide ID identifies the library as a node on the Fibre Channel system. The ID is automatically displayed when you access the Fibre Channel Interface Configuration Menu. It cannot be changed.

## Enabling or Disabling Fast Load

These two terms are defined as follows:

**Fast load on:** The robot will mount a tape to a drive and then immediately report the move completed.

**Fast load off:** The robot will mount a tape to a drive and wait at the drive location until the tape is completely loaded before reporting the move completed.

**Note:** Some host software does not support the fast load enabled option. Check with the customer for their requirement.

Enable or disable the Fast Load feature from the Lib Config Menu.

To set this feature:

1. At the Lib Config Menu screen, press the arrow button until the cursor underscores **FAST LOAD**.
2. Press the **SELECT** button.  
An editing screen appears.
3. Press the up and down arrow buttons to select either **ON** or **OFF**.
4. Press the **SELECT** button to save the changes. (You may press the **MENU** button to abort.)
5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the **RESET** button. If you want to set other configuration values, continue with the next section.

If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the **MENU** button until you exit all menus.

## Setting the Date

Set the date and time from the Lib Config Menu:

1. At the Lib Config Menu screen, press the arrow button until the cursor underscores **DATE**.
2. Press the **SELECT** button.  
An editing screen appears.
3. On the editing screen:
  - a. Press the up and down arrow buttons to select a value for each portion (field) of the date.
  - b. Press the **SELECT** button to move right to the next field.
  - c. Press the **MENU** button to move left to the previous field.
4. When the screen displays your desired setting, press the **SELECT** button from the right-most field to save the changes. You may press the **MENU** button from the left-most field to abort.
5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the **RESET** button. If you wish to set other configuration values, continue with the next section.

If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the **MENU** button until you exit all menus.

## Setting the Time

Set the time from the Lib Config Menu. FSC log entries correspond to this time setting:

1. At the Lib Config Menu screen, press the arrow button until the cursor underscores **TIME**.
2. Press the **SELECT** button.  
An editing screen appears.
3. On the editing screen:
  - a. Press the up and down arrows to select a value for each portion (field) of the time.
  - b. Press the **SELECT** button to move right to the next field.
  - c. Press the **MENU** button to move left to the previous field.
4. When the screen displays your desired setting, press the **SELECT** button from the right-most field to save the changes. (You may press the **MENU** button from the left-most field to abort.)

5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the **RESET** button. If you wish to set other configuration values, continue with the next section.

If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the **MENU** button until you exit all menus.

## Installing a Personality Module

If the customer is planning to use the StorageTek L-Series Library Admin, you must install its personality module and other components according to the documentation included in the StorageTek L-Series Library Admin shipping package. You should consult this documentation for instructions on setting required configuration data.

## Setting the Web Password

If you installed the StorageTek L-Series Library Admin, you must set a Web password at the operator panel. For instructions on setting this value, see the documentation that shipped with the StorageTek L-Series Library Admin.

**Note:** If the password requires resetting, contact Product Support for the procedure.

## Drive Entries (SCSI Drives Only)

**Notes:** To configure a T9x40 drive:

1. The drive must have firmware version 1.24 or higher. Check the drive's firmware version, by selecting **DRIVE INFO** from the Main Menu.
2. Configuring a T9x40 drive might involve more than setting the drive's SCSI ID and bus status. For information about T9x40 drive configuration options and instructions, refer to the *T9x40 Tape Drive Service Reference Manual*, part 95740.

Two entries complete the configuration options for each SCSI drive:

- SCSI ID
- Bus status (on or off bus)

**Note:** On Bus means that the drive is on the same SCSI bus as the library. Off Bus means that the drive is *not* on the same SCSI bus as the library.

### **CAUTION:**

***System configuration problems: When adding or replacing a drive, always check and, if necessary, configure the drive's SCSI ID at the library's operator panel.***

Set the drive SCSI IDs and bus status from the drive configuration menu. You can enter both values for each drive at the same time:



1. At the Main Configuration Menu, press an arrow button until the cursor underscores DRIVE CONFIG.
2. Press the **SELECT** button.

The screen will list all installed drives, and the cursor will align with the first drive on the list.

An example of the format is:

```
00 DLT7000 ID: __
          ON BUS: ON
```

The first two digits are the drive's logical number (the number that the library has assigned the drive). The tape library sets this number during its automatic configuration sequence (at power-on or reset). It is an internal number *only* and is shown for information *only*.

**Note:** The uppermost drive within the column is designated as "0," the next is "1," and so forth.

Next to the logical number is the drive type (DLT 7000 in this example). To the right of the drive type is the ID or SCSI address. On the next line is the drive's bus status.

Ultrium drives will display as:

- IBM LTO for IBM Ultrium drives
- SGT LTO for Seagate Ultrium drives
- HP LTO for Hewlett Packard Ultrium drives

Drive information might also appear on the menu as:

- FIBRE I/F if the drive is a Fibre Channel drive
- INVALID if the drive's SCSI ID is an invalid address

3. Press the arrow buttons to scroll to the drive you wish to change and press the **SELECT** button.

The Set Drive SCSI ID Menu will appear.

**Note:** The operator panel displays only 16 lines per menu. If the library contains more than eight drives, you must use the down arrow button to scroll to drives 09 and above.

4. Press the up and down arrow buttons to change the ID.
5. Press **SELECT** to save your changes.

A message screen will appear to indicate that the library is saving the new ID. Then the drive configuration menu will reappear.

**Notes:** The new SCSI ID for a T9x40 drive might not appear right away.

6. Press the arrow down button to get to the drive's second line of information (the drive's bus status field).

7. Press the **SELECT** button.

The Set Drive SCSI Bus Menu will appear.

8. Press the up and down arrow buttons to change the bus status to ON or OFF.
9. Press the **SELECT** button to save the changes. (You may press the **MENU** button to abort.)

The drive configuration screen will reappear.

10. Continue these steps until all drives are configured.
11. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the **RESET** button. If you wish to set other configuration values, continue with the next section.

If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the **MENU** button until you exit all menus.

## Drive Entries (T9x40)

To configure a T9x40 drive:

1. The drive must have firmware version 1.24 or higher. Check the drive's firmware version, by selecting **DRIVE INFO** from the Main Menu.
2. Configuring a T9x40 drive might involve more than setting the drive's SCSI ID and bus status.

For information about T9x40 drive configuration options and instructions, refer to the *T9x40 Tape Drive Service Reference Manual*, part 95740

## Drive Entries (LTO Fibre Channel Only)

You may either set a hard Fibre Channel address of 0 for LTO drives or allow the address to be set automatically, as arbitrated through the Fibre Channel loop. You set up the drive's Fibre Channel address from the Drive Config Menu.

**Note:** Before you enter an LTO's Fibre Channel address to 0, you must first set the drive's Fibre Channel hard address option to *enabled*.

If you configure the drive for soft addressing, you are allowing the network's software to configure the Port 0 address. For this addressing approach, you must set the Fibre Channel hard address option to *disabled*.

The default for the hard address option is *disabled*.

To set up the Fibre Channel address:

1. At the Main Configuration Menu, press an arrow button until the cursor underscores **DRIVE CONFIG**.
2. Press the **SELECT** button.

The screen will list all installed drives, and the cursor will align with the first drive on the list.

FIBRE I/F displays if the drive is a Fibre Channel drive.

3. Press the arrow buttons to scroll to the drive you wish to configure and press the **SELECT** button.

The screen will allow you to select hard addressing to **enabled** or **disabled**.

4. Press the up or down arrow buttons to line up with your choice. Press **SELECT** and:
  - if you select **enabled**, the hard address will be set to 0
  - if you select **disabled**, the address will be arbitrated through the channel.
5. Press the **SELECT** button to save the changes. (You may press the **MENU** button to abort.)
6. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the **RESET** button. If you wish to set other configuration values, continue with the next section.

If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the **MENU** button until you exit all menus.

## Network Entries

Using the Network Config Menu, six entries can be set for the library's network configuration:

- Library name
- IP address
- Network gateway
- Subnet mask
- DNS Configuration<sup>1</sup>
- SNMP

**Note:** You may need to consult with the systems administrator for some information.

You also may view the library's Ethernet address.

You accomplish these tasks from the Network Config Menu.

### Viewing the Ethernet Address

This is a six-byte address, unique to each library. The address is written into the MPC/MPCL card at the factory and cannot be changed. An example of an Ethernet address is 00:10:4f:00:05:01.

To view the Ethernet address:

---

1. You must enter data for the DNS Configuration if your SNMP agent is set to trap named recipients instead of numbered recipients.

1. At the Main Configuration Menu, press the arrow down button to line up the cursor with **NETWORK CONFIG**.
2. Press the **SELECT** button.

The Network Config Menu will appear and the library's Ethernet address appears at the bottom of the screen.

3. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the **RESET** button. If you wish to set other configuration values, continue with the next section.

If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the **MENU** button until you exit all menus.

## Setting the Library Name

The system administrator might assign the library a name. The name is mapped to the IP address but does not affect operation. To set the library name:

1. At the Network Config Menu, press an arrow button until the cursor underscores **LIBRARY NAME**.
2. Press the **SELECT** button. An editing screen appears.
3. On the editing screen:
  - a. Use the up and down arrow buttons to select a value for each character (field) in the name.
  - b. Use the **SELECT** button to move right to the next field.
  - c. Use the **MENU** button to move left to the previous field.

**Note:** Do not enter a library name longer than 30 characters.

4. When the screen displays your desired setting, press the **SELECT** button twice to save the changes. You may press the **MENU** button from the left-most field to abort.
5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the **RESET** button. If you wish to set other configuration values, continue with the next section.

If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the **MENU** button until you exit all menus.

## Setting the IP Address

The system administrator might assign the library an IP address, which makes the library accessible through a network. This is a four-byte address that must be set with information obtained from the system administrator. The value set identifies the library and makes it accessible through a network.

If your customer uses one of the StorageTek optional Web interfaces (see [“StorageTek Optional Interfaces” on page 1-10](#)), the IP address must be set.

An example of an IP address entry is 192.0.0.1

**Note:** To use the StorageTek L-Series Library Admin, you must set the library’s IP address at the operator panel.

To set the IP address:

1. At the Network Config Menu, press an arrow button until the cursor underscores LIBRARY NAME.
2. Press the **SELECT** button. An editing screen appears.
3. On the editing screen:
  - a. Use the up and down arrow buttons to select a value for each three-digit field in the address.

**Note:** Do *not* leave the first field equal to zero (000)

- b. Use the **SELECT** button to move right to the next field.
  - c. Use the **MENU** button to move left to the previous field.
4. When the screen displays your desired setting, press the **SELECT** button from the right-most field to save the changes. You may press the **MENU** button from the left-most field to abort.
5. If you have already changed the library’s SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the **RESET** button. If you wish to set other configuration values, continue with the next section.

If you have not changed the library’s SCSI ID or Port 0 address and are not setting other configuration values, press the **MENU** button until you exit all menus.

## Setting the Network Gateway Address

A network gateway in a large network allows devices on one subnet to interface with devices on another subnet (see [“Setting the Subnet Mask Address” on page 2-34](#)). This four-byte address must be specified by the system administrator.

**Note:** Entering this address is optional. It serves to indicate the gateway connection between subnets, but it is applicable only when such a connection exists and is necessary for library operation. Consult with your systems administrator for additional information.

To set the network gateway address:

1. At the Network Config Menu, press an arrow button until the cursor underscores NETWORK GATEWAY.
2. Press the **SELECT** button.

An editing screen appears.

3. On the editing screen:
  - a. Press the up and down arrow buttons to select a value for each three-digit field in the address.
  - b. Press the **SELECT** button to move right to the next field.
  - c. Press the **MENU** button to move left to the previous field.
4. Press the **SELECT** button from the right-most field to when the screen displays your desired setting to save the changes. (You may press the **MENU** button from the left-most field to abort.)
5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the **RESET** button. If you wish to set other configuration values, continue with the next section.

If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the **MENU** button until you exit all menus.

## Setting the Subnet Mask Address

This is a four-byte notation (specified by the system administrator) to resolve routing within the customer's intranet. This address makes the library accessible through a subnet on a large network. An example of a subnet mask entry is 255.255.254.0.

To set the subnet mask address:

1. At the Network Config Menu, press an arrow button until the cursor underscores **SUBNET MASK**.
2. Press the **SELECT** button. An editing screen appears.
3. On the editing screen:
  - a. Press the up and down arrow buttons to select a value for each three-digit field in the address.
  - b. Press the **SELECT** button to move right to the next field.
  - c. Press the **MENU** button to move left to the previous field.
4. Press the **SELECT** button from the right-most field when the screen displays your desired setting to save the changes. (You may press the **MENU** button from the left-most field to abort.)
5. If you have already changed the library's SCSI ID or Port 0 address and are planning to exit the Main Configuration Menu at this time, you must press the **RESET** button. If you wish to set other configuration values, continue with the next section.

If you have not changed the library's SCSI ID or Port 0 address and are not setting other configuration values, press the **MENU** button until you exit all menus.

## DNS Configuration

**Note:** You must enter the Domain Name Service (DNS) configuration *only* if your Simplified Network Management Protocol (SNMP) agent is set to trap *named* recipients; if SNMP is set for *numbered* recipients, no entries are required.

The first entry you must make for the DNS Configuration is the Domain Name (DMN) field.

1. Press the arrow button until the cursor underscores DMN.
2. Press the **SELECT** button. An editing screen appears.
3. On the editing screen:
  - a. Press the up and down arrow buttons to select a value for each letter in the domain server's name.
  - b. Press the **SELECT** button to move right to the next field.
  - c. Press the **MENU** button to move left to the previous field.
4. Enter the main server's name, being sure to append the suffix *.com* at the end.
5. Press the **SELECT** button from the right-most field when the screen displays your desired setting to save the changes. (You may press the **MENU** button from the left-most field to abort.)

The second entry you must make is the primary DNS server's IP address.

1. Press the arrow button until the cursor underscores SVR Primary.
2. On the editing screen:
  - a. Press the up and down arrow buttons to select a value for each number in the primary domain server's IP address.
  - b. Press the **SELECT** button to move right to the next field.
  - c. Press the **MENU** button to move left to the previous field. Press the **SELECT** button. An editing screen appears.
3. Press the **SELECT** button from the right-most field when the screen displays your desired setting to save the changes. (You may press the **MENU** button from the left-most field to abort.)

The third entry you *may* make is the secondary DNS server's IP address. This assumes that your site has a secondary (or backup) server; if not, this entry is not required.

1. Press the arrow button until the cursor underscores *SVR Secondary*.
2. On the editing screen:
  - a. Press the up and down arrow buttons to select a value for each number in the secondary domain server's IP address.
  - b. Press the **SELECT** button to move right to the next field.
  - c. Press the **MENU** button to move left to the previous field. Press the **SELECT** button. An editing screen appears.
3. Press the **SELECT** button from the right-most field when the screen displays your desired setting to save the changes. (You may press the **MENU** button from the left-most field to abort.)

If you are planning to exit the Main Configuration Menu at this time, you must press the **RESET** button. If you wish to set other configuration values, continue with the next section.

If you have not changed the library's DNS configuration and are not setting other configuration values, press the **MENU** button until you exit all menus.

## Dynamic Worldwide Name

Dynamic Worldwide Name is a feature added into Version 3.02 firmware.

### ***Background***

To correct re-configuration problems within a customer's Fibre Channel network, 3.02 firmware includes the dynamic Worldwide Name (dWWN) enhancement. Previously, Fibre Channel devices contained fixed Worldwide names within the network. If a device (for example, a defective tape drive) required replacement, the new device was detected by the network as "unknown" and re-configuration of the network was required.

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 replaced, thereby eliminating the need for system re-configuration. There are three Worldwide Names reserved for each drive: Node, Port A, and Port B.

**Note:** This feature requires corresponding drive code that supports the dynamic Worldwide Name feature as well. Currently, IBM LTO drive microcode 27Q1 is the only available supporting code.

Microcode for other drives is in process and will be released with the next drive firmware versions.

### ***Enabling dWWN***

The dWWN feature (default set to OFF) is enabled through the CLI interface and, once enabled, the library must be IPL'd.



**CAUTION:**

***System problems:* Changing the dWWN feature must be coordinated with the system administrator. The feature is usually enabled at installation time.**

**A record of the configuration should be kept; this is not only something that should always be done, but it absolutely essential with the dWWN feature to eliminate system issues in the case of an MPC/MPCL failure.**

To enable dWWN:

1. Through the CLI interface, type in
  - a. `wwn xxx:xxx:xxx:xxx`  
(where “xxx:xxx:xxx:xxx” equals the 12-digit serial number of the library—located on the agency approval sticker of the library). Be sure that each 3-digit group is separated by a colon.  
and press ENTER.
  - b. Type in `wwn enable` and press ENTER.
2. IPL the library.

***Disabling dWWN*****CAUTION:**

***System problems:* Changing the state of the dWWN feature must be coordinated with the system administrator.**

***System problems:* When enabling dWWN, all drives must be at the proper firmware level. If a drive has downlevel firmware, it will remain in the “configuring” state and will be unavailable for host use.**

If you wish to disable the dWWN, through the CLI interface, type in:

1. Type in `wwn disable` and press ENTER.
2. IPL the library.

All supported Fibre Channel drives will return to their native WWN, binding drives to their host and thus requiring a reconfiguration.

***Implications for an MPC/MPCL Replacement***

When replacing the MPC/MPCL cards, however, you must configure dWWN *before* bringing the library and drives online. To do this:

1. Be sure the library and all drives are unavailable to the system.
2. Make sure that any applications that use the library or drives have been suspended.
3. Record all library and drive configuration data so that each field can be set to its proper value.

**CAUTION:**

**Errors: You will receive errors if you power-off the drives before powering-off the library.**

4. Power-off the library.
5. Power-off each drive individually.
6. Disconnect the fiber cable from the library's MPU card.
7. Replace the MPC/MPCL card.

**CAUTION:**

**Errors: Do not power-on the drives until told to do so in these instructions.**

8. Power-on the library *only*.
9. Re-enter the library serial number and re-configure the dWWN feature on the MPC/MPCL card to ON from the CLI interface (as described in [“Enabling dWWN” on page 2-36](#)).
10. Enter the identical configuration data for the library that was previously active. (Refer to the data that you previously saved.)
11. Power-on each drive individually.
12. IPL the library.
13. Verify or set configuration data for each drive. (Refer to the data that you previously saved.)
14. Reconnect the fiber cable to the library's MPU card.
15. Have the operator make the library and all drives available to the system.
16. Make sure that all applications that use the library and drives are working correctly.

When replacing a MPC/MPCL card in a system with dWWN feature disabled, the above sequence is not required. Follow the standard replacement procedure for the MPC/MPCL card.

***Implications for Drive Removal and Replacement***

The dWWN features requires special precautions when removing or replacing a drive in a library that has dWWN enabled. See [“Tape Drive Removal/Replacement when dWWN Enabled” on page 5-67](#).

## **SNMP - Simple Network Management Protocol**

Configuration for SNMP is done after the general configuration of the library and drives. See [Appendix B, “SNMP.”](#)

## Screen Characteristics

You also can change the operator panel's screen characteristics from the main configuration menu. The screen characteristics are saved in non-volatile memory.

To change the contrast and backlight (or brightness) of the operator panel screens:

1. At the main configuration menu, press an arrow button until the cursor underscores `DISPLAY INFO`.
2. Press the **SELECT** button. The display information menu will appear.
3. Press the arrow buttons to line up with the desired screen characteristic: `CONTRAST` or `BACKLIGHT`.

An editing screen will appear.

4. Press the up and down arrow buttons to change the count value.

**Note:** To reset the screen characteristics to the default values, line up the cursor with `DEFAULT SCREEN CHARACTERISTICS` and press the **SELECT** button.

5. Press the **SELECT** button to save the changes. (You may press the **MENU** button to abort.)
6. If you have already changed the library's SCSI ID and are planning to exit the Main Configuration Menu at this time, you must press the **RESET** button. If you try to exit the main configuration menu, a message will appear requesting that you reset the library.

If you have not changed the library's SCSI ID, you may exit the configuration menu to do other tasks.

## ■ Auto Clean

The information below describes the auto cleaning enabled or disabled feature.

These two terms are defined as follows:

- Auto Clean Disabled:** When a drive requires cleaning, the operator must enter the compatible cleaning cartridge into the CAP, using the Clean Drive routine. The robot will retrieve the cartridge, mount the tape into the drive, and return the cartridge to the CAP when cleaning is complete. The operator must then remove the cleaning cartridge from the CAP and manually keep track of its usage.
- Auto Clean Enabled:** When a drive requires cleaning, the robot will retrieve a compatible cleaning cartridge from the reserved cell in the library (these cell locations are shown in [Figure 2-1 on page 2-5](#)) and mount it into the drive. When the cartridge dismounts, the robot will return the cleaning cartridge to its cell location within the library. The MPC/MPCL card will keep track of usage and post an FSC in the log when the warning threshold has been reached.

## Cleaning Cartridge Requirements

Valid cleaning cartridges are those that match the drive types installed in the library. Other requirements are:

- All cleaning cartridges must have a “CLN” in their VOLSER label.
- T9840 cleaning cartridges must also have a “U” on their media ID labels.
- T9940 cleaning cartridges must have a “W” ID label.
- Ultrium cleaning cartridges must either have labels specific to the drive manufacturer or they must be a universal cleaning cartridges for all Ultrium drives.

For more label information, see the *L700e Installation Manual* (part 95843) or the *L700e Operator's Guide* (part 95845).

## Cleaning Cartridge Usage

Cleaning cartridges will be used when the drive requires a cleaning. The drive request is sent from the drive to the host—the library does not request a cleaning action.

If there are multiple cleaning cartridges per drive types:

- One cartridge will be used until it reaches its warning count before proceeding to the next cartridge.
- Once all cartridges have reached their warning counts, the library will rotate through the cartridges until each cartridge reaches its expired status.

- Once all cartridges are expired, if a drive requires cleaning, mounts will still occur, but the library operator panel will display an asterisk on the top line and the drive status screen will display “clean needed.” The “clean needed” status will remain until a new cleaning cartridge is entered into the library to satisfy the cleaning requirement.

See also [“Cleaning Cartridge Warning Count” on page 2-44](#) and [“Cleaning Cartridge Expiration” on page 2-45](#) for more information.

## Enabling Auto Clean

There are two ways to enable the Auto Clean feature:

1. Manually load valid cleaning cartridges into any of the 11 cells that are reserved for cleaning and diagnostic cartridges. For the locations of these cells, refer to [Figure 2-1 on page 2-5](#).
2. Import valid cleaning cartridges through the CAP (see [“Importing Cleaning Cartridges through the CAP” on page 2-42](#)).

The Auto Clean feature is automatically enabled if even one cleaning cartridge is present in the reserved cell area.

## Manually Installing Cleaning Cartridges

To manually install cleaning cartridges in the reserved cells:

1. Unlock and open the front doors.
2. Verify that the cleaning cartridges are right side up (the VOLSER numbers should be closest to the top edge and facing outward).

### **CAUTION:**

***Potential static electricity damage to electrical components. Take precautions against electrostatic discharge by touching gray, unpainted metal (such as the library’s frame) before reaching into the library. Avoid touching any electrical component.***

***Confined space: While reaching inside the library, take care to avoid bumping your head or catching your clothes on protruding edges.***

3. Place cleaning cartridges into any of the 11 designated cells.
4. Close and lock the front access door.

**Note:** Once cleaning cartridges are entered, be sure to set the cartridge warning count and life. The warning count will generate FSCs into the FSC log to notify you that the cartridge is about to expire; the cartridge life should never exceed the number suggested by the manufacturer.

## Importing Cleaning Cartridges through the CAP

A second way to enable Auto Clean is by importing cleaning cartridges from the CAP into the reserved cells, the procedure is to:

1. Press the **MENU** button to return to the Main Menu.
2. Press the arrow buttons until the cursor underscores **CLEANING INFORMATION**.
3. Press the **SELECT** button.

The panel displays the Cleaning Info menu.

4. Press the arrow buttons until the cursor underscores **IMPORT CARTRIDGE**.
5. Press the **SELECT** button.

The Import Clean Cartridges screen appears, which prompts you to:

- Enter only cleaning cartridges—no data cartridges are allowed
- Enter the cleaning cartridges into CAP A only

### **CAUTION:**

***Possible halt to operation or damage to components. You must enter the cartridges properly or you could damage the robot or the drive, or cause the library to stop operating. Use only the correct cartridges for the drive types within the library.***

6. Load cartridges into the magazine. You can do this one of two ways:
  - a. Pull out and down on the magazine handle
  - b. Remove the magazine by lifting it out

### **CAUTION:**

***Possible damage to the hand assembly. Before loading the magazine into the CAP, remove the magazine's retention cover by lifting the side edge.***

7. Enter the cartridges into the magazine so that the cartridges lie flat, with the VOLSER label facing toward you, the customer label facing down, and the reel facing away from you.
8. Return the magazine to its closed position. (If you have used a retention cover on the magazine, remove the cover before replacing the magazine.)
9. Press the **SELECT** button on the operator panel to close the CAP.

The cleaning cartridges are audited by the robot and their types and VOLSERs are listed on the operator panel. You must now select each cartridge at the operator panel to import it into the library.

10. Select the cleaning cartridges you want to import by:

- a. Moving the cursor to the desired cartridge entry on the list
- b. Pressing the **SELECT** button. A selected cleaning cartridge is then highlighted (in reverse video)
- c. Repeating Steps a and b until you have selected all the cartridges you want to import

**Note:** There is no undo available on this menu. If you select a cartridge by mistake, you must exit the menu by pressing the **MENU** button. Then you must start again at Step 10.

Press the **SELECT** button to initiate the import.

**Note:** Once cleaning cartridges are entered, be sure to set the cartridge warning count and life. The warning count will generate FSCs into the FSC log to notify you that the cartridge is about to expire; the cartridge life should never exceed the number suggested by the manufacturer.

## Setting Clean Cartridge Life

After a predetermined count, a cleaning cartridge must be replaced and disposed of at the site.

If the Auto Clean feature is enabled, use the operator panel to set the maximum number of times a cleaning cartridge can be used (or the warning threshold).

**Note:** The Auto Clean feature is automatically enabled if the customer inserts even one cleaning cartridge into the reserved cell area and then resets the library. You set the cleaning cartridge warning count from the Cleaning Info menu.

Check your tape drive's product manual for the recommended use and life of the drive's cleaning cartridge.

To set the cleaning cartridge warning threshold:

1. From the online status screen, press the **MENU** button. The main menu screen will appear.
2. Press the arrow button until the cursor lines up with **CLEANING INFO**.
3. Press the **SELECT** button.

The **CLEANING INFO** screen will appear. It displays the number of cleaning cartridges in the reserved area at initialization.

4. Press an arrow button until the cursor is at the appropriate drive's **WARNING COUNT**.
5. Press the **SELECT** button for your choice.

An editing screen will appear. The editing screen will display the current setting for the cartridge warning count. The maximum recommended warning count is shown below the current setting.

6. Press the arrow buttons to change the warning count.
7. Press the **SELECT** button to save the changes. (You may press the **MENU** button to abort.)
8. Press the **MENU** button to return to the library status screen.

## Cleaning Cartridge Warning Count

Cleaning cartridges have a limited life span. After multiple uses, a cleaning cartridge must be replaced and disposed of at the customer's site.

The customer should periodically check the status of the cleaning cartridges. See [“Cleaning Cartridge Usage Count” on page 2-51](#) for directions.

The warning count should be set lower than the expiration threshold; this will allow the customer time to obtain a replacement cleaning cartridge. For example, if the manufacturer recommends replacement after 20 uses, set the warning count to 17 (or other, lower number).

The customer should always replace a used cleaning cartridge with a new, unused cleaning cartridge.

If customers have enabled the Auto Clean feature, they can use the operator panel to set the maximum number of times a cleaning cartridge can be used (or the warning count). Check the manufacturer's manual for their recommendations.

To set this value:

1. From the status screen, press the **MENU** button. The Main Menu will appear.
2. Press an arrow button until the cursor underscores **CLEANING INFO**.
3. Press the **SELECT** button. The Cleaning Info screen will appear. This menu displays the number of cleaning cartridges in the reserved area.
4. Using an arrow button, line up the cursor with **DLT WARNING COUNT** or **9840 WARNING COUNT**, or **9940 WARNING COUNT**.
5. Press the **SELECT** button. An editing screen will appear.
6. The editing screen displays the current setting for the cartridge warning count. It displays the maximum recommended warning count below the current setting. On this screen, use the up and down arrow buttons to change the count value.
7. When the value is correct, press the **SELECT** button to save the changes. You may press the **MENU** button to abort.
8. When you are finished, press the **MENU** button twice to return to the library status screen.



## Cleaning Cartridge Expiration

A cleaning cartridge is determined as expired when the following sequence occurs:

- A drive has requested to be cleaned
- A cleaning cartridge is mounted on the drive
- After the cartridge is dismounted, the drive still requests a cleaning operation

You can determine if there is an expired cleaning cartridge by:

1. Viewing its usage as described in [“Cleaning Cartridge Usage Count” on page 2-51](#)
2. Viewing its usage through the StorageTek L-Series Library Admin screen
3. Observing that an asterisk (\*) appears on the operator panel display; for example, `STK L700 (Code 3.00.13)*`.

## StorageTek L-Series Library Admin Entries (Optional)

The StorageTek L-Series Library Admin is an optional Web-based interface to the library. Its model is HRZN-002, feature code LS4x for the L700 library. If this interface is required, you must enter two values at the operator panel:

- The library’s IP address
- The library’s Web password

For instructions on how to make these entries, see the documentation included in the StorageTek L-Series Library Admin shipping package. For instructions on using the interface to alter the library’s configuration or monitor library activity, access the online help files for the StorageTek L-Series Library Admin.

## Verifying Configuration

When you have completed all configuration entries, the operator panel will notify you if the entries require you to press the **RESET** button.

When the library becomes ready, go through the configuration screens to verify that all information is complete.

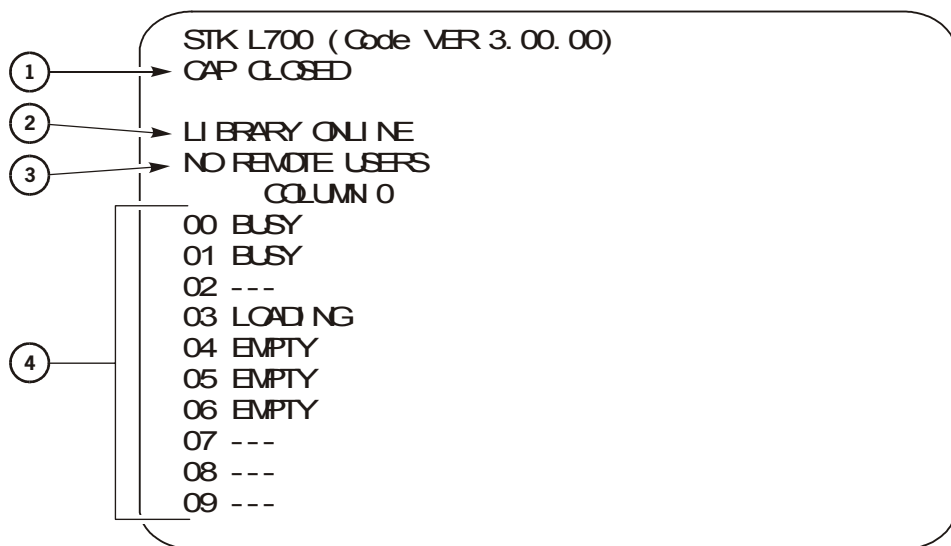
Procedures for monitoring library status information—such as checking the latest firmware additions of the cleaning cartridge usage count, library personality, and StorageTek L-Series Library Admin information—are included in the sections below.

## Monitoring Status Information

You can monitor CAP, library, remote user, and drive status information through the library status screen (see below). This is the main screen on the operator panel. It displays after initialization is complete, and it displays when you press the **MENU** button while you are viewing the Main Menu.

**Note:** With 3.00.xx firmware and later, an asterisk (\*) may appear on the operator panel display; for example, STK L700 (Code 3.02.00)\*. This denotes an expired cleaning cartridge. To determine which cartridge has expired, see “Cleaning Cartridge Usage” on page 2-40.

Figure 2-6. Example Library Status Screen (C65349)



C65349

1. CAP status message
2. Library status message
3. Remote users status message
4. Drives status messages

You also can monitor drive information, CAP magazine status, the cleaning cartridge usage count, and the library’s personality information through operator panel menus.

### CAP Status

The first line of status information on the library status screen displays the condition of the CAP. Table 2-7 on page 2-47 lists the status messages that might appear on this line.

**Table 2-7. CAP Status Messages**

Status Message	Explanation
OPEN	The CAP door is currently open. (The <i>Open</i> indicator also is on.) Cartridges may be entered into or removed from the CAP magazines. But you cannot view the CAP magazine contents through the operator panel menus.
CLOSED	The CAP door is currently closed.
CLOSED (LOCKED)	The CAP door is currently closed and locked. Before the customer can open the CAP door, they must issue a command from their network's system console.
TRANSITION	The CAP door has stalled while attempting to open.
UNKNOWN	The library does not recognize the current state of the CAP door.

## Library Status

The library status line on the status screen indicates the current state of the library. [Table 2-8](#) explains the status messages that might appear on this line.

**Table 2-8. Library Status Messages**

Status Message	Explanation
LIB MAIN DOOR OPEN	The library's front door is open. When you close it, the library will reset (initialize)
LIB INIT REQUIRED	The library requires initialization. You must press the <b>RESET</b> button.
LIBRARY NOT READY	The library is not available to perform operator-requested actions. Some status information might be available through the network interfaces.
LIBRARY READY	The library has completed initialization and is ready to perform requested actions.
LIB MAINTENANCE MODE	The library is offline because it is performing diagnostic tests.
INTERVENTION REQUIRED	The library is experiencing a problem. The customer should note the FSC (if the library has issued one) and take appropriate action.
LIB UNKNOWN STATE	The library does not recognize its current state. The customer should note the FSC (if the library has issued one) and take appropriate action.

## Remote Users Status

Following the library status line is a message indicating the number of users who are currently accessing the library remotely. Currently, the status message on this line never changes.

## Drive Status

Table 2-9 summarizes drive status messages that might appear on the library status screen:

**Table 2-9. Drive Status Messages**

Status Message	Explanation
INIT REQUIRED	You must initialize this drive.
NOT CONNECTED	This drive is not connected to a SCSI bus.
UNKNOWN DRIVE	The library does not recognize the type of drive in this location.
NOT COMMUNICATE	This drive is not communicating with the client or the drive power is off.
NOT FUNCTIONAL	This drive is not operating properly.
NOT LOADABLE	The library cannot load a cartridge into this drive.
EMPTY	No cartridge is loaded in this drive.
CARTRIDGE IN	The drive contains a cartridge, but the cartridge is not loaded into the drive.
CLEAN NEEDED	This drive requires cleaning.
CLEAN FAILED	The attempt to clean this drive failed.
LOADING	The library is mounting a cartridge to this drive.
REWOUND	The cartridge in this drive has been rewound.
UNLOADING	The library is dismounting a cartridge from this drive.
LOADED	The library has loaded a cartridge into this drive.
REWINDING	The cartridge in this drive is being rewound.
BUSY	This drive is performing a read or write operation.
CLEANING	The drive is being cleaned.

**Note:** The operator panel displays only 16 lines per screen. If the library contains more than eight drives, you must use the down arrow button to scroll to drives 09 and above.

## Drive Information

To view details about an installed drive, including its serial number and firmware version:

1. Press the **MENU** button to display the Main Menu.
2. Press an arrow button until the cursor lines up with **DRIVE INFO**.
3. Press the **SELECT** button.  
list of all installed drives will appear.
4. Press the arrow buttons until the cursor underscores the desired drive.
5. Press the **SELECT** button. The Drive Information Menu will appear. The screen lists the manufacturer, model, status, serial number, interface type, and firmware version of the selected drive. See [Table 2-9 on page 2-48](#) for a list of drive status messages.

## CAP Magazine Status

To check the status of a CAP magazine and its contents:

1. Press the **MENU** button to display the Main Menu.
2. Press an arrow button until the cursor lines up with **CAP STATUS**.
3. Press the **SELECT** button.

A blank screen will appear.

4. Press the **SELECT** button again.

The CAP Contents menu will appear. The screen lists the **VOLSER** of each cartridge in an installed magazine or it lists a status message. See the table below for the status messages that appear on this list.

**Note:** Each CAP has four magazines, numbered one through four, from the top location to the bottom.

**Table 2-10. CAP Magazine Slot Status Messages**

Status Message	Explanation
EMPTY	This magazine slot does not contain a cartridge.
UNKNOWN	This magazine slot contains a cartridge, but the library has not yet performed the necessary audit to identify the cartridge.
UNREADABLE	This magazine slot contains a cartridge, but the camera could not read the cartridge's <b>VOLSER</b> label.

## CAP States

When exporting or importing cartridges through the CAPs, the following CAP states may be displayed:

**Table 2-11. CAP States**

State	Explanation
CAP A (B) Open	Specified CAP is open for exporting or importing cartridges
CAP A (B) Closed	Specified CAP is closed and locked
CAP A (B) Transition	Specified CAP is stalled during an open or close transition. This message indicates a problem and an error is posted to the FSC log.
CAP A (B) Unknown	The specified CAP is in an unknown state. Consult the FSC log.

## Library Personality Information

Viewing library personality information lets you determine who library's vendor is and whether the personality module for the StorageTek L-Series Library Admin product is present and enabled.

To view the library's personality information:

1. Press the **MENU** button to return to the Main Menu.
2. Press the arrow buttons until the cursor underscores **CONFIGURATION**.
3. Press the **SELECT** button.

The panel displays the Main Configuration Menu.

4. Press the arrow buttons until the cursor underscores **PERSONALITY MODULE**.
5. Press the **SELECT** button.

The panel displays the Personality Module Info screen.

6. Press the down arrow to view a second screen of information.
7. Press the **MENU** button to exit the Personality Module Info screen.

The following status messages might appear on the Personality Module Info screen:

**Table 2-12. Personality Module Status/Info Screen**

Status Message	Explanation
<b>Status:</b>	
PRESENT	A recognizable personality module is attached to the logic card

**Table 2-12. Personality Module Status/Info Screen (Continued)**

<b>Status Message</b>	<b>Explanation</b>
NOT PRESENT	No personality module is attached to the logic card
UNKNOWN	No valid vendor information has been loaded into this library
<b>Type:</b>	
NORMAL	No personality upgrade is currently active; the factory-installed personality and vendor information are in effect
UPGRADE	A personality upgrade is available
USED UPGRADE	A personality upgrade is available, but the upgrade has been previously used
WRITE IN PROGRESS	A personality upgrade is in progress
<b>VERSION:</b>	The version number for the personality module. If a personality module is not present, this is the version of the vendor information.
<b>LIBRARY VENDOR ID:</b>	The identity number for the library vendor
<b>LIBRARY VENDOR NAME:</b>	The name of the library vendor
<b>LIBRARY PRODUCT NAME:</b>	If TYPE is NORMAL, this is the product name assigned by the library vendor. If TYPE is UPGRADE, this is the name of the product for which the upgrade is valid.
<b>SCSI VENDOR NAME:</b>	The library vendor name reported on the SCSI or Fibre Channel interface
<b>SCSI PRODUCT NAME:</b>	The library product name reported on the SCSI or Fibre Channel interface
<b>Horizon:</b>	
ENABLED	The personality upgrade for the StorageTek L-Series Library Admin product is available on the installed personality module
DISABLED	The personality upgrade for the StorageTek L-Series Library Admin product is not available

## Cleaning Cartridge Usage Count

The cleaning cartridge usage count assumes that you have loaded cleaning cartridges into the reserved cells and have subsequently reset the library. (Taking these steps enables the

Auto Clean function.) You can then check the usage count of cleaning cartridges in the reserved cells or in both the reserved cells and the CAP.

To check the number of times that the cleaning cartridges have been used since they were loaded into the reserved cells in the library:

1. Press the **MENU** button to return to the Main Menu.
2. Press the arrow buttons until the cursor underscores **CLEANING INFORMATION**.
3. Press the **SELECT** button. The panel displays the Cleaning Info menu.
4. Press the arrow buttons until the cursor underscores **EXPORT CARTRIDGE**.
5. Press the **SELECT** button. The Export Clean Cartridges screen appears, which lists all reserved cell cleaning cartridges by domain (or drive type), **VOLSER**, and usage count.

**Note:** If the usage count for a cleaning cartridge has exceeded its warning count, the export screen will display **EXPIRED**. The customer must remove this cartridge from the library.

6. Press the **MENU** button to exit the Export Clean Cartridges screen.

## Exporting Cleaning Cartridges through the CAP

This procedure assumes that cleaning cartridges are loaded into the reserved cells and the library has been reset. (Taking those two steps enables the Auto Clean function.)

When one or more cleaning cartridges have expired, the customer can export them from the reserved cells to the CAP with this procedure:

1. Press the **MENU** button to return to the Main Menu.
2. Press the arrow buttons until the cursor underscores **CLEANING INFORMATION**.
3. Press the **SELECT** button.

The panel displays the Cleaning Info menu.

4. Press the arrow buttons until the cursor underscores **EXPORT CARTRIDGE**.
5. Press the **SELECT** button.

The Export Clean Cartridges screen appears, which lists all reserved cell cleaning cartridges by domain (or drive type), **VOLSER**, and usage count.

6. Select the cleaning cartridges you want to export by:
  - a. Moving the cursor to the desired cartridge entry on the list
  - b. Pressing the **SELECT** button. A selected cleaning cartridge is then highlighted (in reverse video)
  - c. Repeating Steps a and b until you have selected all the cartridges you want to export



7. Press the **SELECT** button to initiate the export.

## Importing Cleaning Cartridges through the CAP

This procedure assumes that you cleaning cartridges are loaded into the reserved cells and the library has been reset. (Taking those two steps enables the Auto Clean function.)

When the customer wants to import cleaning cartridges from the CAP into the reserved cells, the procedure is to:

1. Enter the console command to unlock the CAP.
2. Press the **CAP** button on the operator panel to open the CAP.

The *Open* indicator will light.

### **CAUTION:**

***Possible halt to operation or damage to components. You must enter the cartridges properly or you could damage the robot or the drive, or cause the library to stop operating. Use only the correct cartridges for the drive types within the library.***

3. Load cartridges into the magazine. You can do this one of two ways:
  - a. Pull out and down on the magazine handle
  - b. Remove the magazine by lifting it out

### **CAUTION:**

***Possible damage to the hand assembly. Remove the magazine's retention cover before loading the magazine into the CAP. Remove the clear cover from the back of the magazine by lifting the side edge.***

4. Enter the cartridges into the magazine so that the cartridges lie flat, with the VOLSER label facing toward you, the customer label facing down, and the reel facing away from you.
5. Return the magazine to its closed position. (If you have used a retention cover on the magazine, remove the cover before replacing the magazine.)
6. Press the **CAP** button on the operator panel to close the CAP.
7. Press the **MENU** button to return the display to the Main Menu.
8. Press the arrow buttons until the cursor underscores **CLEANING INFORMATION**.
9. Press the **SELECT** button.

The panel displays the Cleaning Info menu.

10. Press the arrow buttons until the cursor underscores **IMPORT CARTRIDGE**.
11. Press the **SELECT** button.

The Import Clean Cartridges screen appears, which lists all reserved cell cleaning cartridges by domain (or drive type), and VOLSER.

12. Select the cleaning cartridges you want to import by:
  - a. Moving the cursor to the desired cartridge entry on the list
  - b. Pressing the **SELECT** button. A selected cleaning cartridge is then highlighted (in reverse video)
  - c. Repeating Steps a and b until you have selected all the cartridges you want to import

**Note:** There is no undo available on this menu. If you select a cartridge by mistake, you must exit the menu by pressing the **MENU** button. Then you must start again at Step 10.

13. Press the **SELECT** button to initiate the import.

## ■ Diagnostic Tests

Diagnostic tests simulate online library operation. These tests must be run only when the target mechanisms are *offline*. For example, if the test exercises only the robot and does not affect any drives (as in the Get-Put diagnostic test), only the library must be offline. If, however, you wish to mount a tape to a drive (Mount-Dismount diagnostic test), both the library *and* drive must be offline.

The two tests used to check library and drive operation are the Get-Put Loop and Mount-Dismount diagnostic tests, which are described in detail below.

### **CAUTION:**

**System interruption: If you wish to run tests from a laptop device, you must connect the laptop to the CSE port on the MPC/MPCL card. Be sure the library is offline before running tests. The CSE interface does *not* give a warning that the library will be taken offline.**

## Get-Put Loop Diagnostic Test

The Get-Put Loop diagnostic test validates cell-to-cell move capabilities using a diagnostic cartridge. The robot:

- Retrieves (gets) the diagnostic cartridge from its reserved cell
- Moves the hand and cartridge laterally and vertically
- Places (puts) the cartridge back into the reserved cell

To run the Get-Put Loop diagnostic test:

1. Be sure that the library is offline.
2. Make sure the main access door is closed and the library menu is displayed.
3. Be sure there is a diagnostic cartridge in the reserved area.

4. From the status screen, press the **MENU** button on the operator panel.
5. Using the down arrow button, move the cursor down until it underscores **DIAGNOSTICS**.
6. Press **SELECT**. The panel displays the Main Diagnostic Menu.
7. Press the arrow button until the cursor underscores **GET-PUT Loop**.
8. Press **SELECT**. The **GET-PUT** option screen will appear.
9. Follow the screen directions to set the number of times you wish the test to run.
10. You will be prompted to confirm that you want the library in Maintenance Mode (offline) before beginning the test (**ARE YOU SURE?**). Confirm this by pressing the **SELECT** button.
11. After this diagnostic test is complete, press **MENU** to return to the **DIAGNOSTICS** menu.

## Mount-Dismount Loop Diagnostic Test

The Mount-Dismount Loop diagnostic test validates the ability of the robot to load and unload a cartridge to a tape drive. The robot:

- Retrieves a diagnostic cartridge
- Loads the tape into a drive

When the drive dismounts the cartridge, the robot:

- Retrieves the cartridge
- Places it back into its reserved cell.

To run the Mount-Dismount diagnostic test:

1. Be sure that both the library *and* target drive are offline.
2. Make sure the main access door is closed and the library menu is displayed.
3. Be sure there is a diagnostic cartridge in the reserved area.
4. From the status screen, press the **MENU** button. The main menu will appear.
5. Press an arrow button until the cursor underscores **DIAGNOSTICS**.
6. Press the **SELECT** button. The Main Diagnostic Menu screen will appear.
7. Use the arrow button until the cursor underscores **DRIVE DIAGNOSTICS**.
8. Press **SELECT**. The list of available drives will appear.
9. Use the arrow button to move the cursor to the drive you wish to mount.
10. Press the **SELECT** button. The list of drive diagnostic tests will appear.
11. Use the arrow button to move the cursor to **MOUNT/DISMOUNT LOOP**.

12. Press **SELECT**.
13. You will be prompted to confirm that you want the library in Maintenance Mode (offline) before beginning the test (**ARE YOU SURE?**). Confirm this by pressing the **SELECT** button.
14. After this diagnostic test runs to completion, press the **MENU** button to return to the **DIAGNOSTICS** menu.

## PTP Test

The PTP test simulates a cartridge pass-thru operation between two libraries connected by a pass-thru port.

**Note:** There are only two PTP cartridge cells: one above and one below the target. The top recess cannot be used as a cartridge slot.

This test:

- Places a diagnostic tape from the source library into one of the PTP cells
- Moves the cartridge to the destination library
- The robot in the destination library removes and then returns the tape to the PTP cell
- The tape is then either returned to the source library (where it is placed into its home cell) or assigned a new cell in the destination library, depending on the software.

To start the PTP test:

1. Be sure that both libraries are offline.
2. Make sure that there is no cartridge in either of the PTP cells.
3. Make sure the main access doors are closed and the library menu is displayed.
4. Be sure there is a diagnostic cartridge in the reserved area of the source library.
5. From the status screen, press the **MENU** button.

The main menu will appear.

6. Press the down arrow button to move the cursor down until it is next to **DIAGNOSTICS**.
  7. Press the **SELECT** button.
- The **DIAGNOSTICS** screen will appear.
8. Press the down arrow button to move the cursor next to **PTP DIAGNOSTICS**.
  9. Press **SELECT**.

The operator panel will display **NUMBER OF LOOPS = 1**

10. If you wish to increase the number of loops, press the arrow button.
11. Press **SELECT** to start the test (or press **MENU** to stop or exit the test).

12. You will be prompted to confirm that you want the library in Maintenance Mode (offline) before beginning the test (**ARE YOU SURE?**). Confirm this by pressing the **SELECT** button.

If an error is encountered, consult the Event log for the FSC listed.

To re-start this test or to begin another test, press **MENU** to return to the **DIAGNOSTICS** menu.

## Other Diagnostic Tests

You might want to run all diagnostic tests. Descriptions of other tests that are available are given below.

- Clean Drive** This will mount and dismount a specified cleaning cartridge to a drive. This routine does *not* require the library to be offline. Be sure to instruct the operator how to run this routine.
- Mount** This test will mount a diagnostic tape to a selected drive.
- Dismount** This test will dismount a diagnostic tape from a selected drive.
- Run Drive Check** Checks whether the selected drive is functioning. This test applies to DLT 8000 and T9x40 drives; T9x40 drives must be running 1.28 or higher firmware.
- Demo Mode** This test will start a Get-Put Loop with customer cartridges to simulate machine operation. See the caution below.

**CAUTION:**

***Audit information changed:* Running the library in DEMO MODE causes the data cartridges to be rearranged. When DEMO MODE completes, you must IPL the library and notify the customer to upload library audit data to the client system.**

# Trouble Isolation Procedures

## 3

This chapter describes trouble isolation procedures (TIPs). TIPs are guidelines to help diagnose and correct operational failures that may not post a Fault Symptom Code (FSC).

Examples of failures that may not post an FSC are:

- AC power problem
  - AC PDU fault
  - Redundant AC power option (UPS) failure
- DC power faults
- Operator panel problems
- Interface errors
- Tape drive faults
- Mismatched SCSI interfaces

Each TIP is designed to help you isolate these problems. The START TIP is the beginning point for all other TIPs.

### ■ TIP 0000—START

Symptom Explanation	Conditions That Could Cause This Symptom
A failure is detected, but no FSC is displayed	<ul style="list-style-type: none"><li>• Defective AC power component</li><li>• Defective DC power component</li><li>• Defective operator panel</li><li>• Defective or incorrect SCSI cable</li><li>• Defective MPC/MPCL card</li><li>• Defective tape drive</li></ul>
1. Do you have an AC power problem?	<b>Yes:</b> Go to <a href="#">TIP 1000: Power—AC PDU</a> . <b>No:</b> Go to Step 3.
2. Do you have a power problem that may relate to the redundant power option?	<b>Yes:</b> Go to <a href="#">“TIP 1010: Power—UPS Power”</a> <b>No:</b> Go to Step 3.
3. Do you have an DC power problem?	<b>Yes:</b> Go to <a href="#">TIP 2000: Power—DC Power</a> . <b>No:</b> Go to step 4.
4. Do you have an operator panel problem	<b>Yes:</b> Go to <a href="#">TIP 3000: Operator Panel</a> . <b>No:</b> Go to Step 5.

5. Do you have a problem where the client system cannot access the library?	<b>Yes:</b> Go to <a href="#">TIP 4000: SCSI Interface</a> .
	<b>No:</b> Go to Step 7.
6. Do you have a tape drive problem?	<b>Yes:</b> Go to <a href="#">TIP 5000: Tape Drives</a> .
	<b>No:</b> Go to step 7.
7. If you are uncertain, run diagnostic tests on the library.	Refer to the <a href="#">“Diagnostic Tests” in Chapter 2, “Firmware Operation.”</a>

**CAUTION:**

**Be sure the operator has placed the library and drives offline before troubleshooting library faults.**

## ■ TIP 1000: Power—AC PDU

Use this TIP to troubleshoot AC power problems.

Symptom Explanation	Conditions That Could Cause This Symptom
The PDU breaker trips.	<ul style="list-style-type: none"> <li>Defective AC Power Distribution Unit (PDU)</li> <li>Defective power cable</li> <li>Incorrect power source</li> <li>Defective tape drive</li> </ul>

**Note:** Be sure to follow the safety precautions in [“Safety, Fiber Optic, and ESD” on page xxv](#).

1. Open the right front door.	
2. Is the power cord seated properly	<b>Yes:</b> Go to step 3.
	<b>No:</b> Reset the power cord.
3. Open the right side door and power off all the tape drives.	
4. Turn on the PDU breaker.	<b>Yes:</b> Go to step 5.
Does it trip?	<b>No:</b> Power on drives, one at a time, to see which drive causes the breaker to trip. Replace the defective drive.



- 
5. Disconnect the power cable from the customer receptacle. At the male pins on the power connector, use an volt/ohmmeter (set to *ohms*) to check between the following male pins on the power cable:
- 1 phase pin to GND = open
  - 2nd phase pin to GND = open
  - 1 phase pin to 2nd phase pin = <1 M $\Omega$
  - GND pin to frame = short
- Are the measurements correct?
- 
6. Loosen the screw on the cable strain relief bracket for the AC/DC power supply.
- 
7. Remove the power cable from the bottom of the PDU.
- 
8. Use an ohmmeter to check the continuity of all three wires in the power cable.
- Yes:** Go to step 9.  
**No:** Replace the cable.
- Is there continuity?
- 
9. Plug the power cord back into the customer's outlet. Leave the library end of the cord unplugged.
- 

**WARNING:**

***Electrocution hazard:* Take the necessary safety measures when measuring line voltage in the next procedure.**

**Warnung:**

***Lebensgefährliche Spannung:* Bevor Sie die Netzspannung wie nachstehend beschrieben messen, treffen Sie die entsprechenden Sicherheitsmaßnahmen.**

**Avertissement :**

***Danger d'électrocution:* Avant de mesurer la tension de secteur à l'étape suivante, prendre les mesures de sécurité requises.**

---

10. Switch your volt/ohmmeter to *AC volts* and measure the line voltage at the cable. Nominal voltage for North America is 100–120 VAC. Nominal voltage for international is 200–240 VAC.
- Yes:** Go to step 11.  
**No:** Notify customer.
- Is the line voltage correct?
- 
11. Place the cable into the bottom of the AC PDU. Move the breaker to the up position. Does the breaker still trip?
- Yes:** Replace the AC PDU.
-

## ■ TIP 1010: Power—UPS Power

Use this TIP to troubleshoot power problems with the APC uninterruptible power supply (UPS). This UPS is an optional feature that was designed to help prevent blackouts, brownouts, sags and surges in AC power to the library.

See [Figure A-1 on page A-3](#) for a wiring diagram and more information about the UPS.

### Notes:

If power fails, the UPS will supply power to the equipment connected to the power strip until the batteries are exhausted. While running on battery power, periodic beeps will sound.

- Press the TEST/ALARM DISABLE button to turn off this alarm.
- A continuous beep will sound *two* minutes before the UPS will shutdown.

### WARNING:

**Make sure you follow the procedures in “[Safety, Fiber Optic, and ESD](#)” on page xxv.**

Problem	Conditions That Could Cause This Problem
No power to the library.	<ul style="list-style-type: none"> <li>• Defective APC UPS, switch, or power strip</li> <li>• Defective AC PDU</li> <li>• Defective power cable</li> <li>• Disconnected power source</li> </ul>
1. Did the customer site lose power?	<p><b>Yes:</b> Go to step 2.</p> <p><b>No:</b> Go to step 4.</p>
2. Did the APC UPS activate?	<p><b>Yes:</b> Go to step 3</p> <p><b>No:</b> Go to step 4.</p>
3. Check the Replace Battery light. Is the LED on?	<p><b>Yes:</b> See <a href="#">Table 3-1 on page 3-5</a> for information about the problem and possible cause.</p> <p><b>No:</b> Go to step 4.</p>
4. Isolate the power problem between the library and the UPS.	<p>Refer to the <i>APC Reference and Troubleshooting Guide</i>, other APC documentation, or go online at <a href="http://www.apc.com">www.apc.com</a> for additional information.</p> <p>See <a href="#">Table 3-1 on page 3-5</a> to help isolate the problem with the UPS.</p> <p>See “<a href="#">TIP 1000: Power—AC PDU</a>” on page 3-2 for information about the library.</p>

**Table 3-1. Troubleshooting the APC Uninterruptible Power Supply**

<b>Problem and Possible Cause</b>	<b>Solution</b>
<b>UPS will not turn on.</b>	
<ul style="list-style-type: none"> <li>• ON button not pushed.</li> </ul>	Press the ON button once to power on the UPS and other equipment.
<ul style="list-style-type: none"> <li>• UPS not connected to AC power supply.</li> </ul>	Make sure the power cable from the UPS to the customer's input power is securely connected at both ends.
<ul style="list-style-type: none"> <li>• UPS input circuit breaker tripped.</li> </ul>	Reduce the load on the UPS by unplugging equipment and reset the circuit breaker (on back of the UPS) until you isolate the device causing the problem (or the UPS).
<ul style="list-style-type: none"> <li>• Very low or no utility voltage.</li> </ul>	Check the AC power supply to the UPS with a table lamp. If the light is very dim, check the input voltage.
<ul style="list-style-type: none"> <li>• Battery not connected properly.</li> </ul>	Check the battery connections.
<b>UPS will not turn off.</b>	
<ul style="list-style-type: none"> <li>• Internal UPS fault.</li> </ul>	Do not attempt to use the UPS. Unplug the UPS and contact APC immediately.
<b>UPS operates on battery although normal line voltage exists.</b>	
<ul style="list-style-type: none"> <li>• UPS's input circuit breaker tripped.</li> </ul>	Reduce the load on the UPS by unplugging equipment and reset the circuit breaker (on back of the UPS) until you isolate the device causing the problem (or the UPS).
<ul style="list-style-type: none"> <li>• Very high, low, or distorted line voltage. <b>Note:</b> Inexpensive generators can distort the voltage.</li> </ul>	<ul style="list-style-type: none"> <li>• Move the UPS to a different outlet on a different circuit.</li> <li>• Test the input voltage with the Utility Voltage display. If acceptable to the load, reduce the UPS's sensitivity (refer to the APC User's Manual for more information).</li> </ul>
<b>UPS beeps occasionally.</b>	
<ul style="list-style-type: none"> <li>• Normal UPS operation.</li> </ul>	None. The UPS is protecting the load.
<b>UPS does not provide expected backup time.</b>	
<ul style="list-style-type: none"> <li>• The UPS's battery is weak because of a recent power outage or is near the end of its service life.</li> </ul>	Charge the battery. Batteries require recharging after extended outages. The batteries wear faster when in service more often and when operated at higher temperatures. If the battery is near the end of its service life, consider contacting APC to replace the battery.

<b>Problem and Possible Cause</b>	<b>Solution</b>
<ul style="list-style-type: none"> <li>The UPS is overloaded.</li> </ul>	Check the UPS load display and unplug any less needed equipment (such as printers).
<b>Front panel indicators flash sequentially.</b>	
<ul style="list-style-type: none"> <li>The UPS has been shutdown by remote control.</li> </ul>	None. The UPS will restart automatically when power is restored.
<b>All indicators are lit and the UPS emits a constant beeping sound.</b>	
<ul style="list-style-type: none"> <li>Internal UPS fault.</li> </ul>	Do not use the UPS. Turn the UPS off and contact APC for service immediately.
<b>All indicators are off and the UPS is plugged into the power source.</b>	
<ul style="list-style-type: none"> <li>The UPS has shutdown and the battery is discharged from an extended outage.</li> </ul>	None. The UPS will return to normal operation when power is restored and the battery has a sufficient charge.
<b>The Replace Battery light is on.</b>	
<ul style="list-style-type: none"> <li>Weak batteries.</li> </ul>	Allow the batteries to recharge for at least four hours. If the problem persists after recharging, contact APC to replace the batteries.
<ul style="list-style-type: none"> <li>Replacement batteries not connected properly.</li> </ul>	Check or reconnect the battery connections.

Refer to the *APC Reference and Troubleshooting Guide*, other APC documentation, or go online at [www.apc.com](http://www.apc.com) for additional information.

## ■ TIP 2000: Power—DC Power

Use this TIP to troubleshoot and repair DC power cycling problems.

Symptom Explanation	Conditions That Could Cause This Symptom
The library PDU breaker is on, but the machine will not power up.	<ul style="list-style-type: none"> <li>Defective DC power supply</li> <li>Defective operator panel (MPO card)</li> <li>Defective cable from MPC/MPCL card to MPO (operator panel) card</li> <li>Defective MPC/MPCL card</li> <li>Defective component within the library causing the DC power supply to shut down.</li> </ul>

**Note:** Be sure to follow the safety precautions in [“Safety, Fiber Optic, and ESD” on page xxv](#).

1. Open the right front door and the right side door.	
2. Is the AC PDU breaker up?	<p><b>Yes:</b> Go to step 4.</p> <p><b>No:</b> Turn on PDU breaker. Go to step 3.</p>
3. Does the breaker trip?	<p><b>Yes:</b> Go to <a href="#">“TIP 1000: Power—AC PDU” on page 3-2</a>.</p> <p><b>No:</b> Go to step 4.</p>
4. Look at the small viewing window on the DC power supply. Is the green LED lit?	<p><b>Yes:</b> Go to step 6.</p> <p><b>No:</b> Turn off the breaker. Unplug J570 (or J571) on the MPC/MPCL card. Go to step 5.</p>

<p>5. Plug J570/571 into the MPC/MPCL card.</p> <ol style="list-style-type: none"> <li>Turn on the breaker.</li> <li>Look at the small viewing window on the DC power supply.</li> <li>Is the green LED lit?</li> </ol>	<p><b>Yes:</b> A cable or component has caused the machine to shut down the power.</p> <ol style="list-style-type: none"> <li>Turn off the breaker.</li> <li>Unplug the connectors (except J570/571) from the MPC/MPCL card.</li> <li>Plug an MPC/MPCL connector into the MPC/MPCL card.</li> <li>Turn on the breaker and see if the green LED is on.</li> <li>Repeat steps 1–4 until you find the connector that causes the LED to turn off. If a connector causes the LED to turn off, find the component that the connector supplies and replace that component.</li> </ol> <p>Refer to <a href="#">Figure 3-1 on page 3-9</a> for an illustration of the MPC/MPCL card and <a href="#">Table A-11 on page A-26</a> for a list of the connectors.</p>
<p>6. Are the MPC/MPCL card fans and the two fans in the drive area working?</p>	<p><b>No:</b> Go to step 6.</p> <p><b>Yes:</b> Go to step 7.</p> <p><b>No:</b> +43 VDC is missing. Replace the DC power supply.</p>
<p>7. Is the operator panel lit?</p>	<p><b>Yes:</b> Go to step 8.</p> <p><b>No:</b> Replace in this order:</p> <ol style="list-style-type: none"> <li>Operator card (MPO).</li> <li>Operator panel cable to MPC/MPCL card, J28.</li> </ol>
<p>8. Open the left front access door and check the hand LEDs. Are they lit?</p>	<p><b>Yes:</b> Go to step 9.</p> <p><b>No:</b> Possible hand problem. Replace the hand.</p>
<p>9. If the machine still does not power on....</p>	<p>Replace the MPC/MPCL card.</p>

Figure 3-1. MPC/MPCL Card Connections (C65068)

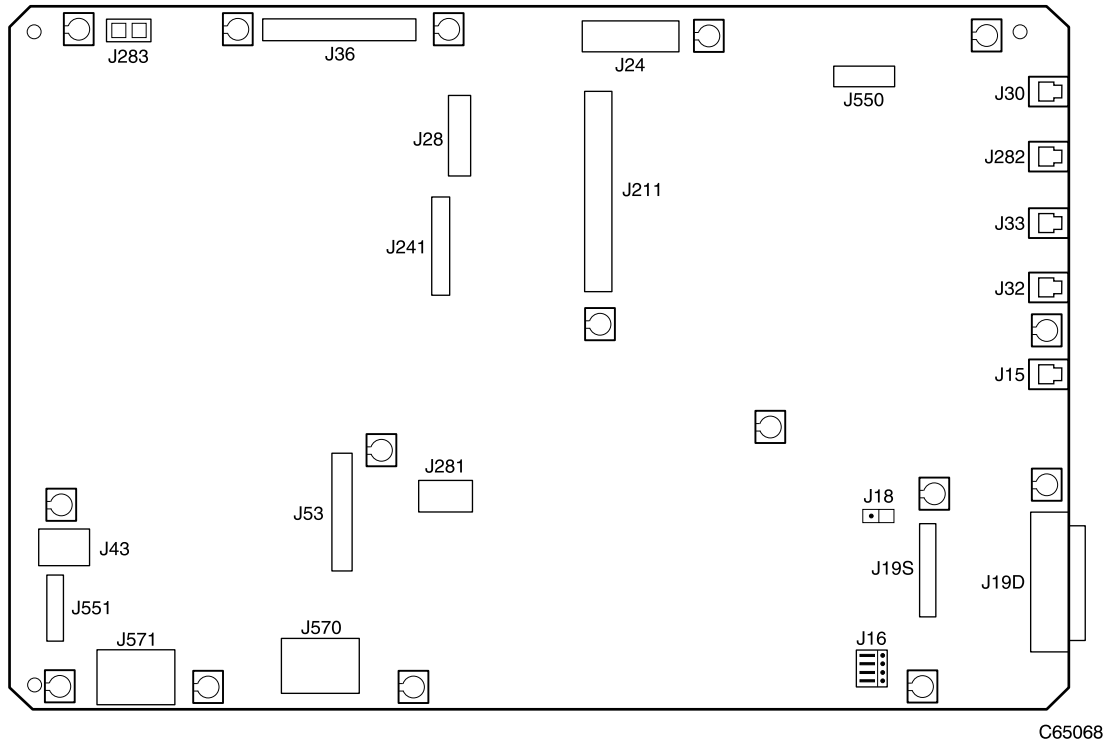


Table 3-2. MPC Card Connections

Connector	Function
J283	PTP power (Unused in standalone library)
J36	Servo signal lines
J24	Tape Transport Interface (TTI) for drives 1 to 10
J550	Personality key (MPK card) - if required
J30 CSE Port RS 423	<ul style="list-style-type: none"> <li>Pre-3.00 firmware: Dumb terminal port, used only to load pre-2.00 firmware.</li> <li>3.00 and later firmware: Command Line Interface (CLI). Laptop connection: 38,400 baud rate. Used for Hyperterminal downloading port for firmware, running diagnostic tests, and examination of FSC log.</li> </ul>
J282	Reserved
J33 SER1 Port RS423	<ul style="list-style-type: none"> <li>Pre-3.00 firmware: Used for laptop command line interface (CLI) connection: 38,400 baud rate. Used for Hyperterminal downloading port for firmware (editions 2.20 and later), running diagnostic tests, and examination of FSC log.</li> <li>3.00 and later firmware: Engineering use only.</li> </ul>

**Table 3-2. MPC Card Connections (Continued)**

<b>Connector</b>	<b>Function</b>
J32	SER2 port (RS423) - unused
J15	Ethernet connector (TCP/IP)
J19D	SCSI Differential
J19S	SCSI Single-ended (MPC) or LVD/SE (MPCL only)
J16	Single-ended or HVD selection jumpers (MPC); LVD/SE or HVD selection jumpers (MPCL)
J18	Terminating power jumper
J211	Connector for Compact PCI – MPV expansion card.
J28	Operator panel
J241	Tape Transport Interface (TTI) connection to MPM multiplexor card for drives 11 to 20
J281	Engineering use only
J53	CAP and door
J570	DC power in from second MPF (DC power) supply (Powers tape library and second bank of drives)
J571	DC power in from first MPF (DC power) supply (Powers tape library and first bank of drives)
J551	DC fans
J43	Servo power to robot and hand-camera assembly



## ■ TIP 3000: Operator Panel

Use this TIP if the operator panel does not function.

Symptom Explanation	Conditions That Could Cause This Symptom
There is no display on the operator panel or the panel does not function correctly.	<ul style="list-style-type: none"> <li>Defective AC PDU</li> <li>Defective DC power supply</li> <li>Defective operator panel (MPO card).</li> <li>Defective cable or connection between MPC/MPCL card to MPO (operator panel) card</li> <li>Defective MPC/MPCL card</li> </ul>
1. Have the customer place the library and drives offline.	
2. Open the right front door	
3. Is the PDU breaker on?	<p><b>Yes:</b> Go to step 5.</p> <p><b>No:</b> Turn on breaker.</p>
4. Does the breaker trip?	<p><b>Yes:</b> Go to <a href="#">“TIP 1000: Power—AC PDU” on page 3-2.</a></p> <p><b>No:</b> Go to step 5.</p>
5. Is the operator panel lit?	<p><b>Yes:</b> Go to step 6.</p> <p><b>No:</b> <a href="#">“TIP 2000: Power—DC Power” on page 3-7.</a></p>
6. Open the left front access door and check the hand LEDs. Are they lit?	<p><b>Yes:</b> Go to Step 7.</p> <p><b>No:</b> Go to <a href="#">“TIP 2000: Power—DC Power” on page 3-7.</a></p>
7. Use the panel buttons to enter a test or move to a different screen.  Does the panel work?	<p><b>No:</b> Replace in this order, checking for operation after each step:</p> <ol style="list-style-type: none"> <li>1. Replace the MPO (operator panel) assembly</li> <li>2. Replace the cable from the MPC/MPCL card to the operator panel.</li> <li>3. Replace the MPC/MPCL logic card</li> </ol>

## ■ TIP 4000: SCSI Interface

Use this TIP if the client system does not recognize the library.

Before starting, be sure that the SCSI cables are the correct type and length for your operation. SCSI cable information is covered in [Table 1-3 on page 1-5](#).

### CAUTION:

**Compatibility problem: The single-ended, differential, and LVD/SE alternatives are not compatible and cannot be mixed on the same SCSI bus.**

You can use the “Lib SCSI I/F Config” menu from the operator panel to check the valid SCSI bus connections. The screen that displays the SCSI ID of the library will display either “single-ended” or “differential.”

If the screen displays “invalid,” you have mixed single-ended devices with differential devices somewhere on the bus. The table below lists possible symptoms of mismatched bus types.

**Table 3-3. SCSI Device/Bus Types: Precautions**

If you plug a . . .	Into . . .	The result is . . .
Single-ended device	Single-ended bus	Proper connection
	LVD bus	Single-ended mode
	HVD bus	Operation disabled
Low voltage differential device	Single-ended bus	Single-ended mode
	LVD bus	Proper connection
	HVD	<i>Potential damage</i> /disabled device
High voltage differential device	Single-ended bus	Disabled device
	LVD bus	<i>Potential damage</i> /disabled device
	HVD bus	Proper connection

Correct the bus connection, then use the menu to verify the bus connection.

Symptom Explanation	Conditions That Could Cause This Symptom
The library cannot be accessed by the client system.	<ul style="list-style-type: none"> <li>• The system is not working or incorrectly configured</li> <li>• Incorrect library configuration</li> <li>• Loose or incorrect cable connection at the system or at the library</li> <li>• Defective MPC/MPCL card</li> </ul>

1.	Have the customer place the library and drives offline.		
2.	Open the right front door.		
3.	Is the library the only client system component not operating correctly?	<b>Yes:</b>	Go to step 4.
		<b>No:</b>	Notify the system administrator.
4.	Check the library configuration to be sure it matches the system requirements. This can be checked in the “Lib Config Menu” and the “Lib SCSI I/F Config Menu” on the operator panel.  Is the library correctly configured?	<b>Yes:</b>	Go to step 5.
		<b>No:</b>	Correctly configure the library (See “Configuration” in Chapter 2, “Firmware Operation.”).
5.	Check the host-to-library cable connection at the library bulkhead.  Is the cable the correct type and the connection good?  <b>Note:</b> The correct lengths and types of connectors are discussed in <a href="#">Table 1-3 on page 1-5</a> .	<b>Yes:</b>	Go to step 6.
		<b>No:</b>	Reseat the cable connector or correct the cable type.
6.	If the control path is SCSI, is there a SCSI terminator at the library bulkhead?	<b>Yes:</b>	Go to step 7.
		<b>No:</b>	Apply the correct terminator: <ul style="list-style-type: none"> <li>• Differential = part 10148003</li> <li>• Single-ended = part 10148002</li> </ul>
7.	Check the library bulkhead-to-MPC/MPCL card cable connection.  Is the cable the correct type and the connection good?	<b>Yes:</b>	Go to Step 8.
		<b>No:</b>	Reseat the cable connector or correct the cable type.
8.	Check the cable connection at the host  Is the cable the correct type and the connection good?	<b>Yes:</b>	Go to Step 9.
		<b>No:</b>	Reseat the cable connector or correct the cable type.
9.	Check the SCSI terminator at the client.  Is the terminator turned on?	<b>Yes:</b>	Go to step 10.
		<b>No:</b>	Turn it on.
10.	Is the length of the SCSI bus correct for its operation type?  The correct lengths and types of connectors are discussed in <a href="#">Table 1-3 on page 1-5</a> .	<b>Yes:</b>	Go to step 11.
		<b>No:</b>	Connect the correct length of SCSI cable.

<p>11. Does the SCSI bus have more than the maximum number of devices allowed?</p>	<p><b>Yes:</b> Check with system administrator to correct the number of devices on this bus.</p> <p><b>No:</b> Go to step <a href="#">12</a>.</p>
<p>12. Check all connections at the MPC/MPCL card. A physical diagram of this card is shown in <a href="#">Figure A-8 on page A-26</a>.</p> <p>Are the connections correct?</p>	<p><b>Yes:</b> Go to step <a href="#">13</a>.</p> <p><b>No:</b> Reset the connectors.</p>
<p>13. Replace the MPC/MPCL card.</p> <p><b>Note:</b> Be sure to re-configure the new MPC card.</p> <p>Does this fix the problem?</p>	<p><b>Yes:</b> Return the equipment to the customer.</p> <p><b>No:</b> The problem may be due to:</p> <ul style="list-style-type: none"> <li>• Defective SCSI cable</li> <li>• Intermittent DC power problem</li> </ul> <p>Replace the SCSI cables one at a time. If this does not fix the problem, replace the DC power supply.</p>

## ■ TIP 5000: Tape Drives

The following procedure describes the isolation of a faulty tape drive and its replacement while the library and other drives are online. This procedure is termed a “hot swap” of a tape drive.

**Note:** Before starting, read through the procedure to become familiar with the tasks both you and the operator must perform.

You can use the “Drive Status” menu from the operator panel (see “[Drive Status](#)” on [page 2-48](#)) to check the drive’s status. Typically, drive failures are reported in this menu as:

- Not connected
- Unknown drive
- Not communicating
- Not functional
- Not loadable

Symptom Explanation	Conditions That Could Cause This Symptom	
The client system: <ul style="list-style-type: none"> <li>• Cannot access a drive</li> <li>• Marks the drive unavailable</li> <li>• Detects an unrecoverable error in the drive</li> </ul>	<ul style="list-style-type: none"> <li>• The drive has lost power</li> <li>• A poor or missing SCSI/fiber bus connection</li> <li>• A defective SCSI/fiber cable</li> <li>• A damaged tape</li> <li>• A faulty drive</li> </ul>	
1. Have the customer place the drive offline.		
2. Open the right side door.		
3. At the operator panel, consult the drive’s status (see <a href="#">Table 2-9 on page 2-48</a> ). Does the panel display: <ul style="list-style-type: none"> <li>• “Not communicating?”</li> <li>• “Not functional?”</li> </ul>	<b>Yes:</b>	Go to step <a href="#">4</a> .
	<b>No:</b>	Go to step <a href="#">6</a> .
4. Is the drive firmly seated into its connector?	<b>Yes:</b>	Go to step <a href="#">5</a> .
	<b>No:</b>	Firmly seat the drive into the connector. Go to step <a href="#">5</a> .
5. Is the drive AC switch in the on ( ) position?	<b>Yes:</b>	Go to step <a href="#">6</a> .
	<b>No:</b>	Set the switch on. If the drive still fails to function, go to step <a href="#">10</a> .

6. At the operator panel, consult the drive's status (see <a href="#">Table 2-9 on page 2-48</a> ). Does the panel display "Unknown drive?"	<b>Yes:</b> Check the drive type to be sure it matches the system requirements. This can be checked in the "Lib Config Menu" and the "Lib SCSI I/F Config Menu" on the operator panel.
	<b>No:</b> Go to step 7.
7. At the operator panel, consult the drive's status (see <a href="#">Table 2-9 on page 2-48</a> ). Does the panel display "Not connected?"	<b>Yes:</b> The drive's Tape Transport Interface (TTI) connector is not firmly connected or the AC switch may be off. See steps 4 and 5.
	<b>No:</b> Go to step 9.
8. Check the host-to-drive cable connection at the library bulkhead (SCSI) or fiber component <i>and</i> at the drive.	<b>Yes:</b> Go to step 10.
Is the cable the correct type and the connection good?	<b>No:</b> If the cable is: <ul style="list-style-type: none"> <li>• Incorrect type—schedule time to replace cable.</li> <li>• Incorrectly connected or the connector is damaged—schedule time to replace the cable.</li> </ul>
The correct lengths and types of connectors are discussed in <a href="#">Table 1-3 on page 1-5</a> .	
9. If possible, obtain the tape that was mounted on the drive at the time of the error.	<b>Yes:</b> Have the operator remove the tape from the system pool.
Have the operator make another drive offline and use a system diagnostic test with this tape on that drive.	<b>No:</b> Go to step 10.
Was an error encountered?	

---

10. Drive replacement:

**CAUTION:**

**System interruption:** To avoid a system interruption, be sure to carefully follow the step below when replacing the drive.

- a. Place the replacement drive in a convenient position near the defective drive's position.
- b. Have the operator quiesce the system's SCSI/fiber bus to the drive and make the drive unavailable to the system.
- c. Replace the drive:
  1. For DLT drives, follow the procedure in [“DLT 4000/7000E/8000 Tape Drive” on page 5-69](#) to replace the drive.
  2. For Ultrium drives, follow the procedures in [Chapter 5](#) for the specific drive manufacturer.

**CAUTION:**

**Special information for T9x40 drives:** Consult the *T9x40 Tape Drive Service Reference Manual* for drive configuration options. The library will automatically assign the same address to the replacement drive. However, you may need to configure other information for the drive before performing the swap.

3. For T9x40 drives, follow the directions in the *T9x40 Tape Drive Service Reference Manual* to replace the drive.

---

11. Recovery information:

Drive, library, and system recovery from the hot swap procedure is explained below.

Once the drive is replaced:

- A SCSI “Bus Reset” command is *not* asserted during the operation
  - The library will sense that a new drive is installed
  - Library communications with the drive is automatically resumed
  - The SCSI ID of the drive is automatically assigned the same ID of the drive that was replaced—no reconfiguration or library re-boot is required.
  - The drive type, serial number, and firmware version is also automatically updated.
  - The drive handle is cycled (DLT only)
  - The drive is automatically available to the library
  - Some system intervention may still be required to make the drive available to the system
-

This page intentionally left blank.



This chapter describes the SER1 and CSE ports located on the MPC/MPCL logic card.

**Note:** With firmware edition 3.00 and later, you should download firmware through the CSE (CLI) port, using hyperterminal protocol.

For firmware edition 2.00 and lower, you should download firmware through the SER1 port, using hyperterminal protocol.

The Hyperterminal procedure is explained in [“CLI Port - Hyperteminal Method” on page 2-11](#).

## ■ SER1 Port

The SER1 port is used *only* to download firmware editions 2.0 or lower.:

- RS423 or RS232 serial protocol
- An RJ45 connector and cable (part 4108289xx)
- An RJ45—DB9 adapter (part 10410823) or CSE DOS Diagnostic cable (part 24100134).
- The communication must be set to:
  - 38,400 baud
  - Eight data bits
  - No parity bit
  - One stop bit

**Note:** This port is unused in firmware editions 3.00 and later.

## ■ CLI (CSE) Port

The command line interface (CLI) or CSE port is used for editions *3.00 or later* firmware. It enables a remote or laptop computer user to load firmware, run diagnostic tests, examine and clear the FSC log, view fault symptom codes, or connect the library to a remote modem. Operation through the CLI port requires:

- RS423 or RS232 serial protocol
- An RJ45 connector and cable (part 4108289xx)
- An RJ45—DB9 adapter (part 10410823) or CSE DOS Diagnostic cable (part 24100134).
- The communication must be set to:
  - 38,400 baud
  - Eight data bits

- No parity bit
- One stop bit

**Note:** Firmware loads at the rate determined by the firmware executable file (38,400 baud).

## ■ Modem Installation

To accomplish a remote hookup, you will need:

- An auto-answer modem with all the proper regulatory approvals for the country in which it will be used
- A CCITT cable with RJ45 connectors
- A serial device or laptop computer. Either device must:
  - Support dumb terminal mode
  - Use a standard modem communication utility (such as StorageTek STDS)<sup>1</sup>

CCITT modular cable assemblies are available for connecting the adapter to the Machine Activated Routing Switch (MARS). StorageTek cables are listed in [Table 4-1](#).

**Table 4-1. CCITT Cables**

Part	Length (m)	Length (ft)
4108289-02	6 m	19 ft
4108289-05	15 m	50 ft
4108289-20	30 m	100 ft
4108289-25	45 m	150 ft
4108289-30	60 m	200 ft
4108289-25	75 m	250 ft

## Modem Configuration—Switch Settings

If your installation requires a modem, allowing you to remotely link to the tape library, refer to [Table 4-2 on page 4-3](#) for the modem DIP switch settings.

**Note:** Most modem settings can be accomplished with DIP switches within the modem. This method is preferable, because it allows automatic configuration if the modem power is cycled. Refer to the manual for your modem model.

---

1. Consult FIXIT database, entry R8348, for more information regarding STDS.

**Table 4-2. Modem Switch Settings**

Configuration	Setting	Entry
Carrier Detect (CD) to remote system	ON	&C1
Data Set Ready (DSR) complies with CCITT, Clear To Send (CTS) always on (see note).	ON	\D3
Long form result code	ON	\VO
Auto answer	ON	SO=1
Auto-reliable mode	ON	\N3
Enable remote access (see note)	ON	*E1
Data Terminal Ready (DTR)	ON	&D2
Disable rate adjust	ON	\JO

**Note:** This setting does not appear on all modems.

## Modem Configuration—Serial Device or Laptop Computer Entries

If your modem does not permit setup through DIP switch settings, perform the following:

1. Set your serial device or laptop computer to:
  - 38,400 baud
  - Eight bits
  - No parity bit
  - One stop bit
2. Power-on the modem.
3. Connect the RJ45 cable from your device to the modem.
4. Enter “dumb terminal mode” on your device.
5. Enter AT (**Return** or **Enter**) from your keyboard. The modem should respond by displaying *OK* on the screen of your serial device or laptop computer. If it does not, inspect all cable connections; also verify that the cables and connectors have the correct part numbers.
6. Enter:
 

```
AT&F&W (Return or Enter)
```
7. Enter only *one* of the following strings from your keyboard:
  - For modems that require *all* settings as shown in [Table 4-2](#), enter
 

```
AT&C1\D3\VOSO=1\N3*E1&D2\JO&W (Return or Enter)
```

- For modems that do *not* require all settings as shown in [Table 4-2 on page 4-3](#), enter

```
AT&C1\VOSO=1\N3&D2\JO&W (Return or Enter)
```

## ■ Testing the Modem

To test the modem configuration:

1. Set the modem to go off-hook in answer mode; on some modems this is done by a switch setting.
2. Open the right, front door of the tape library.
3. Connect the CCITT cable from the modem to the third phone jack (labeled *SER 1*) on the side of the MPC/MPCL card.

**Note:** If your modem has a DTR LED, this LED will light.

4. Dial into the modem.
5. To disable rate adjust—enter \J0.
6. Once connected, enter P. This will present the L700/700e diagnostic menu to your screen.
7. Upon completion of your session, exit the menu.
8. Enter ++++ and wait for the message “OK.”
9. Enter ATH and (Return or Enter) to disconnect.

# Removal and Replacement

## 5

---

This chapter contains the procedures to replace components within the tape library.

### ■ Preparation

You will need a standard tool kit for most procedures. Before beginning any procedure:

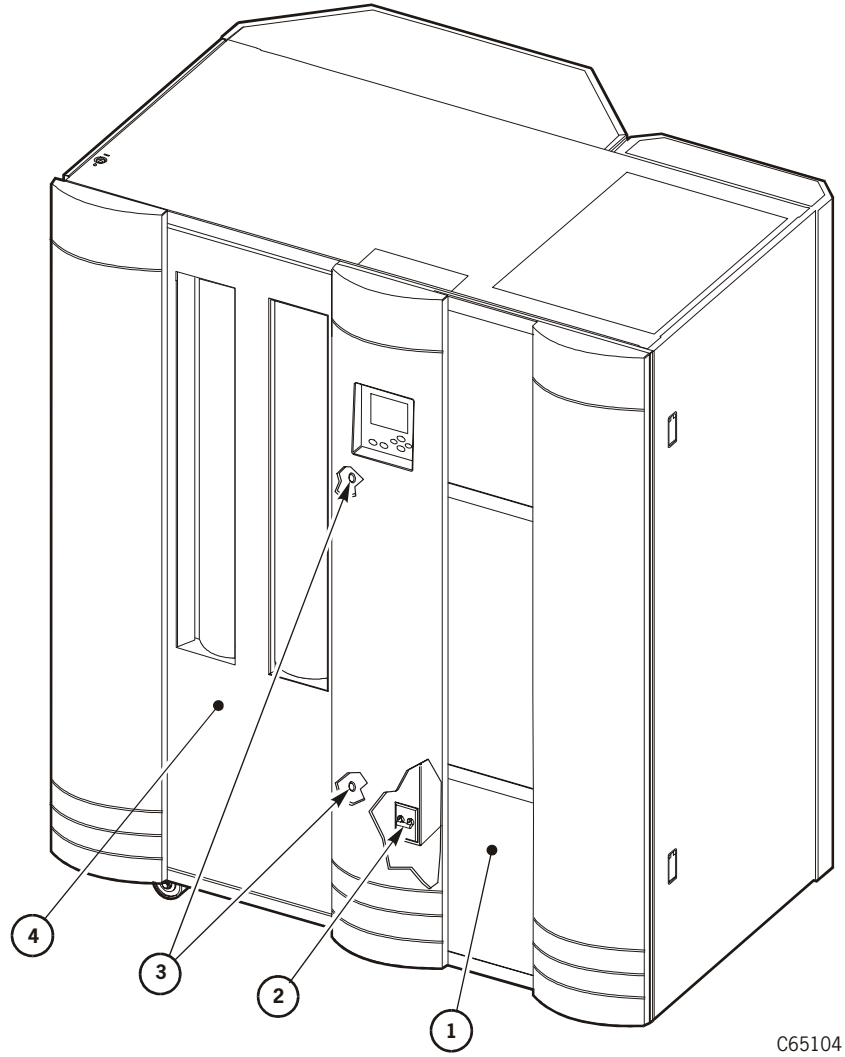
- Be sure to read the safety and ESD instructions in [“Safety, Fiber Optic, and ESD” on page xxv](#).
- Make sure the tape library and all drives are idle and not in use.
- If your libraries are connected by a Pass-thru Port (PTP), make sure that *both* libraries are idle and not in use.

**CAUTION:**

***Confined space:* While working within the library, take care to avoid bumping your head or catching your clothing on protruding edges.**

**Figure 5-1. L700/700e Exterior Components (C65104)**

---

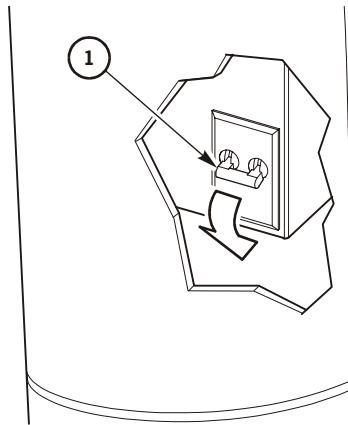


1. Right front door
2. Power switch
3. Left front door key slots
4. Left front door

For most field replaceable units, you will need to perform the following steps before accessing the FRU.

1. Be sure the customer has ended all jobs that the robot and drives are performing.
  2. Open the tape library right front door.
- 
3. Remove power from the tape library by pressing down on the power switch or switches inside the right front door.

1. Power switch

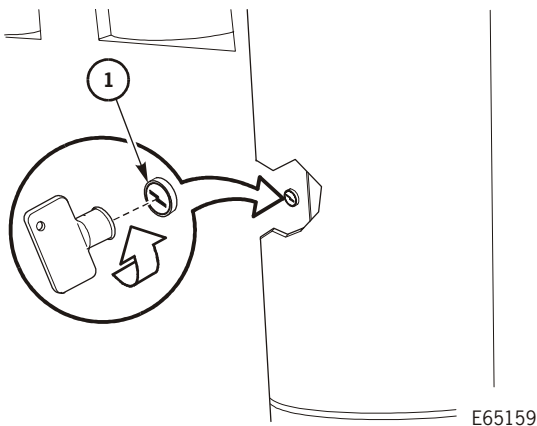


E65158

- 
4. Open the tape library left front door by unlocking the top and bottom latches with the key provided.

**Note:** For some FRUs—including logic cards, fans, power supply, and operator panel—you will not need to open the left front door.

1. Left front door key

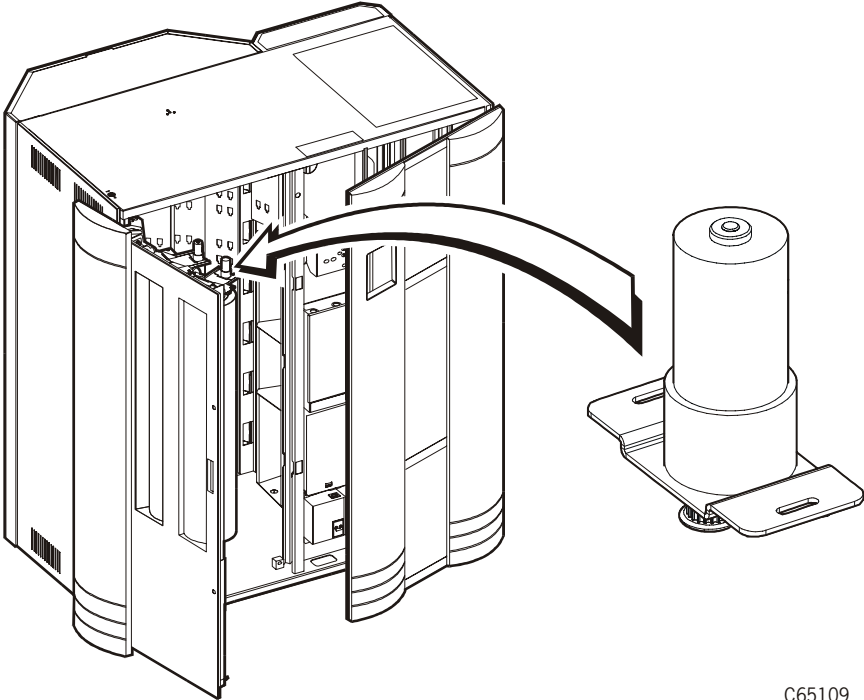


E65159

# ■ Cartridge Access Port (CAP) Components

## CAP Motor

Figure 5-2. CAP Motor (C65109)

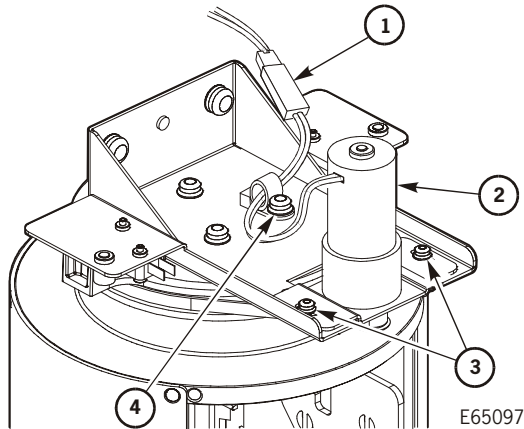


C65109



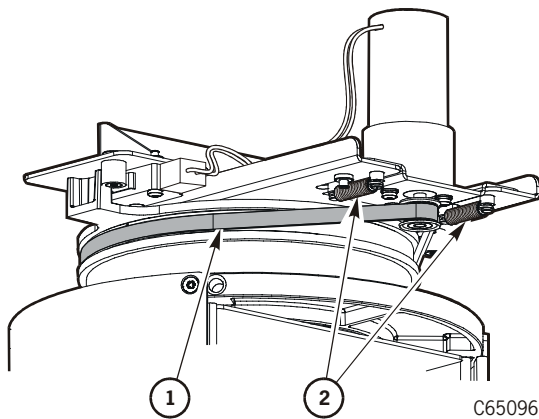
## Removal

1. Review the information under [“Preparation” on page 5-1](#).
2. Remove the two CAP motor screws (Torx T-15 driver).
3. Remove the Torx T-25 cable clamp screw.
4. Disconnect the CAP motor cable connector.



1. CAP motor cable connector
2. CAP motor
3. CAP motor screws
4. Cable clamp screw

5. Remove the CAP belt from the motor pulley.
6. Remove the two CAP motor springs below the CAP motor with a needle-nose pliers.

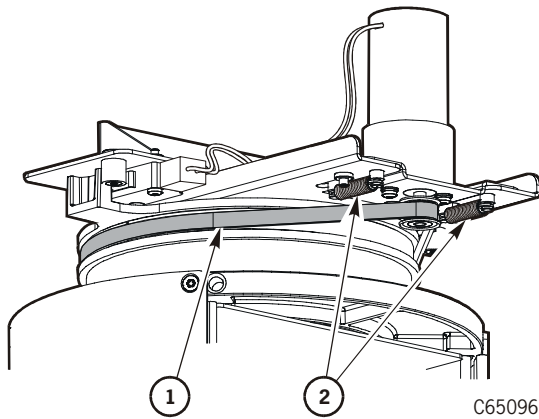


1. CAP belt
2. CAP motor springs

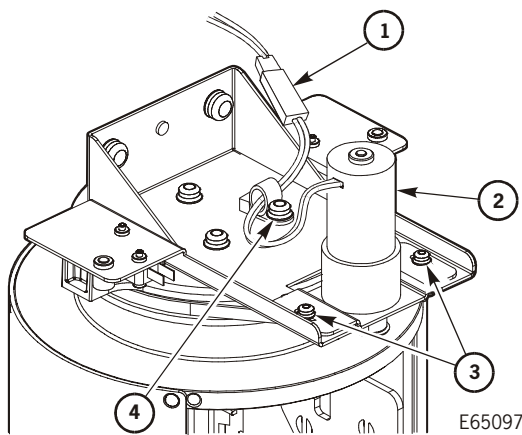
7. Remove the CAP motor.

## Replacement

1. Install the new CAP motor and, using a needle-nose pliers, attach two springs below the CAP motor. Be sure the CAP belt is placed on the CAP motor pulley and centered in the top channel.



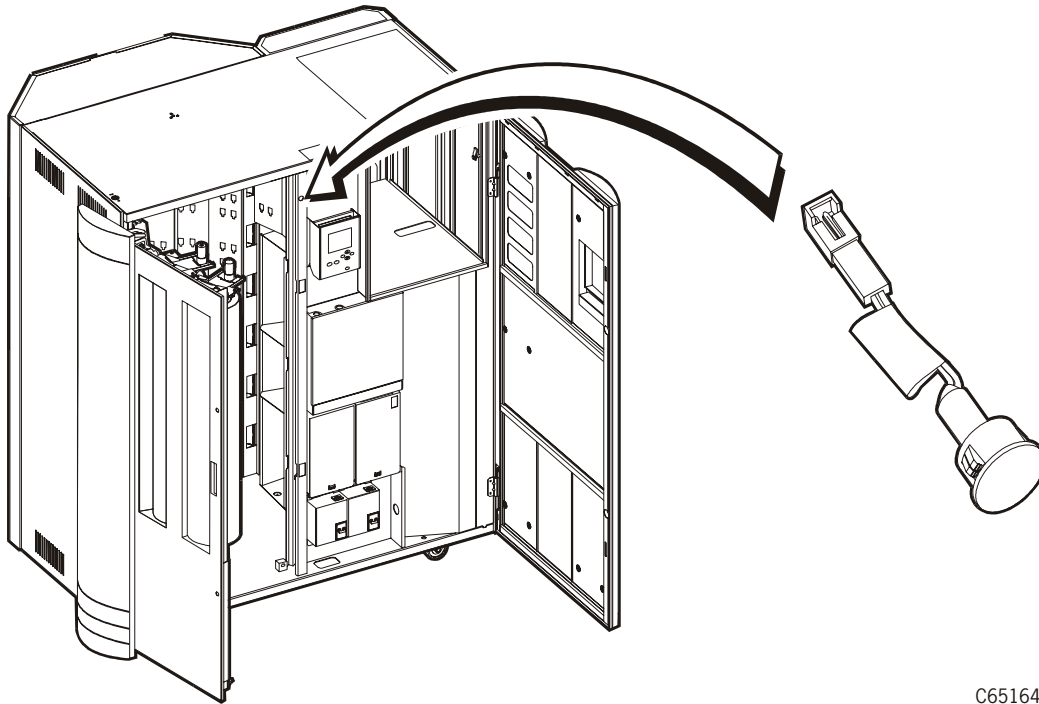
2. Connect the CAP motor cable connector.
3. Replace the cables in the cable clamp
4. Use a Torx T-25 screw to attach the cable clamp to the CAP motor bracket.
5. Attach the two CAP motor screws using a Torx T-15 driver.



6. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.

## CAP and Door Interlock Cable

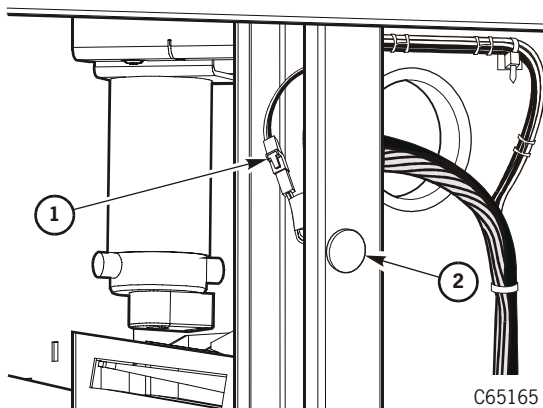
Figure 5-3. Interlock Cable (C65164)



C65164

### Removal

1. Review the information under [“Preparation”](#) on page 5-1.
2. Disconnect the interlock cable connector.



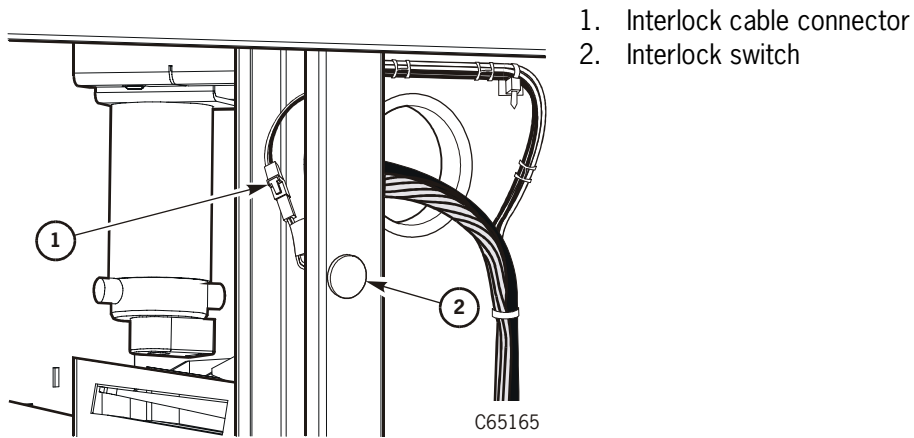
1. Interlock cable connector
2. Interlock switch

C65165

3. Squeeze the ears of the interlock switch and push it through the opening in the frame.

## Replacement

- 
1. Thread the interlock switch and cables through the opening in the frame and press the switch until the ears engage.
- 
2. Connect the interlock cable connector.

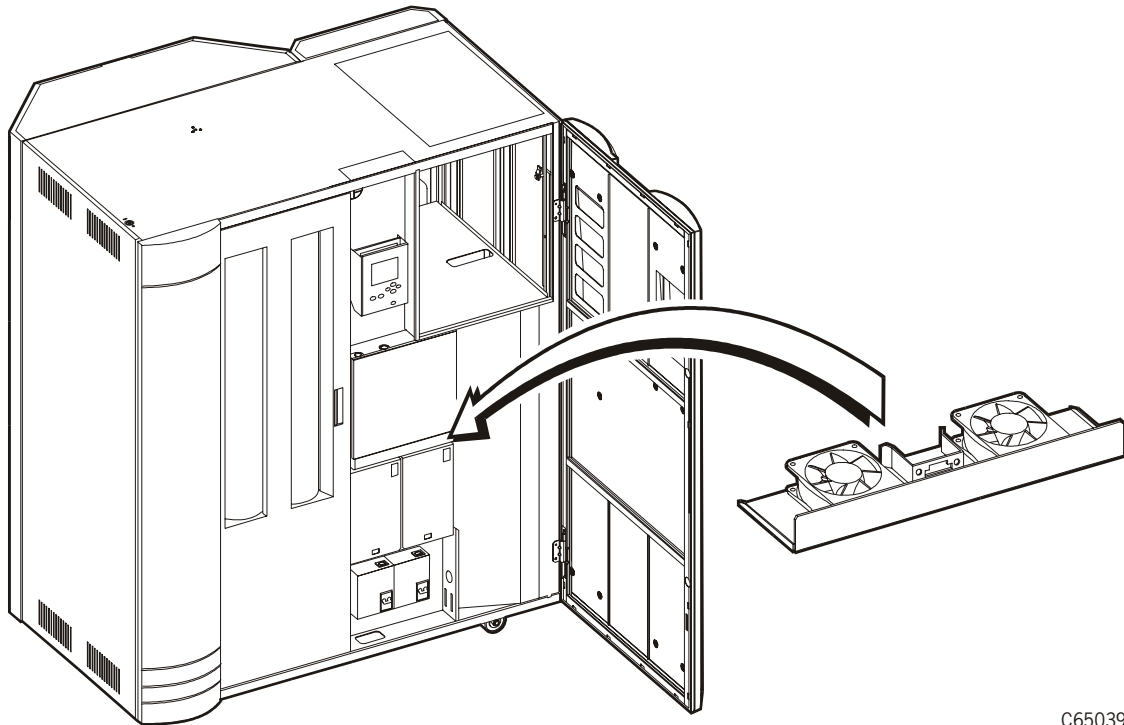


- 
3. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
-

## ■ Fans

### Electronics Module Fan Tray Assembly

Figure 5-4. Electronics Module Fan Tray Assembly (C65039)



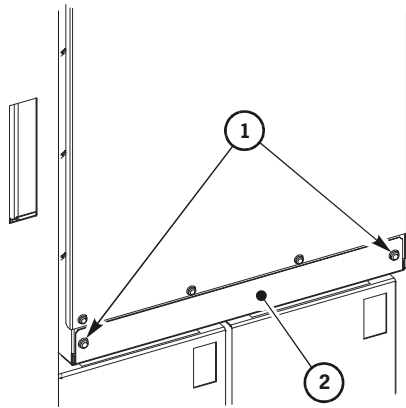
C65039

## Removal

---

**Note:** This field replaceable unit may be removed and replaced while the library is powered on.

1. Open the tape library right front door.
- 
2. Remove the two fan tray screws by using a Torx T-15 driver. Retain the screws.



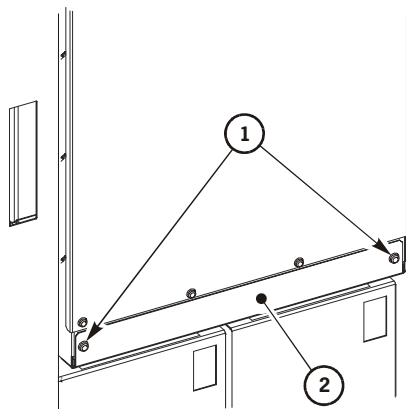
E65130

1. Fan tray screws
2. Fan tray assembly

- 
3. Remove the fan tray assembly.
- 

## Replacement

- 
1. Install the new fan tray assembly.
- 
2. Attach the two fan tray screws by using a Torx T-15 driver.

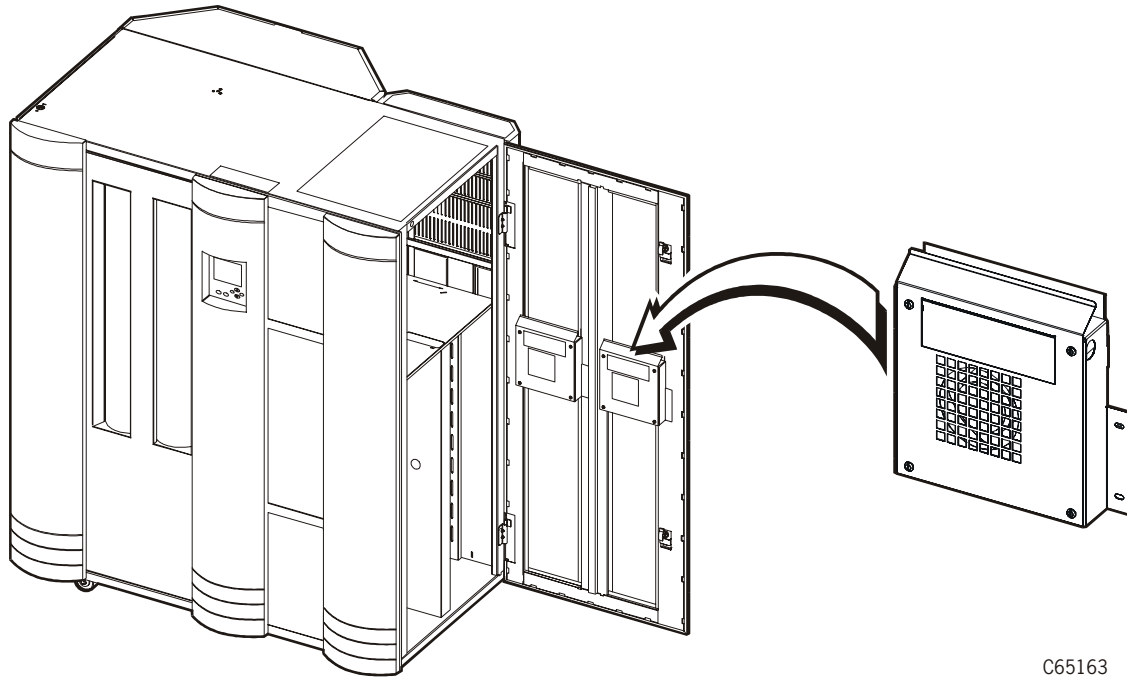


E65130

1. Fan tray screws
2. Fan tray assembly

## Drive Bay Exhaust Fan

Figure 5-5. Drive Bay Exhaust Fan (C65163)



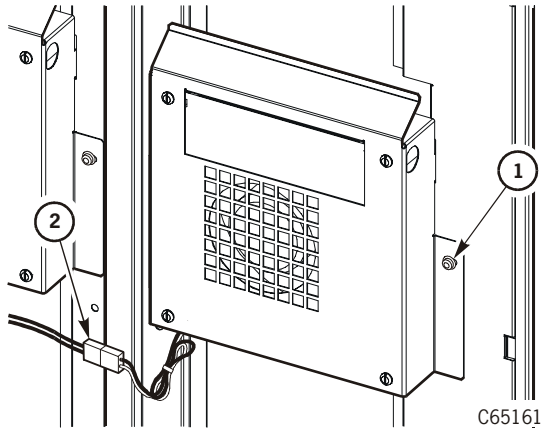
C65163

## Removal

---

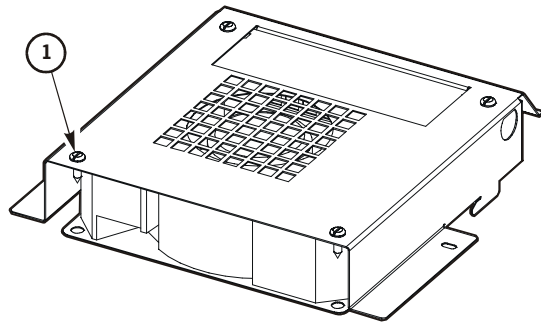
**Note:** This field replaceable unit may be removed and replaced while the library is powered on.

1. Open the tape library right side door.
2. Disconnect the fan motor cable connector.
3. Remove the two fan assembly screws by using a Torx T-25 driver. Retain the screws.



1. Fan assembly screw
2. Fan motor cable connector

- 
4. Lift and remove the fan assembly from the tape library door.
  5. Remove the four Phillips face plate screws attaching the face plate to the fan assembly. Retain the screws.



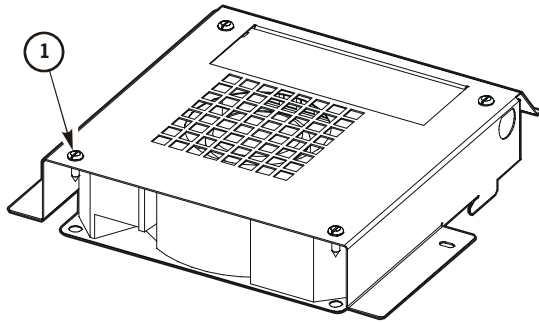
1. Face plate screw.

- 
6. Remove the fan assembly from the face plate.
-



## Replacement

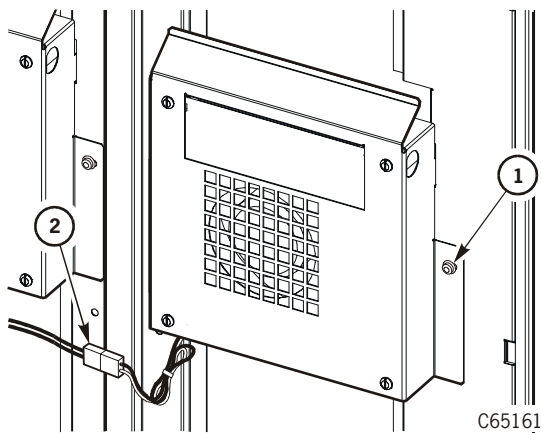
1. Insert the new fan assembly into the face plate, and be sure the text on the fan appears in the large rectangular cutout.
2. Attach the four face plate screws to the fan assembly by using a Phillips screwdriver.



1. Face plate screw

C65162

3. Connect the fan motor cable connector.
4. Attach the two fan assembly screws to the tape library right side door by using a Torx T-25 driver.

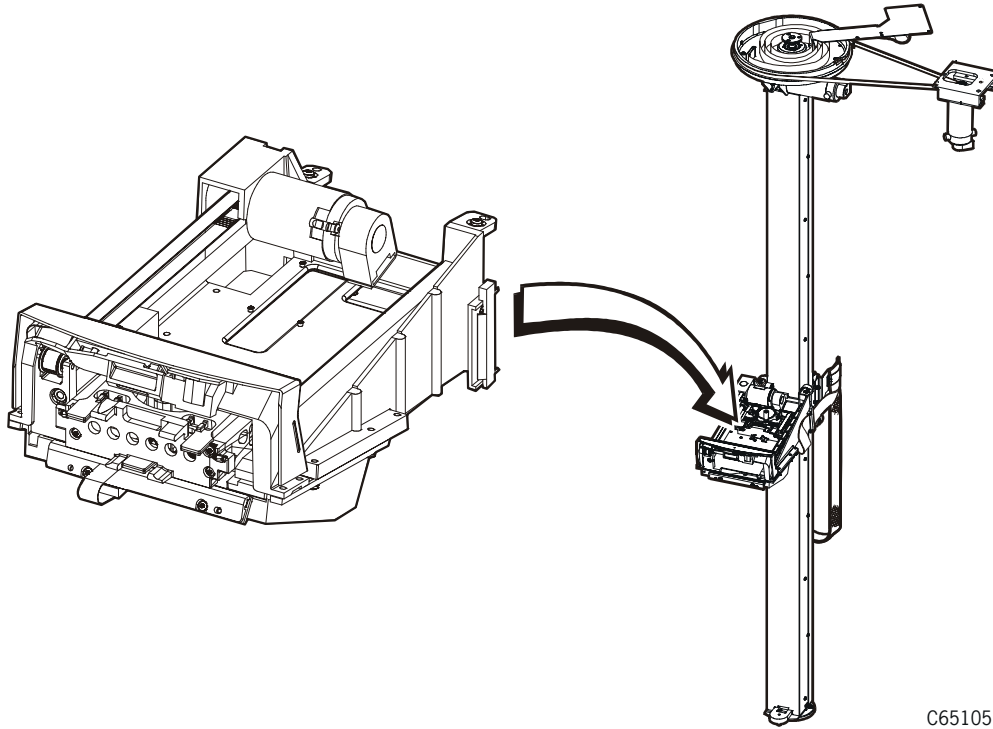


1. Fan assembly screw
2. Fan motor cable connector

C65161

## ■ Hand-Camera Assembly

Figure 5-6. Hand-Camera Assembly (C65105)



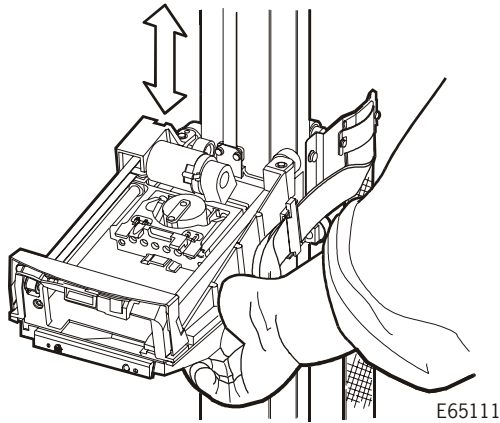
### Removal

**CAUTION:**

***Possible equipment damage:*** You will need the hand-camera assembly shipping pin that was shipped with the tape library to replace the hand-camera. The pin should have been left inside the tape library after it was installed.

If the shipping pin is not available, be sure to hold the Z belt when removing the hand-camera assembly. The Z carriage will be damaged if it is not held in place.

1. Review the information under “Preparation” on page 5-1.
2. Carefully raise the Z carriage to the top of the Z column assembly.

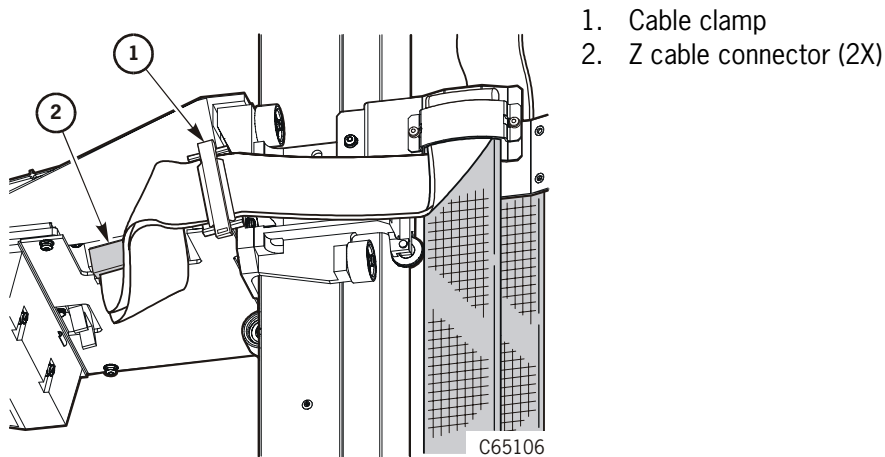


3. Open the cable clamp on the left side of the hand-camera assembly.

**CAUTION:**

**Possible equipment damage: Make sure to note to which bracket each cable attaches. Connecting the cables incorrectly can seriously damage the hand-camera components.**

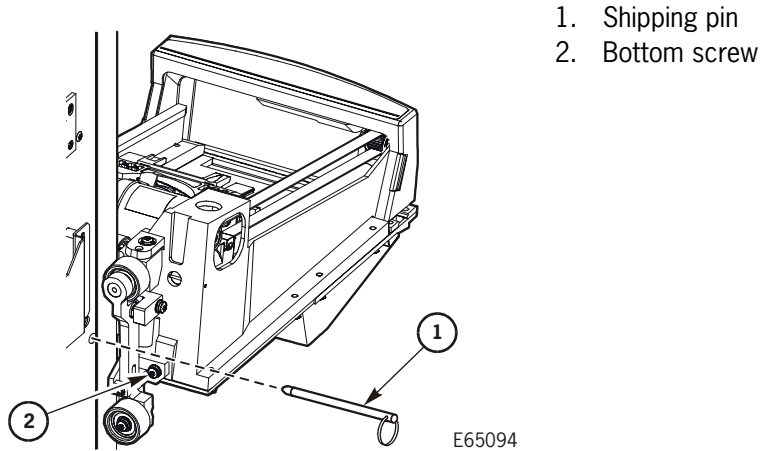
4. Disconnect P/J194A and P/J194B connectors from the bottom of the hand-camera assembly by pressing the tabs on the cables.



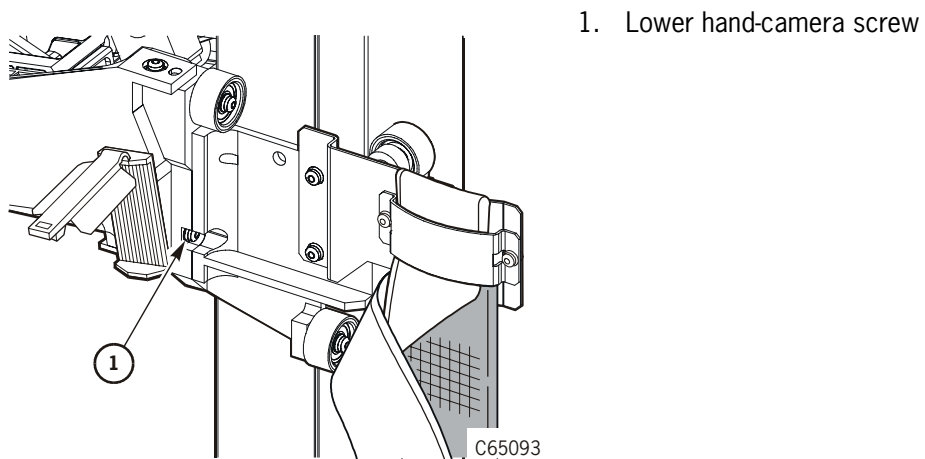
**CAUTION:**

**Possible equipment damage:** If the shipping pin is not available, make sure to hold on to the Z belt when removing the hand-camera assembly. The Z carriage could be damaged if it is not held in place.

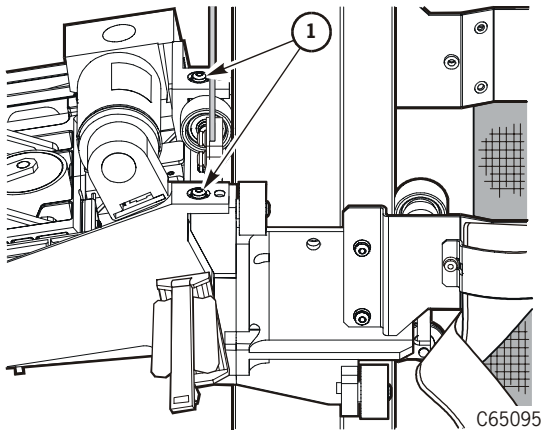
5. Carefully lower the Z carriage to the middle of the Z column assembly, rotate the Z column until the hand-camera is facing Column 0, Panel 0, and insert the shipping pin left to right through the Z column into the Z carriage.
6. Remove the Torx T-15 lower hand-camera assembly screw from behind the hand-camera.



7. Rotate the Z column clockwise as far as possible and remove the second Torx T-15 lower screw.



- 
8. Rotate the hand-camera counterclockwise toward you. Remove the two Torx T-15 upper hand-camera assembly screws and lift the hand-camera assembly off of the Z carriage.

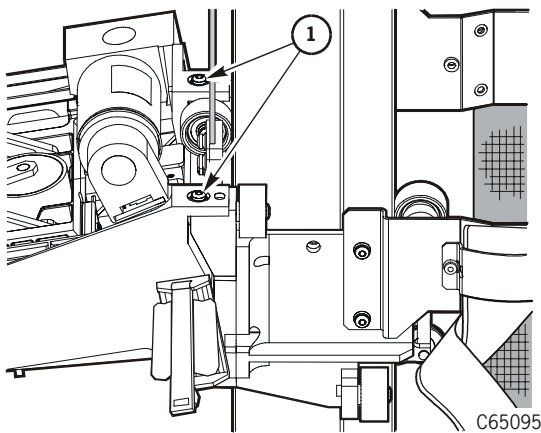


1. Upper hand-camera assembly screws

---

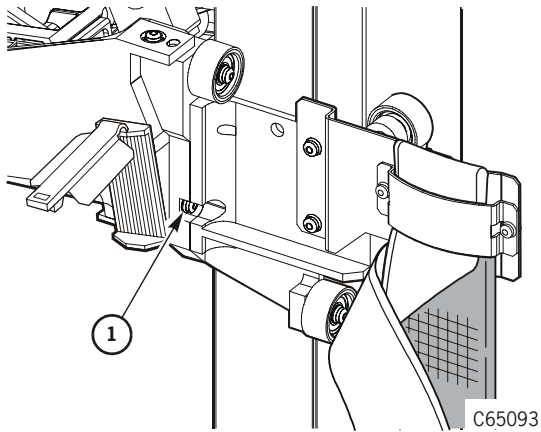
## Replacement

1. Align the holes on the hand-camera with the alignment pins on the Z carriage
2. Attach the hand-camera assembly with the upper two Torx T-15 hand-camera screws.



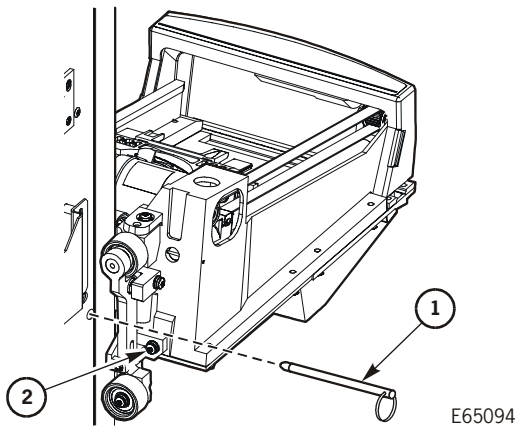
1. Upper hand-camera assembly screws

3. Rotate the Z column clockwise as far as possible
4. Attach a lower hand-camera screw using a Torx T-15 driver.



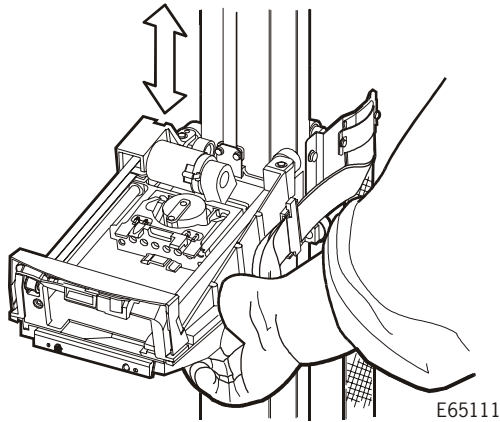
1. Lower hand-camera screw

5. Rotate the Z column counterclockwise as far as you can and attach the remaining Torx T-15 lower hand-camera screw.
6. Remove the shipping pin.



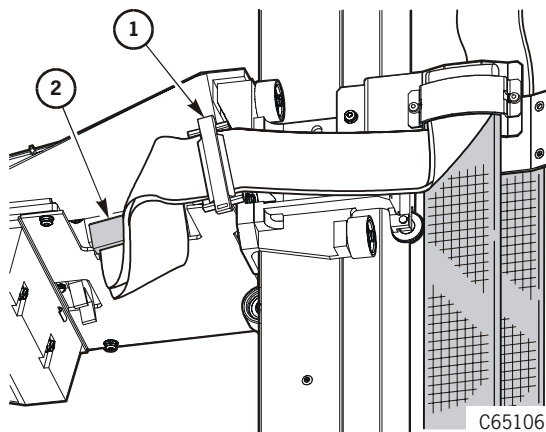
1. Shipping pin
2. Lower hand-camera screw

- 
- Carefully raise the Z carriage to the top of the Z column assembly.

**CAUTION:**

**Possible component damage:** Make sure to connect the cables to the correct bracket. Connecting the cables incorrectly can seriously damage the hand-camera components.

- Connect the two Z cable connectors (P/J194A and P/J194B) to the card on the bottom of the hand-camera assembly.
- Close the cable clamp.

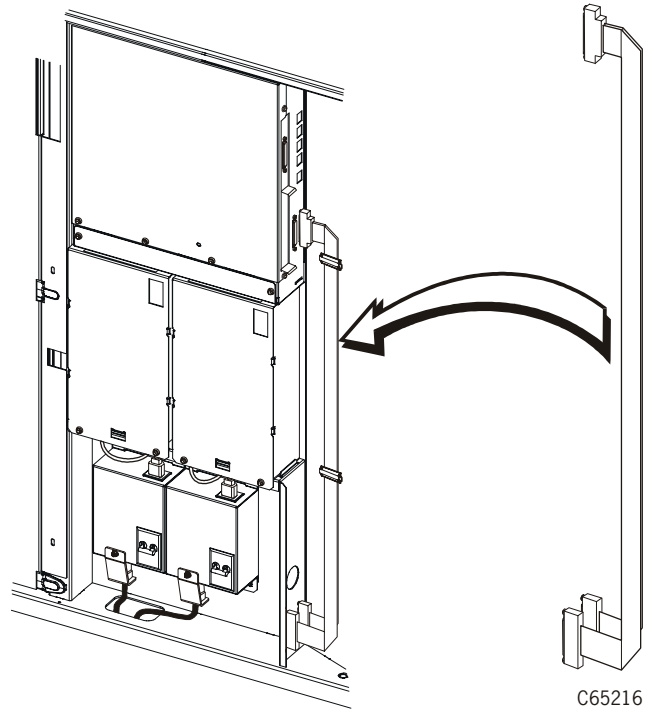


- Cable clamp
- Z cable connector (2X)

- Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
-

## ■ Library SCSI Y Cable

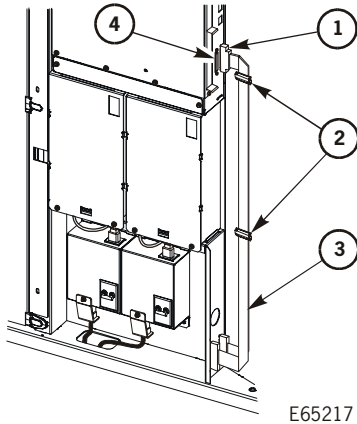
Figure 5-7. Library SCSI Y Cable (C65216)





## Removal

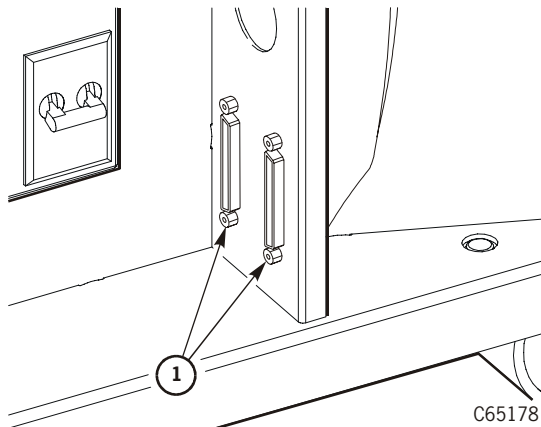
1. Review the information under [“Preparation” on page 5-1](#).
2. Release the two Y cable clamps.
3. Remove the cable connector attaching the Y cable to the MPC/MPCL card. Make sure to note whether the connector was removed from the single-ended or differential jack.



1. Differential jack
2. Cable clamps
3. Library Y cable
4. Single-ended jack

E65217

4. Using a 3/16-in. hex driver, remove the four jackscrews on the left side of the bulkhead from the Y cable connectors.
5. Remove the Y cable.



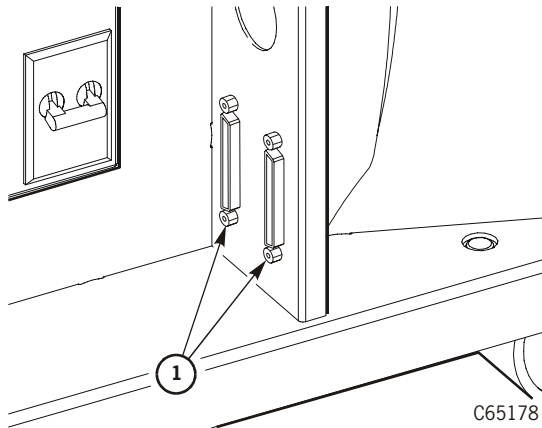
1. Jackscrews

C65178

## Replacement

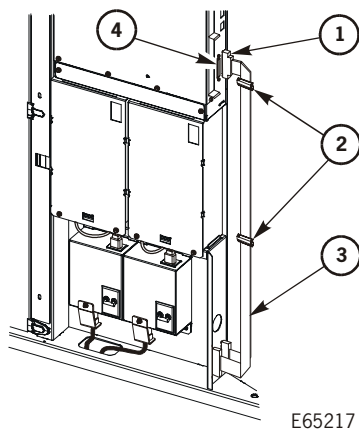
---

1. Using a 3/16-in. hex driver, connect the four jackscrews through the left side of the bulkhead to the Y cable connectors.



1. Jackscrews

2. Insert the single connector end of the Y cable into the MPC/MPCL card. Make sure to connect the cable to the correct jack.
3. Attach the two Y cable clamps.



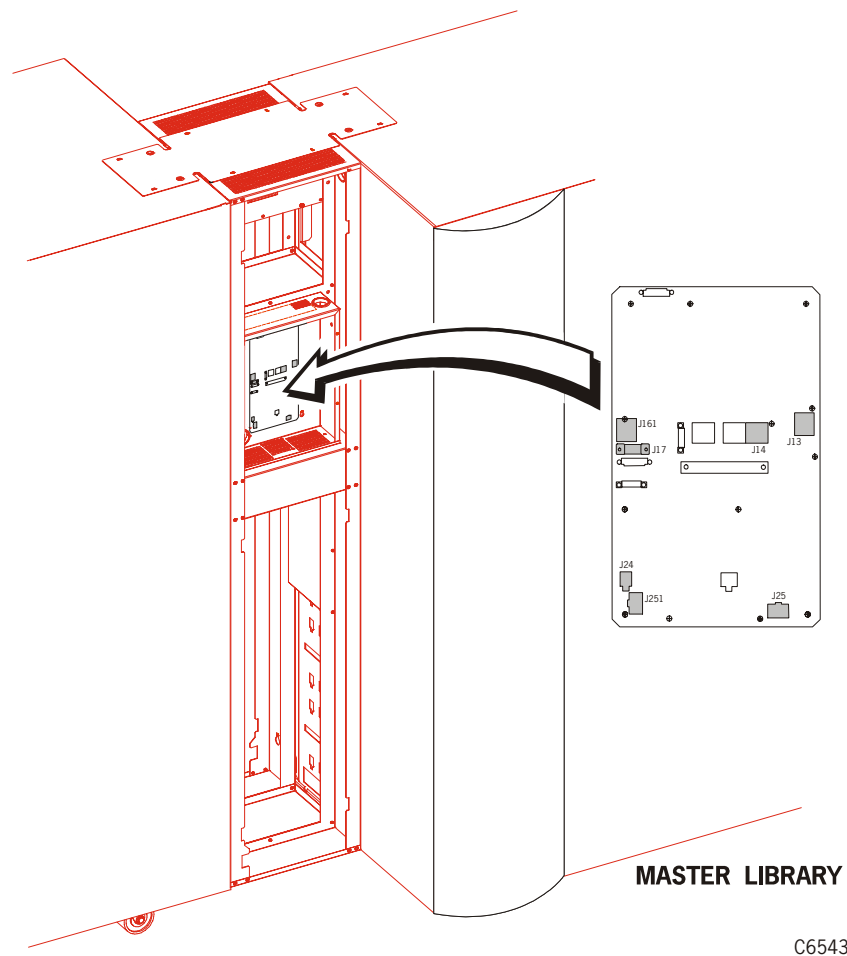
1. Differential jack
2. Cable clamps (2X)
3. Library Y cable
4. Single-ended jack

4. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
-

## ■ Logic Cards

### MPB Card

Figure 5-8. MPB Card (C65431)



**Note:** The MPB card is the Pass-thru Port (PTP) controller card, located between the two connected libraries.

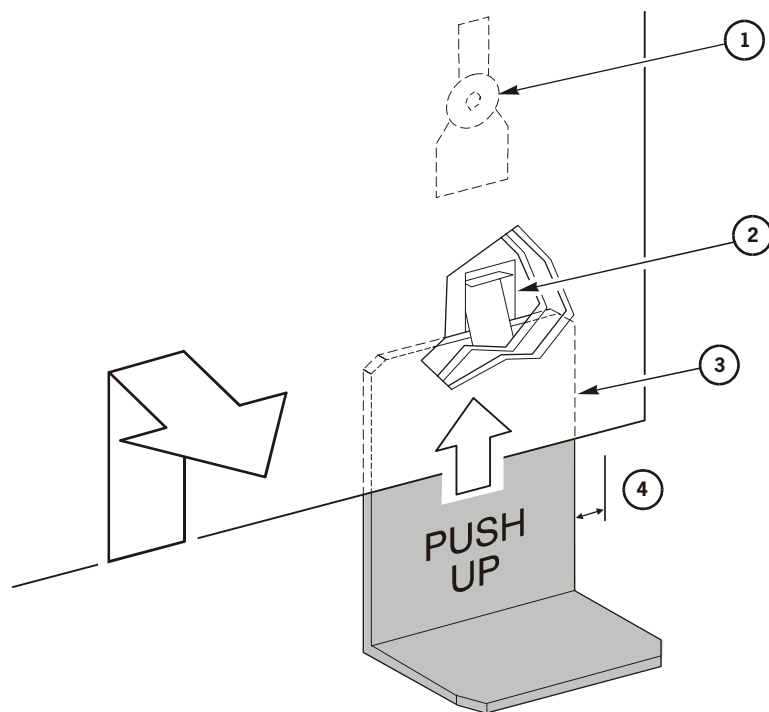
## Removal

- 
1. Review the information under “Preparation” on page 5-1.
  2. Be sure that all activity for both libraries has stopped.
  3. Power off both the Master and Standby libraries.
- 

### CAUTION:

**Lifting hazard:** Follow the directions in “Lifting Techniques” on page xxv.

4. Use the cover release tool (part 310229501) on the left side of the decorative cover; lift up and remove the decorative cover for the PTP frame.



- |                      |                        |
|----------------------|------------------------|
| 1. Mushroom fastener | 3. Cover release tool  |
| 2. Retaining clip    | 4. 38 mm (1.5-in.) gap |

- 
5. Using a Torx driver, loosen the four MPB card cover screws.
  6. Slide the cover to remove it.
-

**CAUTION:**

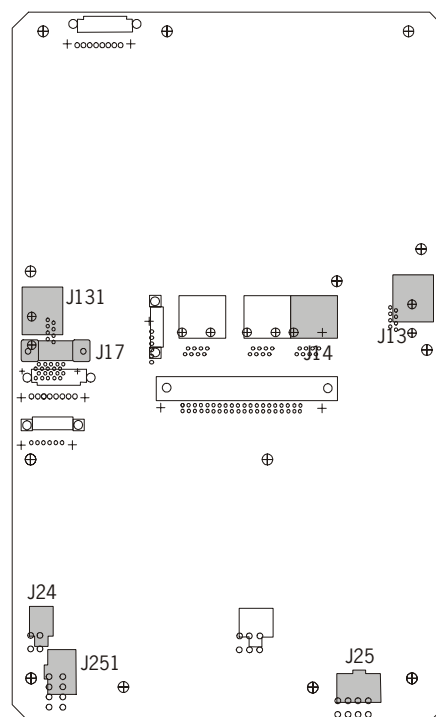
**Possible ESD damage:** Follow the ESD precautions outlined in “[Safety, Fiber Optic, and ESD](#)” on page xxv.

7. Remove the connectors to the card. Do *not* cut any tiewraps.

The connector locations and their functions are shown in [Figure 5-9](#).

8. Using a Torx driver, remove the 13 screws that attach the card to the metal case.
9. Remove the card from the metal case.

**Figure 5-9. MPB Card Connections (C65430)**



C65430

**Standby Cable Bundle**

J131: Standby serial communication cable

J251: Standby door interlock switch

**Bulkhead (PTP assembly) Cable Bundle**

J17: PTP encoder signal cable

J24: +5 VDC PTP power

**Master Cable Bundle**

J25: MPB power and Master library door interlock

J13: Master serial communication cable

J14: CSE (CLI) port—for downloading MPB firmware (`mpbxxyz.prm`) only

## Replacement

---

**CAUTION:**

**Possible ESD damage:** Follow the ESD precautions outlined in [“Safety, Fiber Optic, and ESD” on page xxv](#).

1. Remove the replacement MPB card from its package.
  2. Insert the card into the metal case.
  3. Using a Torx driver, attach the card with the 13 screws.
  4. Connect the cables (see [Figure 5-9 on page 5-25](#)).
  5. Place the MPB card cover over its screws and slide it into its notches.
  6. Using a T-15 Torx driver, tighten the screws to the MPB card cover.
- 

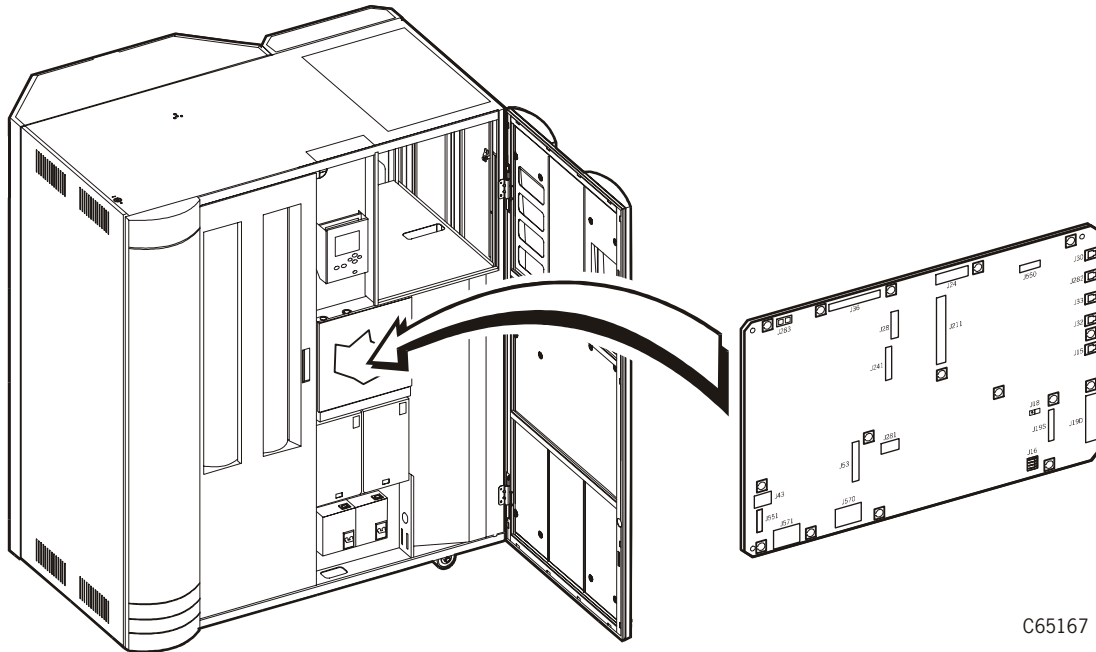
**CAUTION:**

**Lifting hazard:** Follow the directions in [“Lifting Techniques” on page xxv](#).

7. Replace the decorative cover.
  8. Return the system to operation. See [“Restoring Library Operation” on page 5-140](#).
-

## MPC/MPCL Card

Figure 5-10. MPC/MPCL Card (C65167)



C65167

**Note:** Depending on the tape library's features, you may need to remove the MPM card and MPV (CPCI module) before removing the MPC/MPCL card. Refer to the [“MPM Card” on page 5-32](#) and [“MPV Card \(CPCI Module\)” on page 5-44](#) for instructions on removal and replacement of these components.

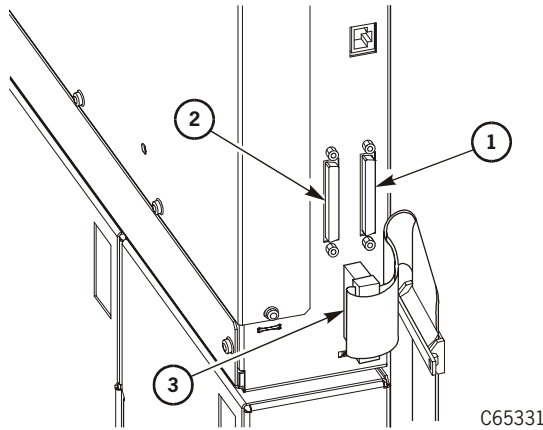
**CAUTION:**

**Network Outage:** You must re-configure all devices if dWWN was enabled on the MPC/MPCL card that is being replaced.

If your library and drives are configured for the Dynamic Worldwide Name (dWWN) feature, be sure to first consult the instructions in [“Dynamic Worldwide Name” on page 2-36](#) and [“Implications for an MPC/MPCL Replacement” on page 2-37](#) before replacing the card.

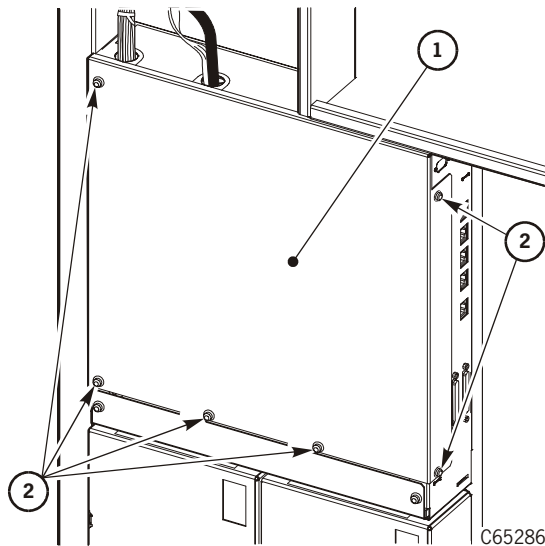
## Removal

1. Review the information under [“Preparation” on page 5-1](#).
2. Disconnect the SCSI Y cable from the MPC/MPCL card, making sure to note whether it connects to the single-ended or differential connector.



1. SCSI differential connector
2. SCSI single-ended connector
3. SCSI Y cable

3. Using a Torx T-15 driver, remove the six electronics module cover screws and remove the cover.

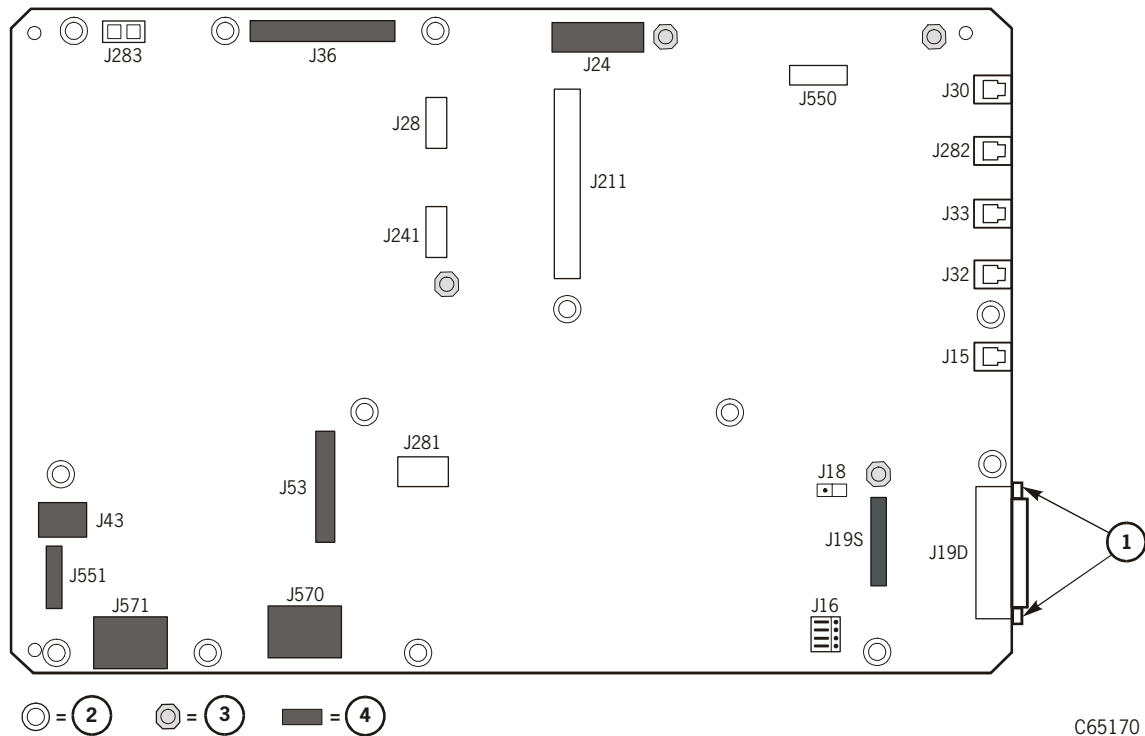


1. MPC/MPCL card cover
2. Cover screws

4. Disconnect the P/J36, P/J24, P/J53, P/J550 (MPK connector, if present), P/J570, P/J571, P/J551, and P/J43 connectors from the MPC/MPCL card, making sure to note where each cable is connected. Refer to the next illustration.

**Note:** Depending on the tape library's features, you may need to disconnect additional cables including the Ethernet connector, single-ended jumper (J19S), and PTP power (J283).





1. Jackscrews
2. MPC/MPCL card screws (13X)
3. Standoffs (4X)
4. Connectors

**CAUTION:**

**Possible component damage:** Make sure to account for all screws and standoffs. You might damage the DC power supply if you drop a fastener.

5. Using a Torx T-10 driver, remove the 13 MPC/MPCL card screws.
  6. Using a 1/4-in. hex driver, remove the four standoffs, making sure to note each standoff's location.
- Using a 3/16-in. hex driver, remove the two hex nuts attaching the J19D jack to the library frame.

**CAUTION:**

**Possible cable damage:** Do not cut the cable tie wraps on the left side of the enclosure. You might damage the cables.

7. Carefully remove the MPC/MPCL card either by pulling it out through the front or sliding it to the right.

## Replacement

---

**CAUTION:**

**Possible ESD damage:** Follow the ESD precautions outlined in [“Safety, Fiber Optic, and ESD” on page xxv.](#)

1. Remove the MPC/MPCL card assembly from the anti-static bag.
2. Using a 3/16-in. hex driver, attach the J19D jack to the library frame. Refer to the previous illustration.
3. Using a 1/4-in. hex driver, attach the four standoffs.

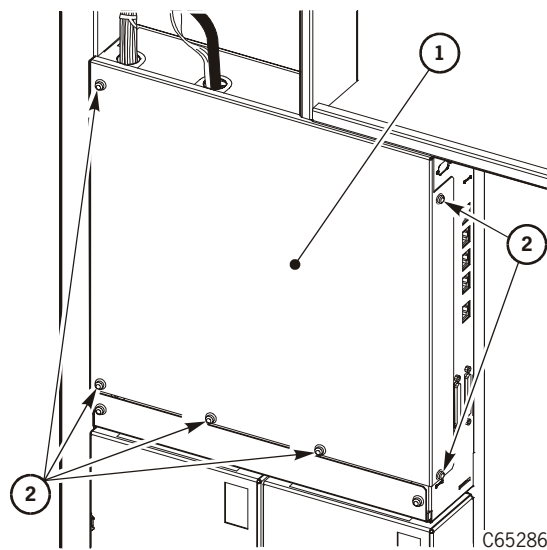
**Note:** Do not overtighten the standoffs or screws.

4. Using a Torx T-10 driver, attach the 13 MPC/MPCL card screws.

**CAUTION:**

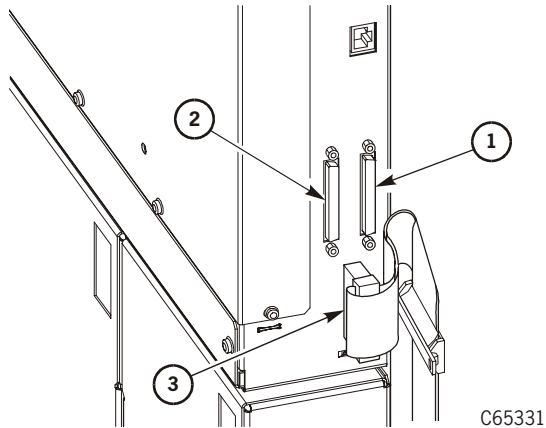
**Network Outage:** For replacement of MPC/MPCL cards that have dWWN enabled, see [“Implications for an MPC/MPCL Replacement” on page 2-37.](#)

5. Connect the P/J36, P/J24, P/J53, P/J550 (MPK connector, if present), P/J570, P/J571, P/J551, and P/J43 cables to the MPC/MPCL card, making sure they are in the correct position.
6. Use six Torx T-15 screws on the front and two on the side to attach the cover.



1. MPC/MPCL card cover
2. Cover screws

- 
7. Connect the SCSI Y cable to the MPC/MPCL card.



1. SCSI differential connector
2. SCSI single-ended connector (MPC) or SCSI LVD/SE connector (MPC/MPL)
3. SCSI Y cable

- 
8. You must configure the library, as outlined below.

**CAUTION:**

**Configuration Error: You must perform the steps below to ensure correct configuration of the library**

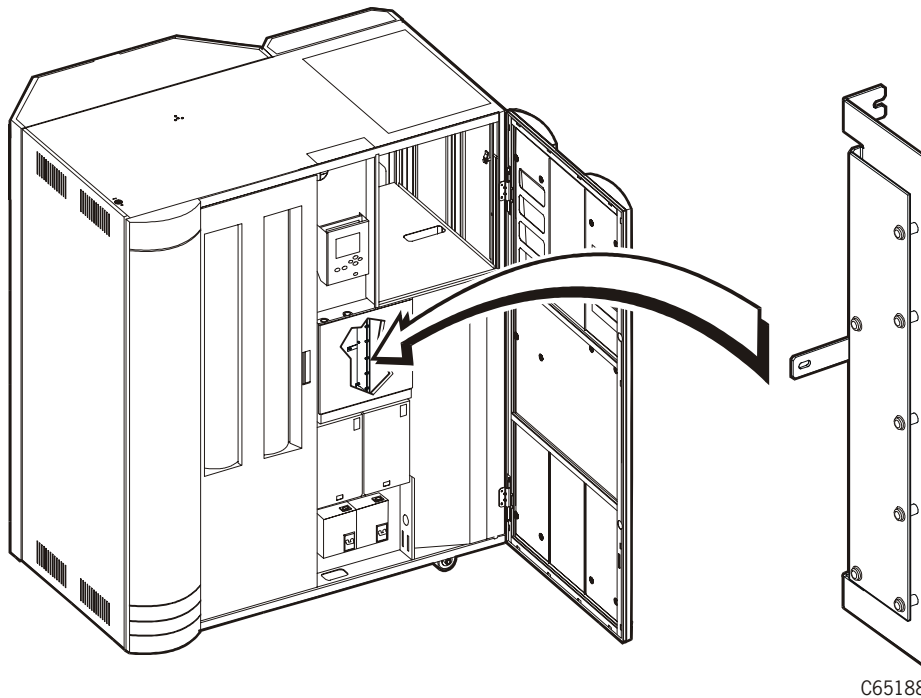
- Firmware edition lower than 2.0:
  - a. Connect the personality module (MPK) cable to the MPC/MPCL card at P/J550.
  - b. Load the firmware.
  - c. Configure the tape library. Refer to [“Configuration” on page 2-15](#).
  - d. If your machine did *not* contain a personality module (MPK card), but the customer requires a vendor ID:
    - a. Load the required firmware that supports a vendor ID.
    - b. Load the vendor flash file.
    - c. Configure the tape library. Refer to [“Configuration” on page 2-15](#).

**Note:** The StorageTek L-Series Library Admin (Web interface) feature resides within the personality module (MPK card). When replacing the MPC/MPCL card, there is no need to re-configure this option.

- 
9. Return the system to operation. See [“Restoring Library Operation” on page 5-140](#).
-

## MPM Card

Figure 5-11. MPM Card (C65188)

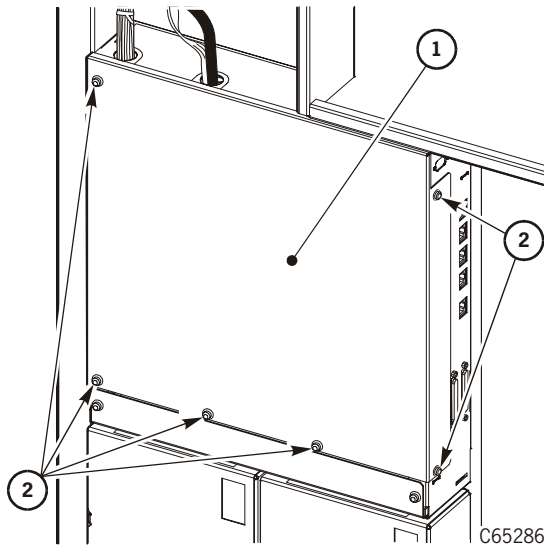


The MPM card is the multiplexor component for drives in the second drive tower, Drive Column 1. It is located behind the MPC/MPCL card cover and is mounted at a right angle to the MPC/MPCL card.

The MPM card must be removed and replaced whenever the MPC/MPCL or MPV (CPCI module) cards are replaced.

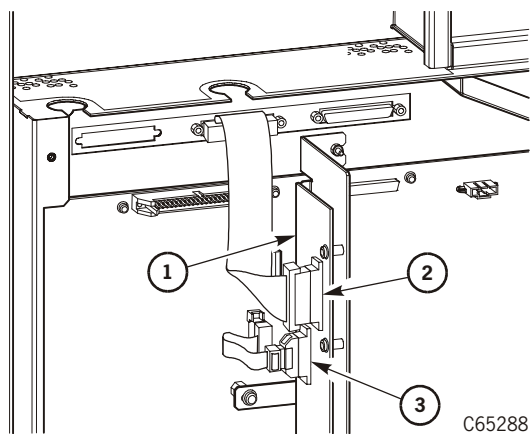
## Removal

1. Review the information under [“Preparation” on page 5-1](#).
2. Using a Torx T-15 driver, remove the six electronics module cover screws on the front and the two on the side and remove the cover.



1. MPC/MPCL card cover
2. Cover screws

3. Disconnect the P/J242 and P/J243 connectors from the MPM card.



1. MPM card
2. P/J243
3. P/J242

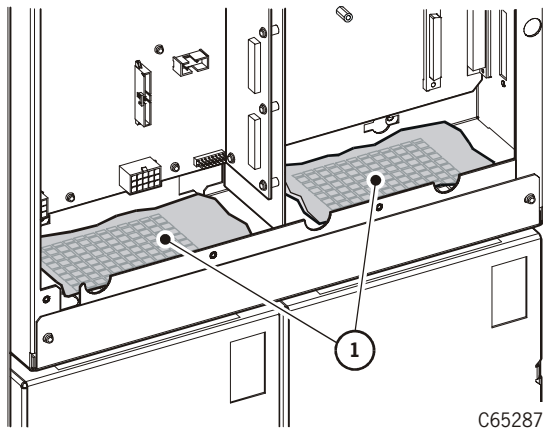
---

**CAUTION:**

**Possible equipment damage:** Cover the power supply grating with a piece of cardboard or an ESD bag before removing nuts and screws from the MPM card. This will help prevent one of the fasteners from falling into the power supply.

**Do not remove the protective cardboard or ESD bag until finished with the replacement procedure.**

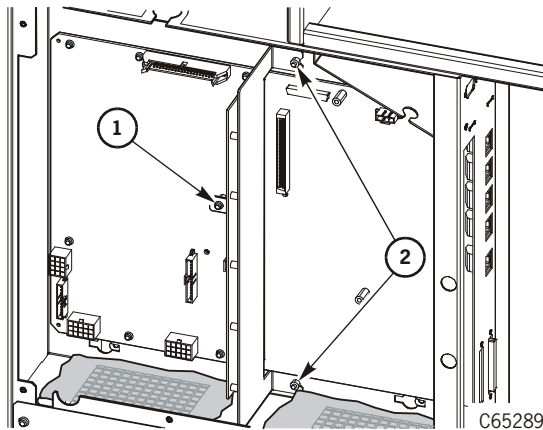
4. Cover the power supply grating with a piece of cardboard or an ESD bag.



1. ESD bag or cardboard

C65287

5. Using a Torx T-10 driver, remove the center MPM bracket screw.
6. Using a 3/8-in. hex driver, remove the upper and lower MPM bracket nuts.



1. MPM bracket screw
2. MPM bracket nuts

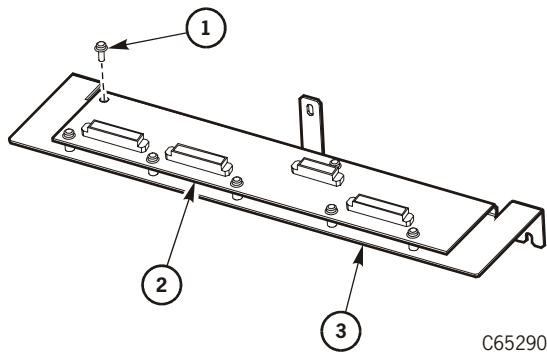
C65289

7. Pull back slightly and turn the card to the left to remove the bracket from the two studs.
  8. Remove the MPM card and bracket.
-

---

9. Remove the seven screws that attach the MPM card to the bracket.

- 1. MPM card screw (7X)
- 2. MPM card
- 3. MPM card bracket



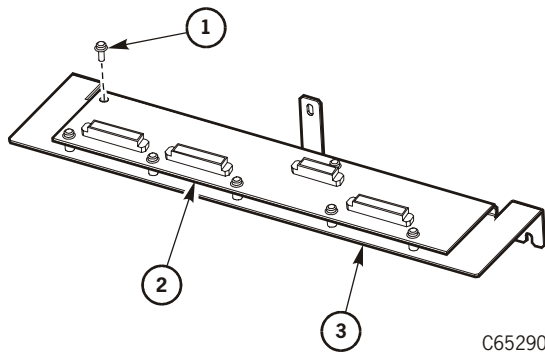
## Replacement

1. Remove the replacement MPM card from the anti-static container.

**CAUTION:**

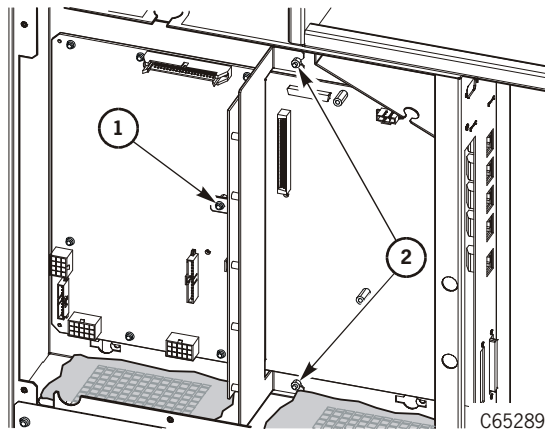
**Possible ESD damage:** Follow the ESD precautions outlined in **“Safety, Fiber Optic, and ESD”** on page xxv.

2. Align the MPM card to the bracket standoffs.
3. Use the six screws to attach the MPM card to the bracket.



1. MPM card screw (7X)
2. MPM card
3. MPM card bracket

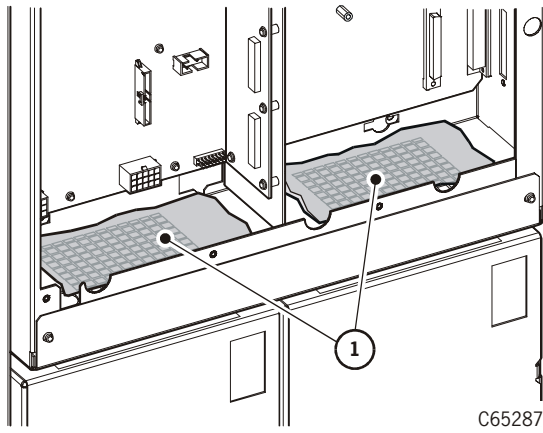
4. Turn the card and bracket slightly to the left and align the top and bottom bracket holes with the holes on the frame.
5. Using a Torx T-10 driver, attach the center MPM card screw.
6. Using a 3/8-in. hex driver, attach the upper and lower MPM card nuts.



1. MPM card screw
2. MPM card nuts

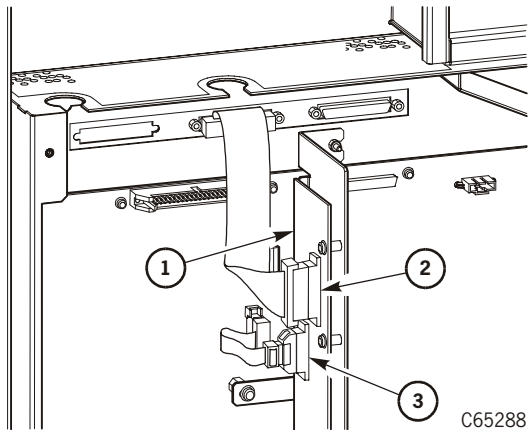


- 
7. Remove the protective cardboard or ESD bag from the top of the DC power supply cover.



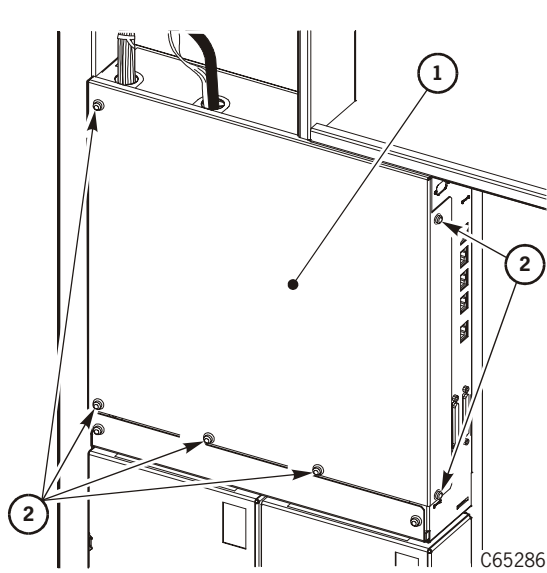
1. ESD bag or cardboard

8. Connect the P/J242 and P/J243 connectors to the MPM card.



1. MPM card  
2. P/J243  
3. P/J242

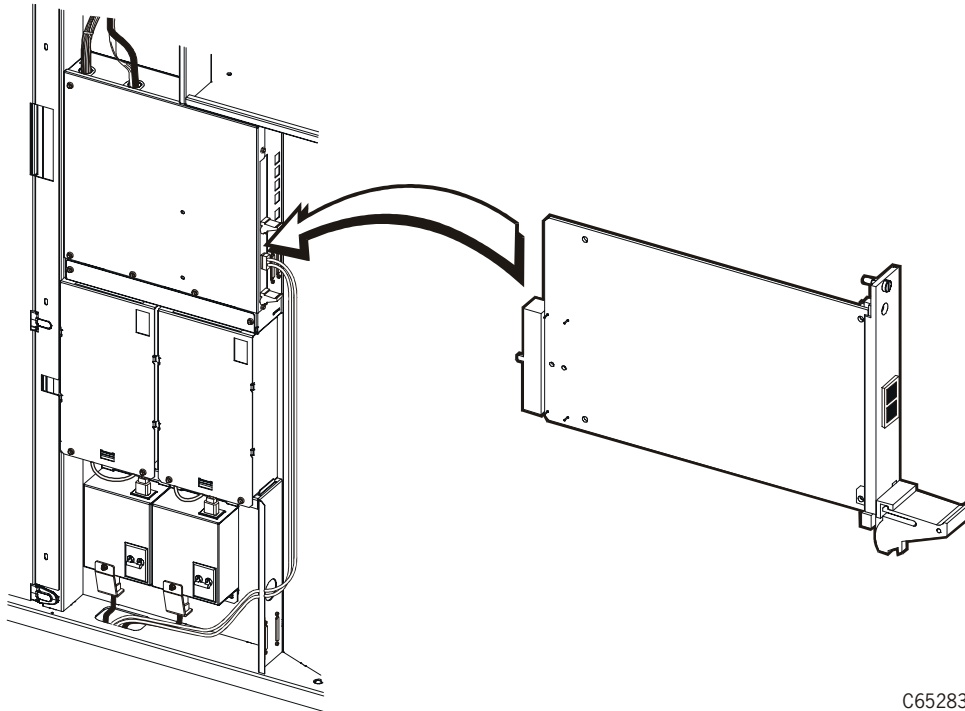
- 
9. Attach the electronics module cover with six Torx T-15 screws on the front and the two on the side.



- 
10. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
-

## MPU Card

Figure 5-12. MPU Card (C65283)



C65283

The MPU card attaches to the MPV card (CPCI module). The MPU card can be accessed from the front of the electronics compartment.

Use the following figure and procedure to replace the FRU.

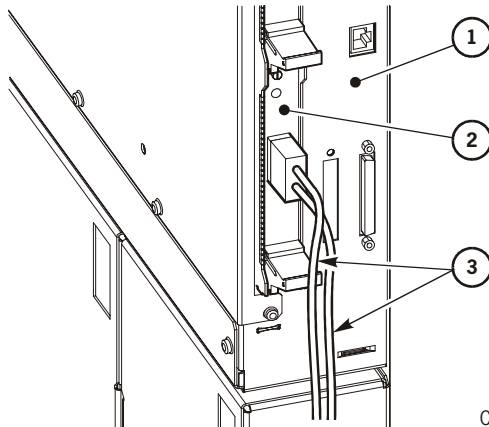
**Note:** The MPU card contains a Class 1 laser product that complies with EN-60825-1 and sections 21CFR 1040.10 and 1040.11 of the Food and Drug Administration (FDA) regulations. Class 1 laser products do not require any special safety precautions.

Read the information in [“Preparation” on page 5-1](#) before beginning this procedure.

## Removal

**CAUTION:**  
Be sure to follow the directions for handling Fiber cables in **“Safety, Fiber Optic, and ESD”** on page xxv before beginning the following procedure.

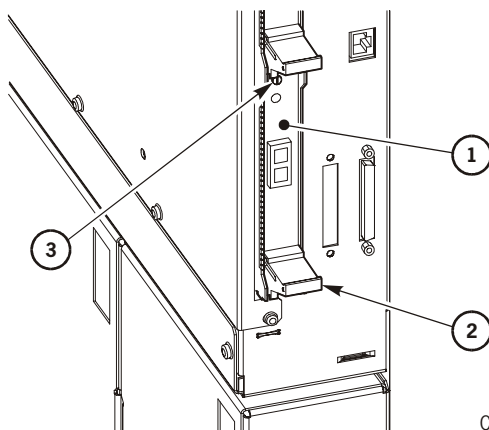
- 
1. Be sure that the operator has the library and all drives idle and not in use.
- 
2. Open the right front door.
  3. Remove power to the library and drives by pressing down on the main circuit breaker.
  4. Open the left front door
- 
5. The MPU card is located at the lower right of the MPC/MPCL card. Remove the fiber cable attached to the MPU card.



1. MPC/MPCL card
2. MPU card
3. Fiber cable

C65277

- 
6. Using a flat blade screwdriver, loosen the captive screw at the top of the MPU card.
  7. Push down on the card latch at the bottom of the card.

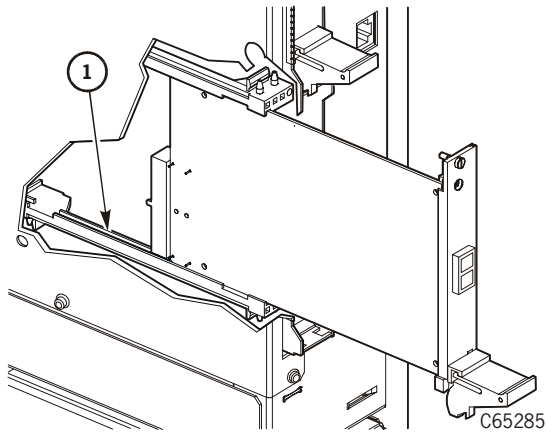


1. MPU card
2. MPU card latch
3. Captive screw

C65284

- 
- Slide out the MPU card on the guide rail.

- Guide rail



---

## Replacement

---

**CAUTION:**

**Possible ESD damage: Follow ESD precautions.**

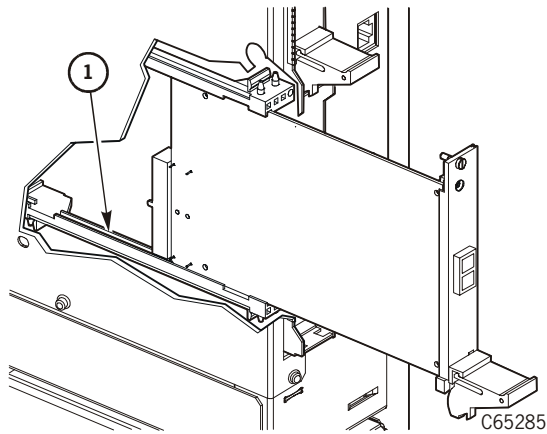
- Remove the MPU card from its static-free package. The MPU card is inserted into the CPCI module as described in the next step.

**CAUTION:**

**Fiber safety: The optical Fibre Channel circuit (MPU card) contains a laser system (GBIC Module) that is classified as a Class 1 laser product. Refer to “[Safety, Fiber Optic, and ESD](#)” on page xxv for compliance information and safety precautions.**

- Hold the card so that the card connector aligns with the MPV card connector (*circuit side out, components facing the MPC/MPCL card*).
-

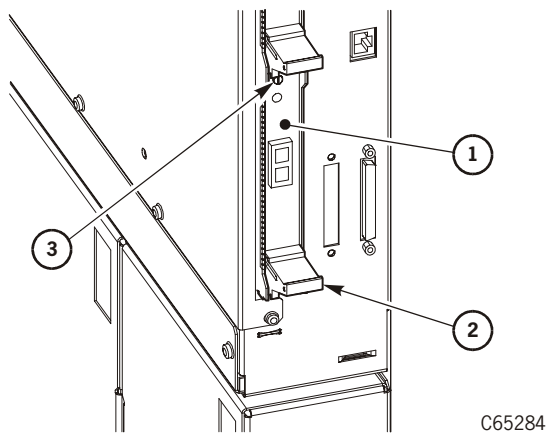
- 
- Slide the MPU card onto the guide rail and gently push it in until it mates with the MPV card connector.



**CAUTION:**  
*Only the lower slot is supported at this time. Be sure to insert the MPU card in that slot.*

- Guide rail

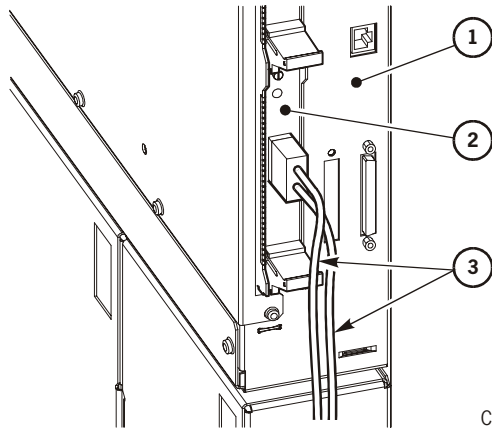
- 
- Make sure the card latch engages upward.
  - Using a flat-bladed screwdriver, tighten the captive screw.



- MPU card
- MPU card latch
- Captive screw

---

6. Replace the fiber cable.



- 1. MPC/MPCL card
- 2. MPU card
- 3. Fiber cable

C65277

---

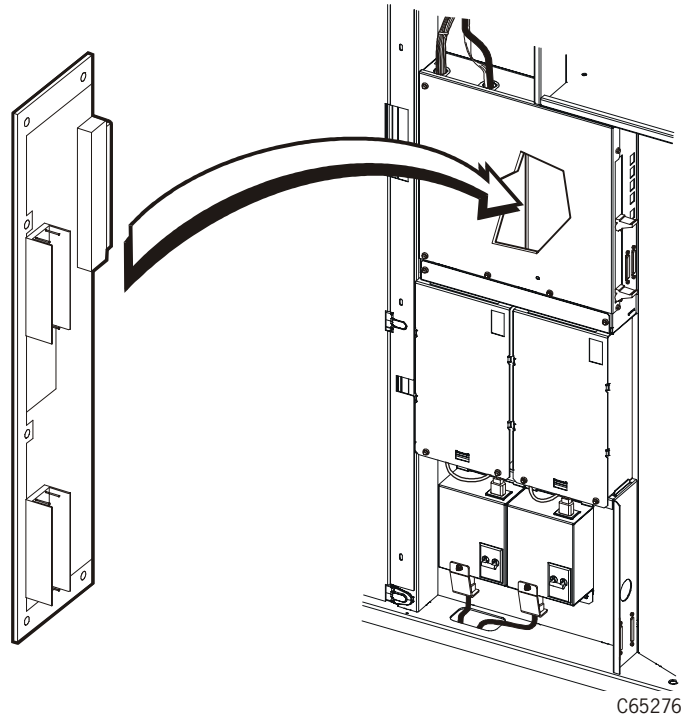
7. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.

---

## MPV Card (CPCI Module)

The MPV card is attached to the CPCI card cage and connected to the MPC/MPCL card in the electronics module.

**Figure 5-13. MPV (CPCI) Module (C65276)**



**Note:** You must first remove the MPU (fiber card) or the MPW (LVD interface for libraries with MPC cards only) before removing the MPV card.

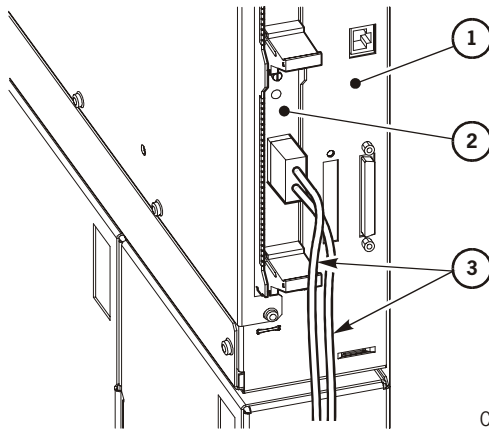
If your library contains the second drive tower, you must also remove the MPM card before installing the MPV card. If this is the case, refer to [“MPM Card” on page 5-32](#) before beginning the procedure below.

Use the following procedure to replace the FRU.



## Removal

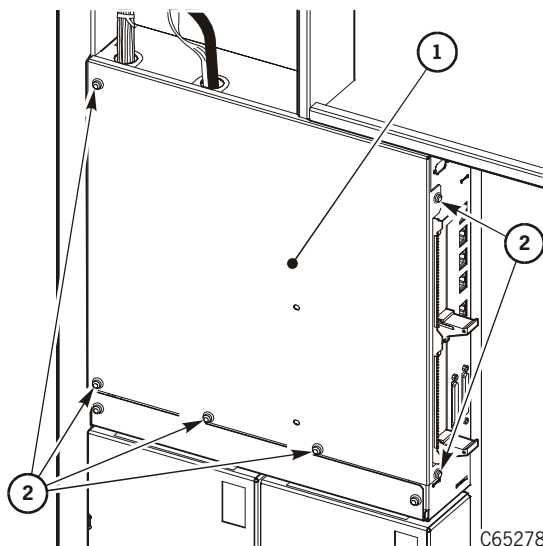
1. Open the right front door.
2. Remove power to the library and drives by pressing down on the main circuit breaker.
3. Open the left front door.
4. The MPU card is located at the lower right of the MPC/MPCL card. Remove the fiber cable attached to the MPU card or remove the SCSI cable attached to the MPW card (MPC cards only).



C65277

1. MPC/MPCL card
2. MPU (shown) or MPW card (MPC cards only)
3. Fiber cable

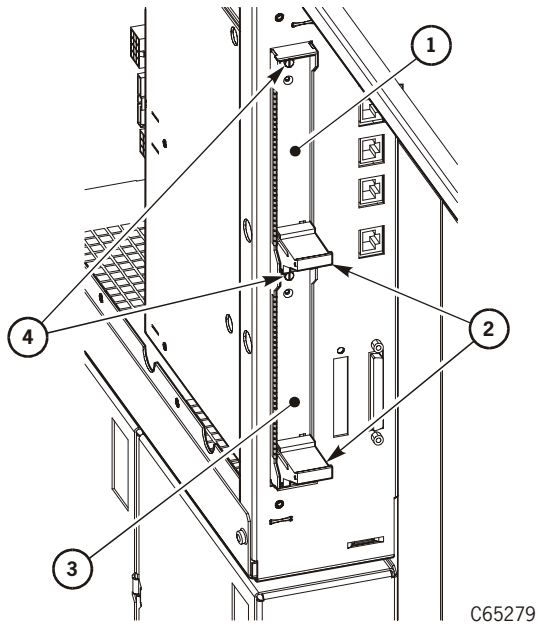
5. Remove the six screws and the MPC/MPCL cover.



C65278

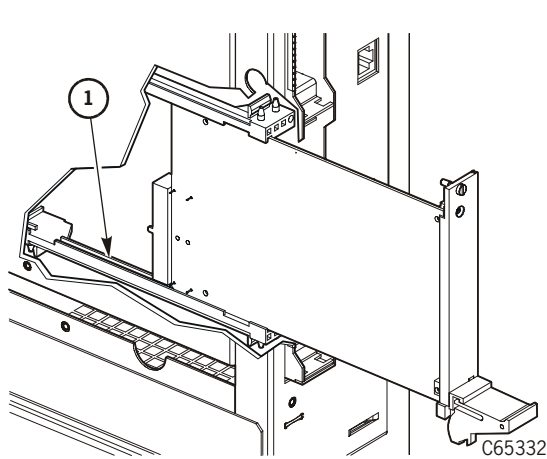
1. MPC/MPCL card cover
2. Cover screws

- 
6. Using a flat blade screw driver, loosen the captive screws on the PCI face plate and MPU or MPW card (MPC cards only).
  7. Push down on the latches.



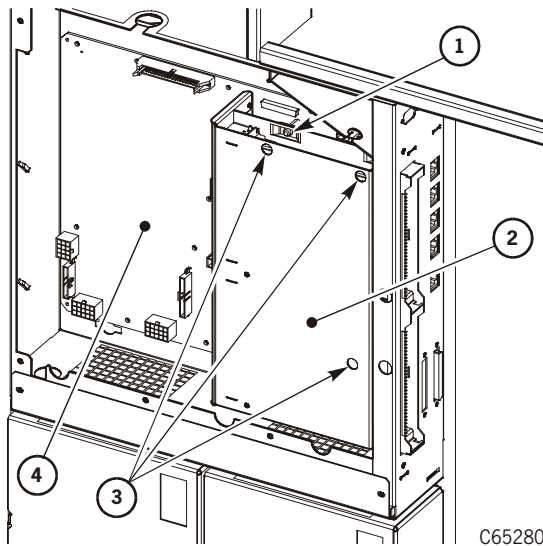
1. PCI face plate
2. Latches
3. MPU or MPW card (MPC cards only)
4. Captive screws

- 
8. Slide out the MPU or MPW (MPC cards only) card on the guide rail.



1. Guide rail

9. Insert a screwdriver into the three access holes in the CPCI module and remove the mounting screws from the standoffs, as shown in the figure below.

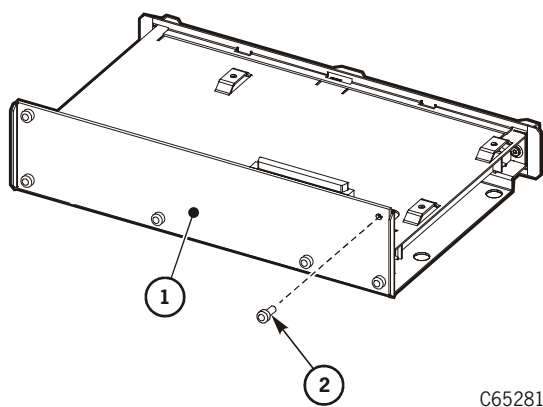


1. Mounting screw
2. CPCI module
3. CPCI access holes for mounting screws
4. MPC/MPCL card

**CAUTION:**

**Possible equipment damage:** Pull the CPCI module straight out, being careful not to damage the connector on the MPC/MPCL card.

10. Pull out the MPV card and CPCI module.
11. Place the CPCI module on a flat surface and remove the six MPV mounting screws and the MPV card.



1. CPCI module
2. MPV mounting screw (6X)

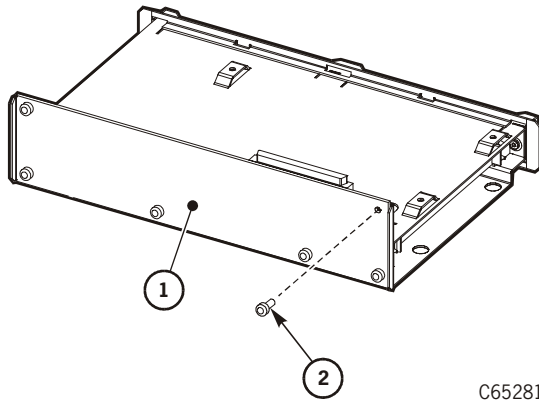
## Replacement

---

**CAUTION:**

**Possible ESD damage:** Follow ESD precautions when handling the CPCI module and MPV card.

1. Unpack the new MPV card.
2. Attach the MPV card to the CPCI module, as shown below.



1. CPCI module
2. MPV mounting screw (6X)

C65281

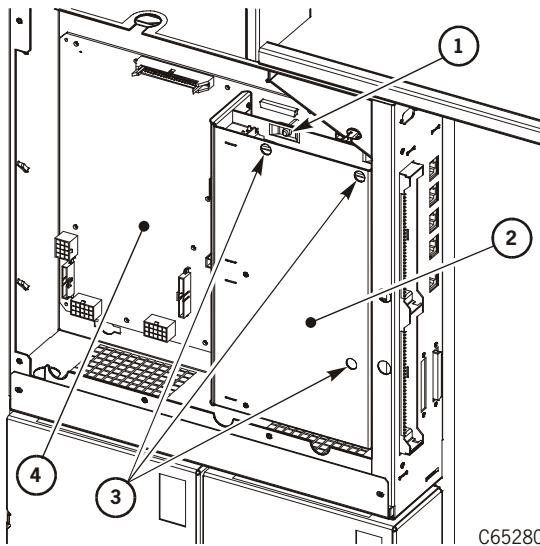
---

**CAUTION:**

**Possible equipment damage:** Push the CPCI module straight in, being careful not to damage the connector on the MPC/MPCL card.

3. Gently mate the MPV card with the MPC/MPCL card at the J211 connector.
-

4. Insert the three CPCI mounting screws through the three access holes in the MPV cover and attach the module to the three standoffs (as shown below).



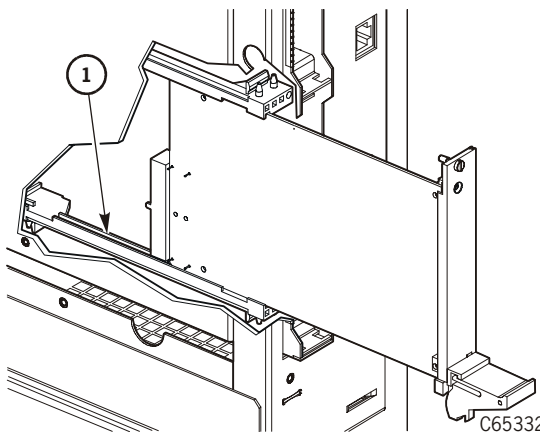
1. Mounting screw
2. CPCI module
3. CPCI access holes for mounting screw
4. MPC card

**CAUTION:**

**Possible ESD damage:** Follow ESD precautions when handling the MPU card.

**Fiber safety:** The optical Fibre Channel circuit (MPU card) contains a laser system (GBIC Module) that is classified as a Class 1 laser product. Refer to **“Safety, Fiber Optic, and ESD”** on page xxv for compliance information and safety precautions.

5. Hold the MPU or MPW (MPC card only) card so that the card connector aligns with the MPV card connector (*circuit side out, components facing the MPC/MPCL card*).

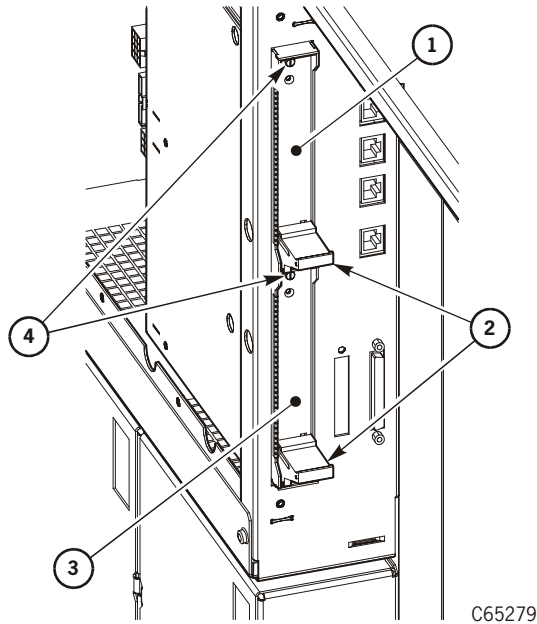


**CAUTION:**

**Only the lower slot is supported at this time. Be sure to insert the MPU card into that slot.**

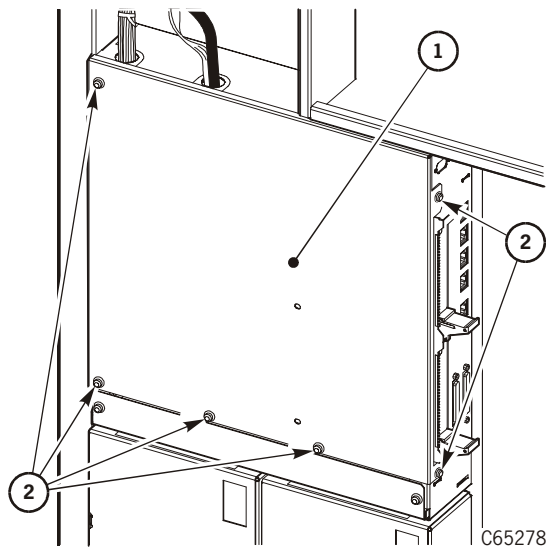
1. Alignment groove

- 
6. Make sure the latches engage upward.
  7. Using a flat-bladed screwdriver, tighten the captive screws.



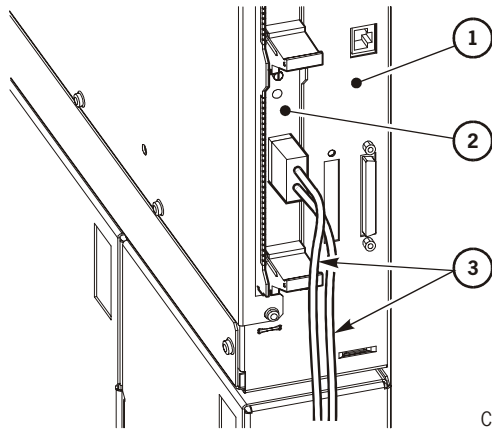
1. PCI face plate
2. Latches
3. MPU or MPW card (MPC cards only)
4. Captive screws

- 
8. Install the MPC/MPCL cover plate, using six screws on the front and two screws on the side.



1. MPC/MPCL card cover
2. Cover screws

- 
9. Insert the connector into the MPU card (fiber) or the connector into the MPW card (MPC cards only).



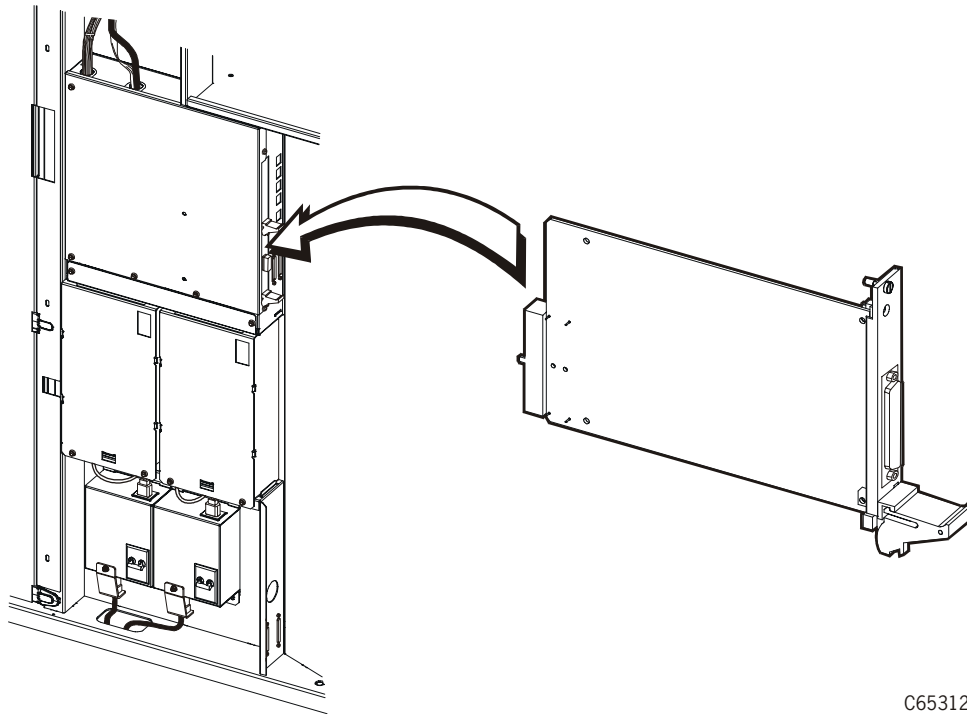
1. MPC/MPCL card
2. MPU (shown) or MPW card (MPC cards only)
3. Fiber cable

C65277

- 
10. If you must replace the MPM card, follow the directions in [“MPM Card”](#) on page 5-32. If your library has no MPM card, return the system to operation following the procedures [“Restoring Library Operation”](#) on page 5-140.
-

## MPW Card (for MPC Cards Only)

Figure 5-14. MPW Card (C65312)



C65312

The MPW card is an HVD-to-LVD adapter required for *MPC cards only*. It attaches to the MPV card (CPCI module). The MPW card can be accessed from the front of the electronics compartment.

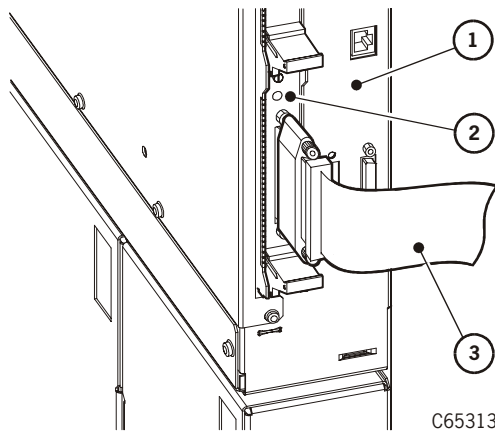
Use the following figure and procedure to replace the FRU.

Read the information in [“Preparation” on page 5-1](#) before beginning this procedure.



## Removal

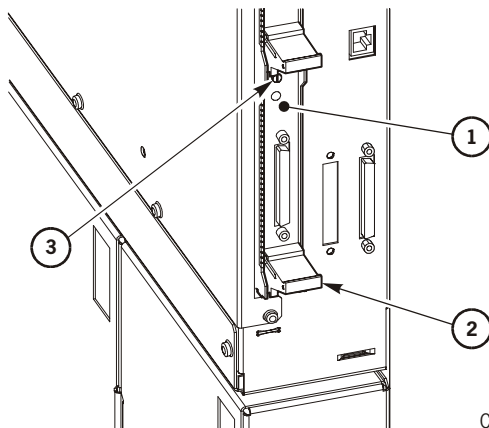
1. Be sure that the operator has the library and all drives idle and not in use.
2. Open the right front door.
3. Remove power to the library and drives by pressing down on the main circuit breaker.
4. Open the left front door
5. The MPW card is located at the lower right of the MPC card. Remove the SCSI cable plus the pass through terminator attached to the MPW card.



1. MPC card
2. MPW card
3. SCSI cable (shown with terminator)

C65313

6. Using a flat blade screwdriver, loosen the captive screw at the top of the MPW card.
7. Push down on the card latch at the bottom of the card.

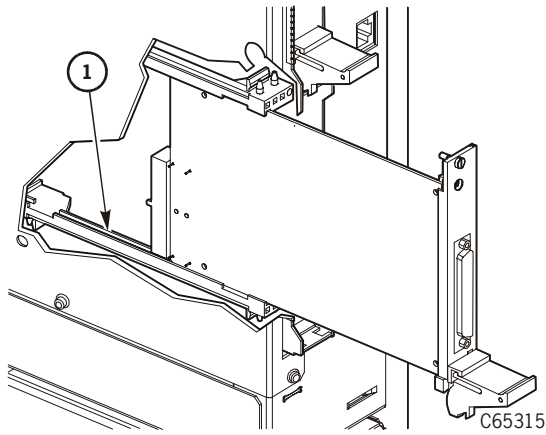


1. MPW card
2. MPW card latch
3. Captive screw

C65314

- 
- Slide out the MPW card on the guide rail.

- Guide rail



---

## Replacement

---

**CAUTION:**

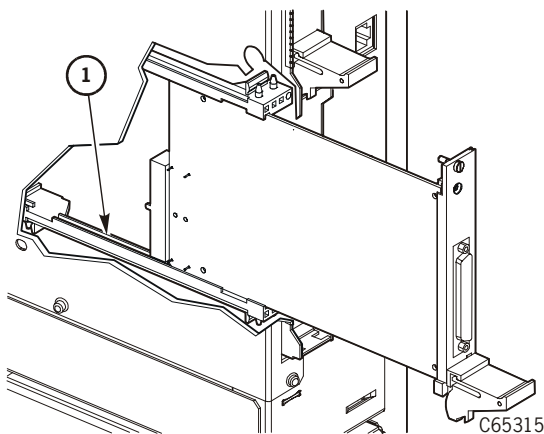
**Possible ESD damage: Follow ESD precautions.**

- Unpack the MPW card from its static-free package. The MPW card is inserted into the CPCI module as described in the next step.
- Hold the card so that the card connector aligns with the MPV card connector (*circuit side out, components facing the MPC card*).
- Slide the MPW card onto the guide rail and gently push it in until it mates with the MPV card connector.

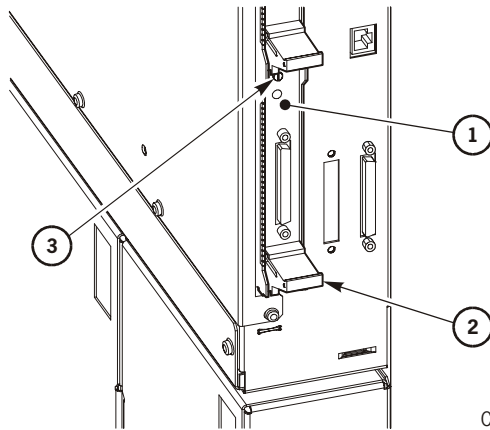
**CAUTION:**

**Only the lower slot is supported at this time. Be sure to insert the MPW card in that slot.**

- Guide slot



4. Make sure the card latch engages upward.
5. Using a flat-bladed screwdriver, tighten the captive screw.

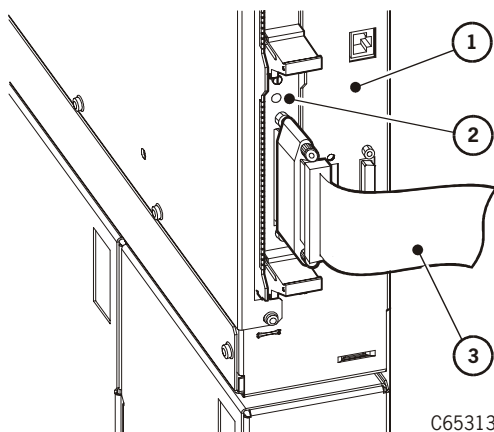


1. MPW card
2. MPW card latch
3. Captive screw

C65314

**Note:** The library must be at the end of the SCSI bus and you must use a single, shielded cable.

6. Replace the SCSI cable plus the pass through terminator.



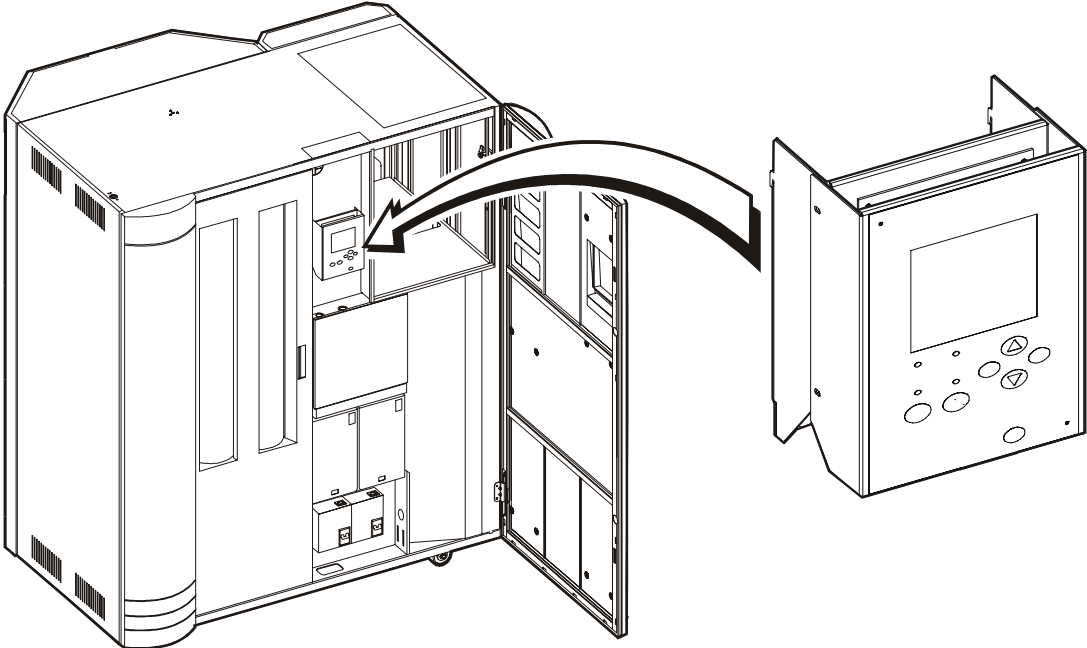
1. MPC card
2. MPW card
3. SCSI cable (shown with terminator)

C65313

7. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.

# Operator Panel

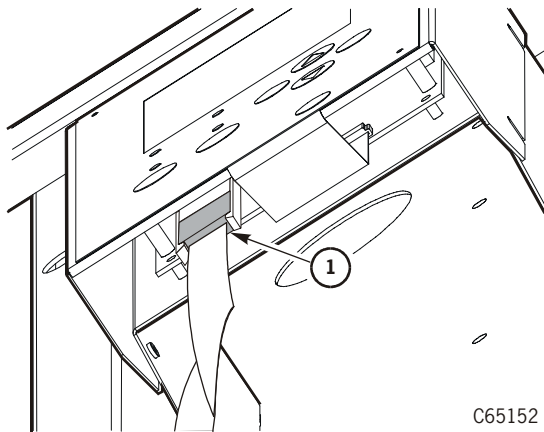
Figure 5-15. Operator Panel (C65132)



C65132

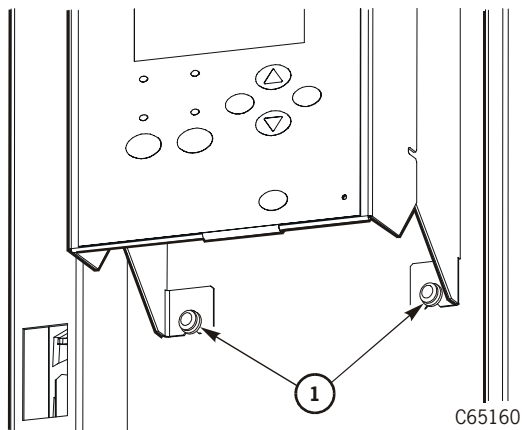
## Removal

1. Review the information under [“Preparation” on page 5-1](#).
2. Disconnect the operator panel cable connector by squeezing and pulling the connector.



1. Operator panel cable connector

3. Using a Torx T-25 driver, remove the two operator panel screws.



1. Operator panel screws

4. Lift and remove the operator panel from the tape library frame.

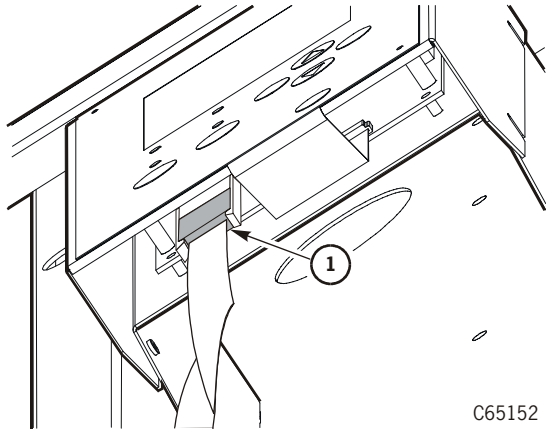
## Replacement

---

1. Slide the operator panel brackets into the slots on the tape library frame.

---

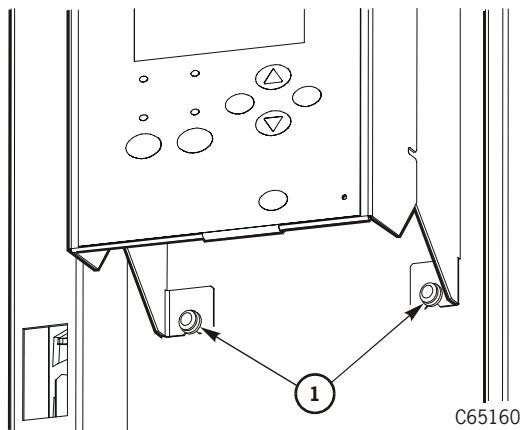
2. Connect the operator panel cable connector.



1. Operator panel cable connector

---

3. Using a Torx T-25 driver, attach the two operator panel screws.



1. Operator panel screws

---

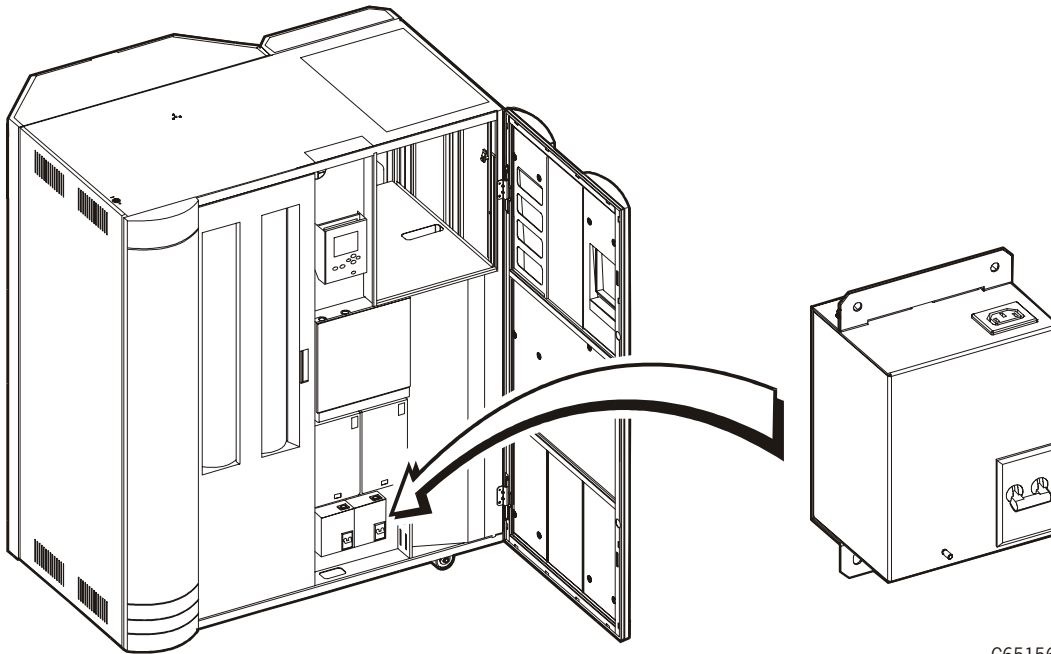
4. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.

---

## ■ Power Components

### AC Power Distribution Unit (PDU)

Figure 5-16. AC Power Distribution Unit (C65156)



**WARNING:**

***Electrocution hazard:*** Make sure that you press down on the power switch before removing the PDU.

**WARNUNG:**

***Lebensgefährliche Spannung!*** Bevor Sie den Netzstrom-Verteiler herausnehmen, kippen Sie den Netzschalter nach unten.

**AVERTISSEMENT:**

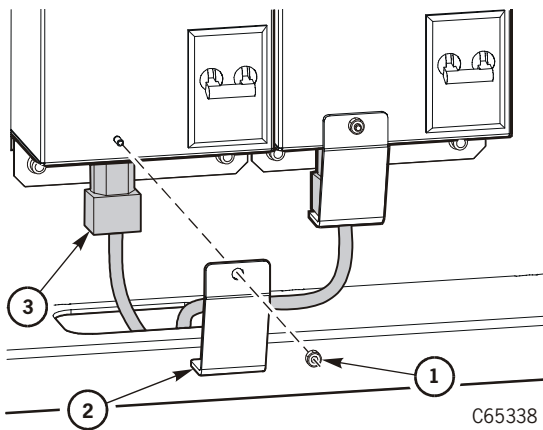
***Danger d'électrocution:*** Appuyer sur le commutateur avant de retirer l'unité de distribution de l'énergie (PDU).

## Removal

---

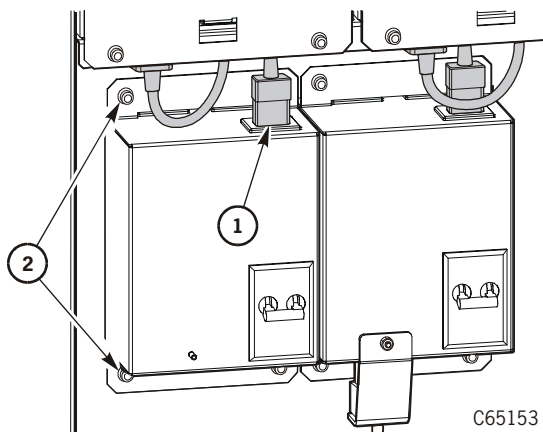
**Note:** If you have two AC PDUs, this field replaceable unit may be removed and replaced while the library is powered on.

1. Review the information under [“Preparation” on page 5-1](#).
2. Using a 5/16-in. hex driver, remove the nut attaching the strain relief to the AC PDU.
3. Disconnect the customer power cable.



1. Nut
2. Strain relief
3. Customer power cable

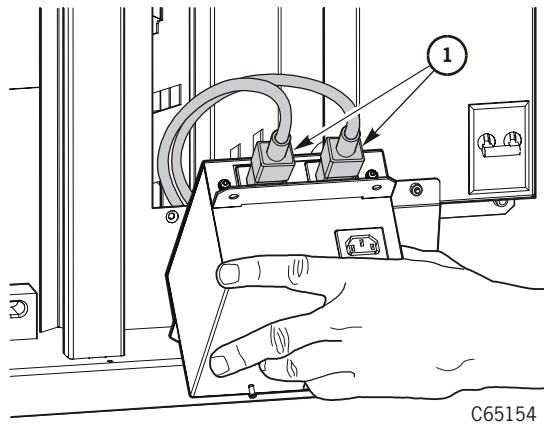
4. Disconnect the PDU-to-DC power supply cables.
5. Using a Torx T-25 driver, remove the four AC PDU screws.



1. PDU-to-DC power supply cable
2. AC PDU screws (4X)



- 
6. Rotate the top of the AC PDU out and remove the drive power cables.



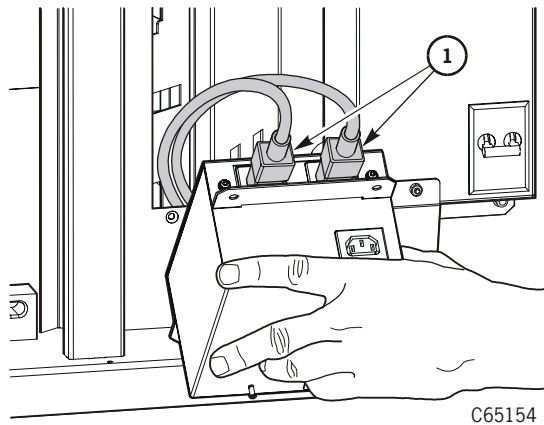
1. Drive power cables

- 
7. Remove the AC PDU.
- 

## Replacement

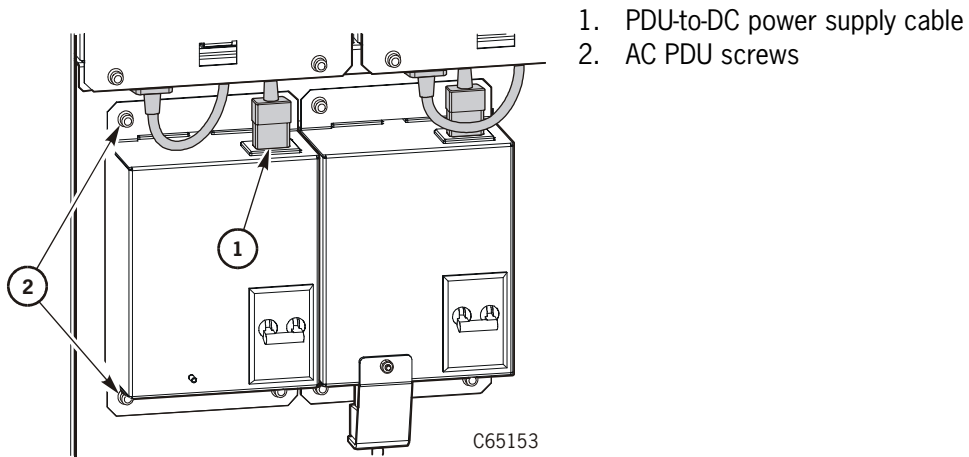
---

1. Connect the drive power cables.
2. Place the AC PDU in the library frame making sure the distribution unit's flanges remain outside of the frame.

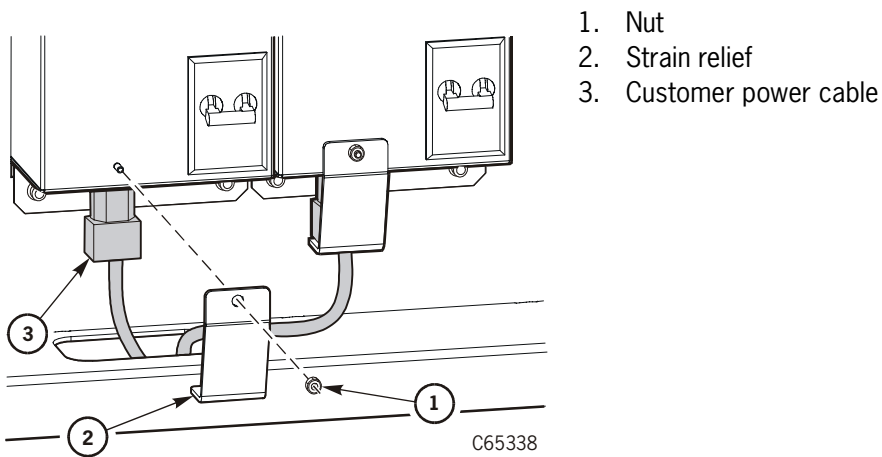


1. Drive power cables
-

- 
- Using a Torx T-25 driver, attach the AC PDU and screws to the library frame.
  - Connect the PDU-to-DC power supply cable.



- 
- Connect the customer's power cable.
  - Using a 5/16-in. hex driver, attach the strain relief with the nut.

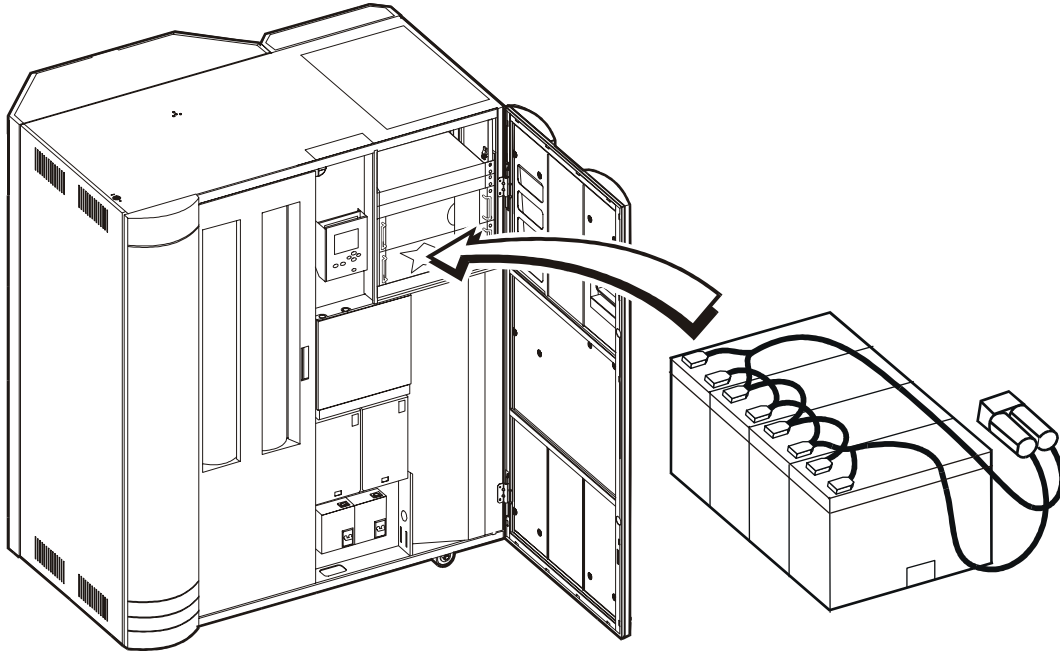


- 
- Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
-

## APC (UPS) Battery Replacement

Figure 5-17. APC (UPS) Batteries (C65353)

---



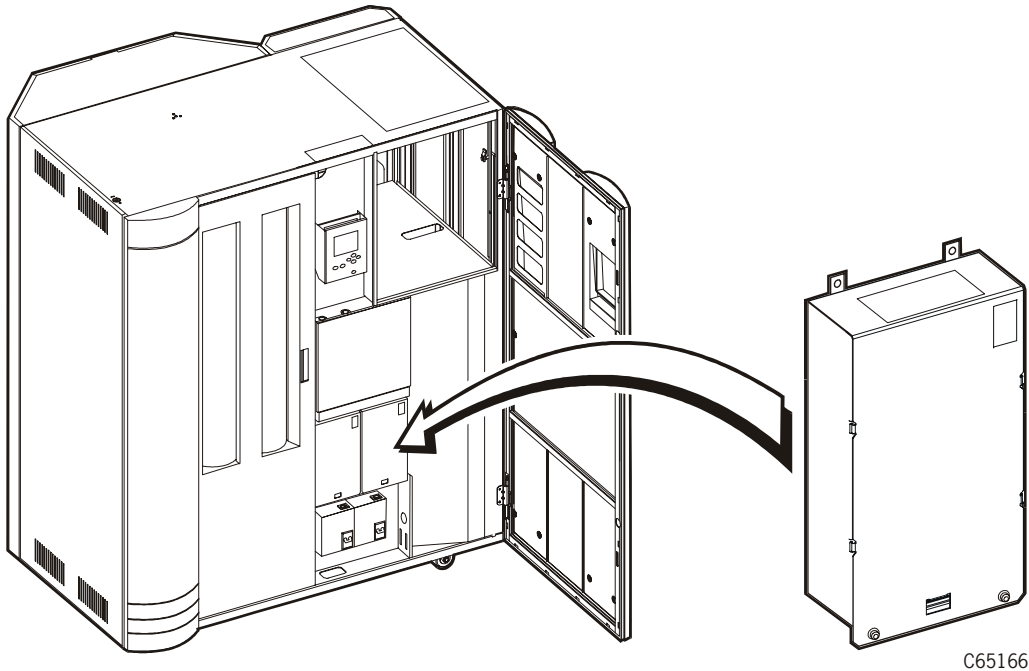
C65353

---

The batteries for the APC Uninterruptible Power Source must be periodically changed. Refer to the APC publication, APC part number 990-7095C, for the replacement procedure.

## DC Power Supply Assembly

Figure 5-18. DC Power Supply Assembly (C65166)



**WARNING:**

***Electrocution hazard:*** Make sure you push down on the power switch before removing the DC power supply assembly.

**WARNUNG:**

***Lebensgefährliche Spannung:*** Bevor Sie die Gleichstrom-Versorgungseinheit herausnehmen, kippen Sie den Netzschalter nach unten.

**AVERTISEMENT:**

***Danger d'électrocution:*** Appuyer sur le commutateur avant de retirer le bloc d'alimentation en courant continu.

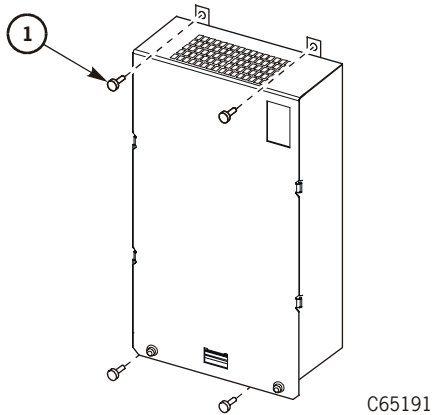
## Removal

---

**Note:** This field replaceable unit may be removed and replaced while the library is powered on.

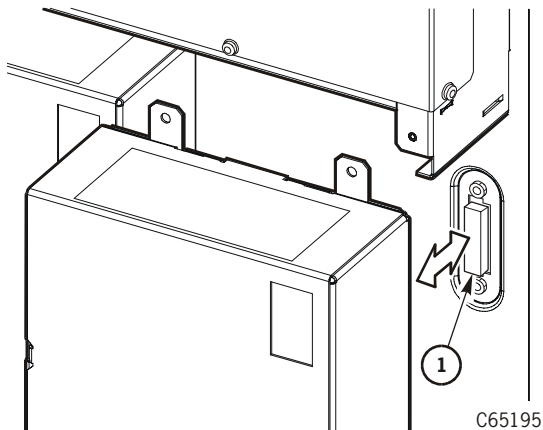
1. Review the information under “Preparation” on page 5-1.
- 
2. Using a Torx T-15 driver, remove the two electronics module fan tray screws and the fan tray. Refer to “Electronics Module Fan Tray Assembly” on page 5-9 for more information.
- 
3. Using a Torx T-25 driver, remove the two *upper* DC power supply screws.
  4. Using a Torx T-25 driver, remove the two *lower* DC power supply screws.

1. DC power supply screws (4X)



5. Pull the DC power supply from the library frame to disconnect it from the P2B connector.

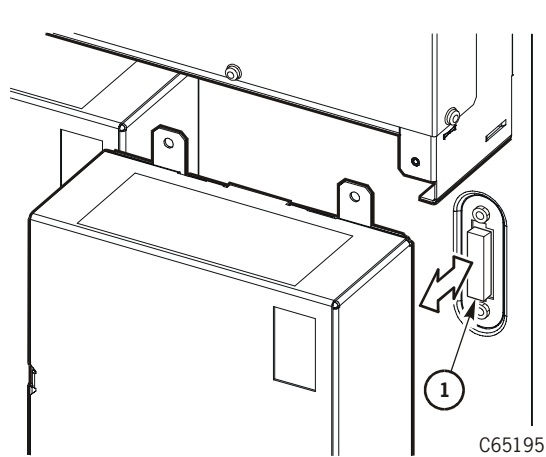
1. P2B connector



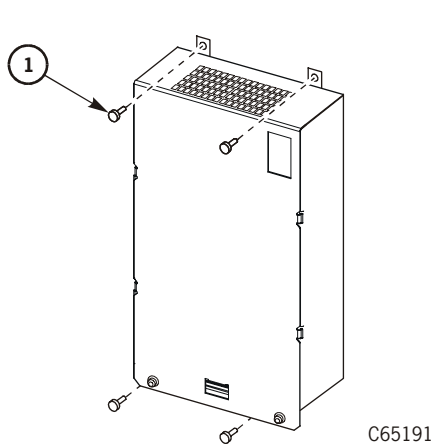
6. Disconnect the power cable on the bottom of the DC power supply.
-

## Replacement

- 
1. Connect the power cable on the bottom of the DC power supply.
  2. Connect the DC power supply to the P2B connector by pressing the power supply into place.
- 



- 
3. Using a Torx T-25 driver, attach the two *lower* DC power supply screws.
  4. Using a Torx T-25 driver, attach the two *upper* DC power supply screws.



- 
5. Install the fan tray by using a Torx T-15 driver to attach the two electronics module fan tray screws.
  6. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
-

## ■ Tape Drive Removal/Replacement when dWWN Enabled

### CAUTION:

***Fiber fabric problems:* Read the information below before removing or replacing a Fibre Channel drive in a library that has dynamic World-Wide Naming enabled.**

The dynamic world-wide naming feature assigns names to Fibre Channel drives by their *slot* location in a drive tower rather than by their drive number. The dWWN feature allows you to replace a Fibre Channel drive without the need to re-configure the network. An explanation of the feature is given in [“Dynamic Worldwide Name” on page 2-36](#).

**Note:** With firmware version 3.04, you *cannot* mix dWWN-supported and non-dWWN supported drives when the dWWN feature is enabled on the library. In such a case, non-supported drives remain in the “configuring” state on the library operator panel.

## Drive Removal

When removing a drive in a library that has dWWN enabled, you must determine:

- If the drive is to be left on site and if there is a possibility that the drive will later be connected in a non-dWWN environment.
- If the drive may be used in another library that does not contain 3.02 or later firmware.

In either of these situations:

1. Make sure that the drive is unavailable to the system.
2. Disconnect the Fibre Channel cable from the drive.
3. Connect your laptop to the CLI port.

### CAUTION:

***Fiber fabric problems:* Be sure that the “pprrcc” in the next step is correct; if the wrong drive value is entered, you may have to re-configure the system.**

4. Enter `DRIVE PPRRCC REVERT`, where “pprrcc” is the panel, row, and column of the drive. The “revert” command will cause the drive to revert to its native value.
  - a. If the drive is to be returned to the factory, power off the drive and pack the drive for return shipment.
  - b. If the drive is not functional enough to revert, make note of this fact in the return shipment.

## Drive Replacement

When replacing a drive in a library that has dWWN enabled:

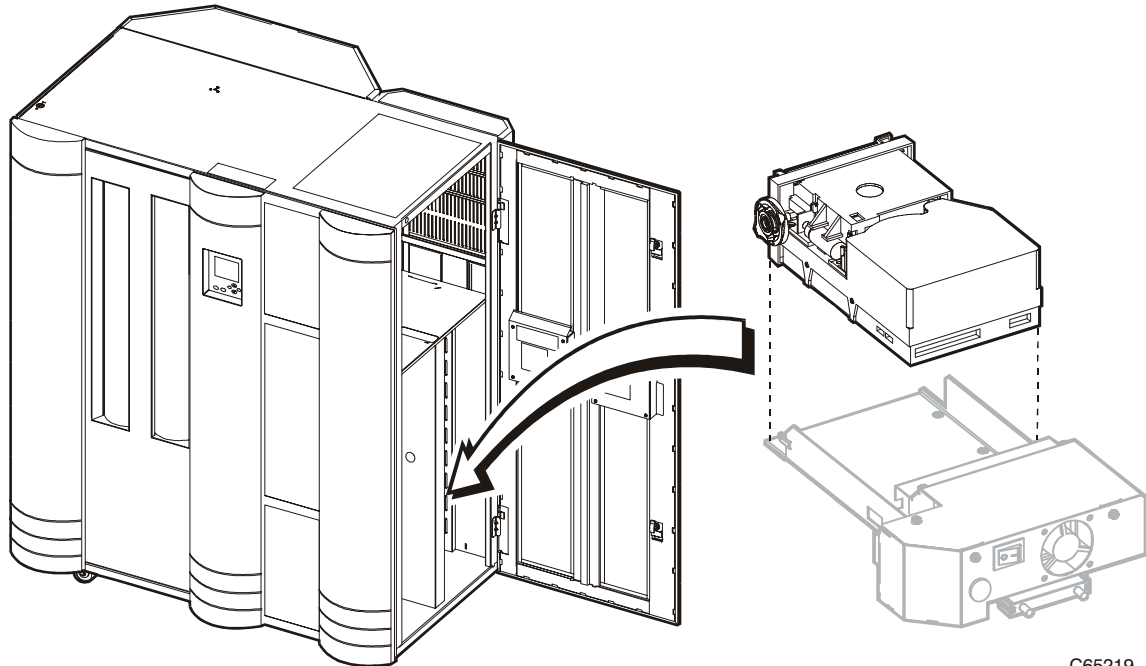
- If the drive is dWWN-compatible:
  - Replace the drive
  - Power-on the drive
  - *Wait* until the operator panel notifies you that the drive configuration is completed (that is, until the operator panel no longer indicates “configuring” on the initial status screen).
  - Connect the Fibre Channel cable
- If the drive is downlevel (the operator panel displays CONFIGURING continuously):
  - Upgrade the drive to the supported dWWN firmware level
  - *Wait* until the operator panel notifies you that the drive configuration is completed (that is, until the operator panel no longer indicates “configuring” on the initial status screen).
  - Connect the Fibre Channel cable



## ■ Tape Drive Components

### DLT 4000/7000E/8000 Tape Drive

Figure 5-19. DLT 4000/7000E/8000 Tape Drive (C65219)



C65219

#### DLT Preparation

**WARNING:**

***Electrocution hazard.*** 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 unit is powered off. Do not apply power to the drive tray assembly when it is not installed in the library.

**WARNUNG:**

***Stromschlaggefahr!*** Berühren Sie auf keinen Fall die Bestandteile des Netzteils im Elektronikmodul oder an den Laufwerksschächten, da das Gerät auch nach dem Abschalten unter Spannung stehen kann. Schließen Sie den Laufwerksschacht nicht an das Stromnetz an, solange er nicht im Bandarchiv installiert ist.

**AVERTISSEMENT:**

***Danger d'électrocution:*** Ne toucher aucun élément du bloc d'alimentation situé à l'intérieur du module électronique ou sur les porte-lecteurs. Ces éléments pourraient être sous tension, même lorsque l'appareil est hors tension. Ne remettez pas l'ensemble de porte-lecteurs sous tension s'il n'est pas installé dans la bibliothèque.

Observe these precautions before beginning:

1. If the drives are daisy-chained, stop all data processing in the channel before disconnecting them.
2. Make sure there is no activity on the SCSI bus before disconnecting the external SCSI cables. The host must be quiesced; do not disconnect a hot bus.
3. Make sure any third-party software is quiesced.
4. Make sure all signals are terminated at each end of the SCSI bus. Also, do not mix terminator types.

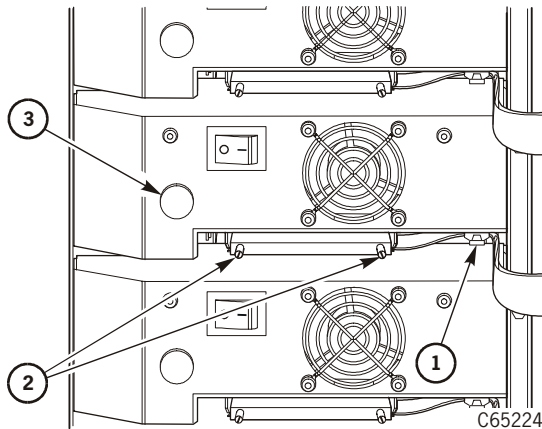
**CAUTION:**

***System configuration problems:*** When adding or replacing a drive, always check and, if necessary, configure the drive's SCSI ID at the library's operator panel.

## Removal

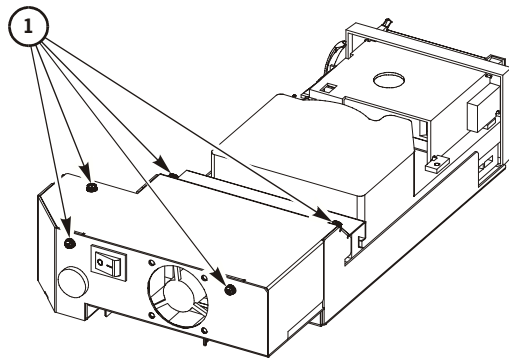
- 
1. Review the information under [“Preparation”](#) on page 5-1.
  2. Open the right side door of the tape library.
-

3. Turn off the power to the drive by placing the switch in the off (O) position.
4. Carefully release the cable clamp and remove the SCSI cable from the rear of the drive by unscrewing the two SCSI cable screw locks.
5. Loosen the thumbscrew on the left side of the DLT drive.



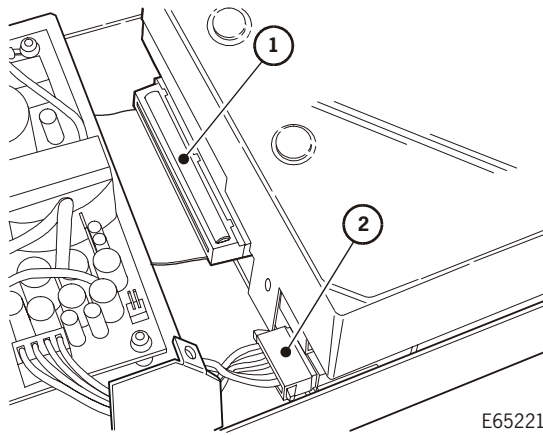
1. Cable clamp
2. SCSI cable screw locks
3. Thumbscrew

6. Grip the rear of the drive and, while pulling it toward you, place your other hand under the drive tray for support.
7. Using both hands, remove the drive tray assembly from the slot, and place it on a flat, stable surface.
8. Using a Torx T-15 driver, remove the five power supply cover screws.



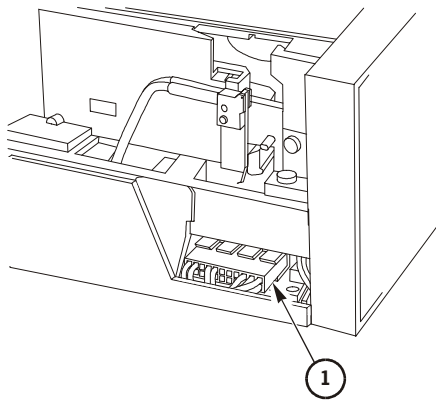
1. Power supply cover screws

9. Remove the SCSI cable and the P2 connector from the drive.



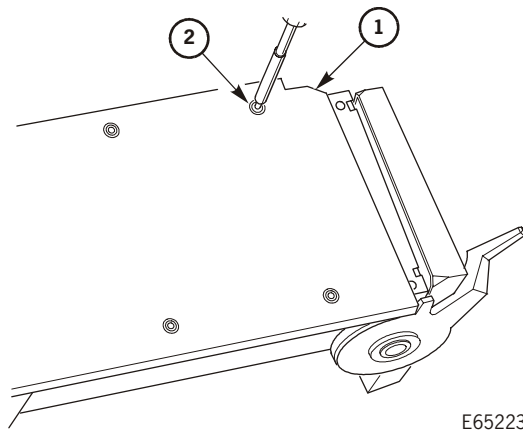
- 1. SCSI cable
- 2. P2 connector

10. Remove the DRV connector from the drive.



- 1. DRV connector

11. Turn the drive tray over to access the four screws on the bottom of the drive tray. Using a Torx T-10 driver, remove the four drive screws.
12. Lift and remove the drive tray.

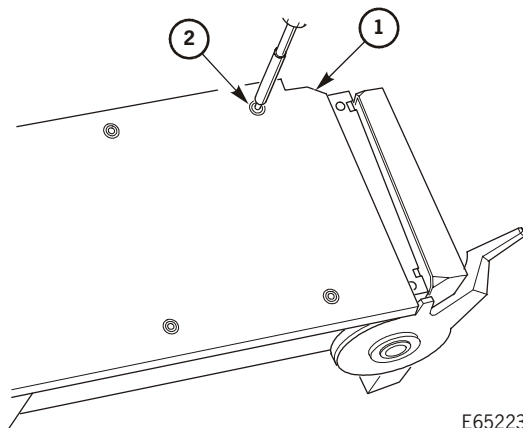


1. Drive tray bottom
2. Drive screw

E65223

## Replacement

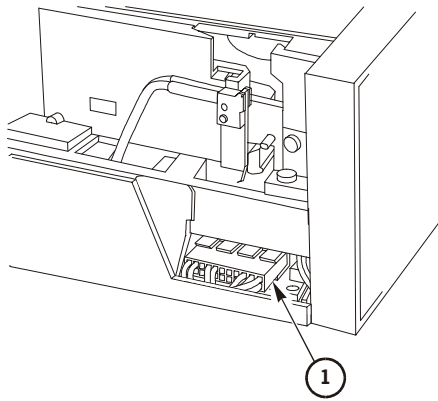
1. Set the drive on a work surface, make sure the DRV cable is away from the drive so it does not get pinched. Slide the drive tray over the drive so the SCSI and P2 cables do not get pinched.
2. On the left side of the drive, set the terminating power jumper to match the location of the drive you removed.
3. Using a Torx T-10 driver, attach the four screws on the bottom of the drive tray.



1. Drive tray bottom
2. Drive screw

E65223

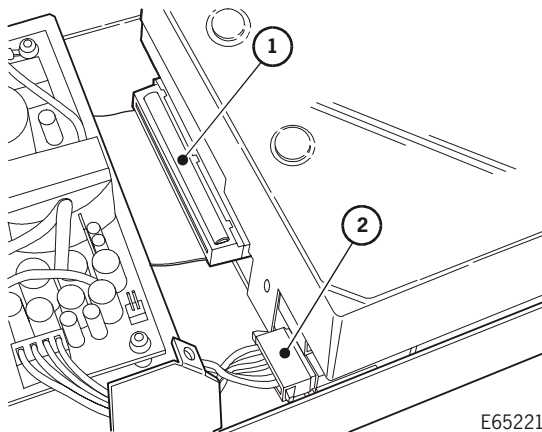
- 
- Turn the drive tray over and attach the DRV connector to the drive, threading the cable along the channel beside the drive.



- DRV connector

E65222

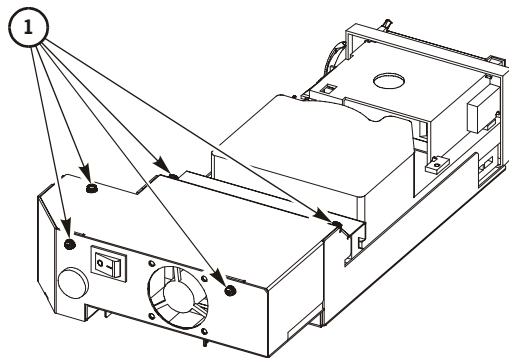
- 
- Attach the SCSI cable and the P2 connector to the drive.



- SCSI cable
- P2 connector

E65221

- 
- Using a Torx T-15 driver, attach the five power supply cover screws.



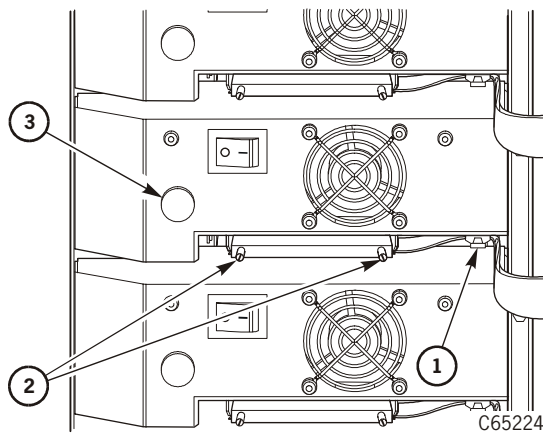
- Power supply screws

E65220

**CAUTION:**

**Possible equipment damage:** When sliding the tape drive into its slot, make sure the drive SCSI cable is out of the way. Do not force the drive into the slot.

7. Slide the drive into its slot, being careful not to catch or crush any cables.
8. Tighten the thumbscrew on the left side of the DLT drive.
9. Connect the SCSI cable screw locks to the SCSI connector on the rear of the drive.
10. Insert and secure the cable through the cable clamp.
11. Turn on the drive power by placing the switch to the on (I) position.
12. Close the right side door of the library.

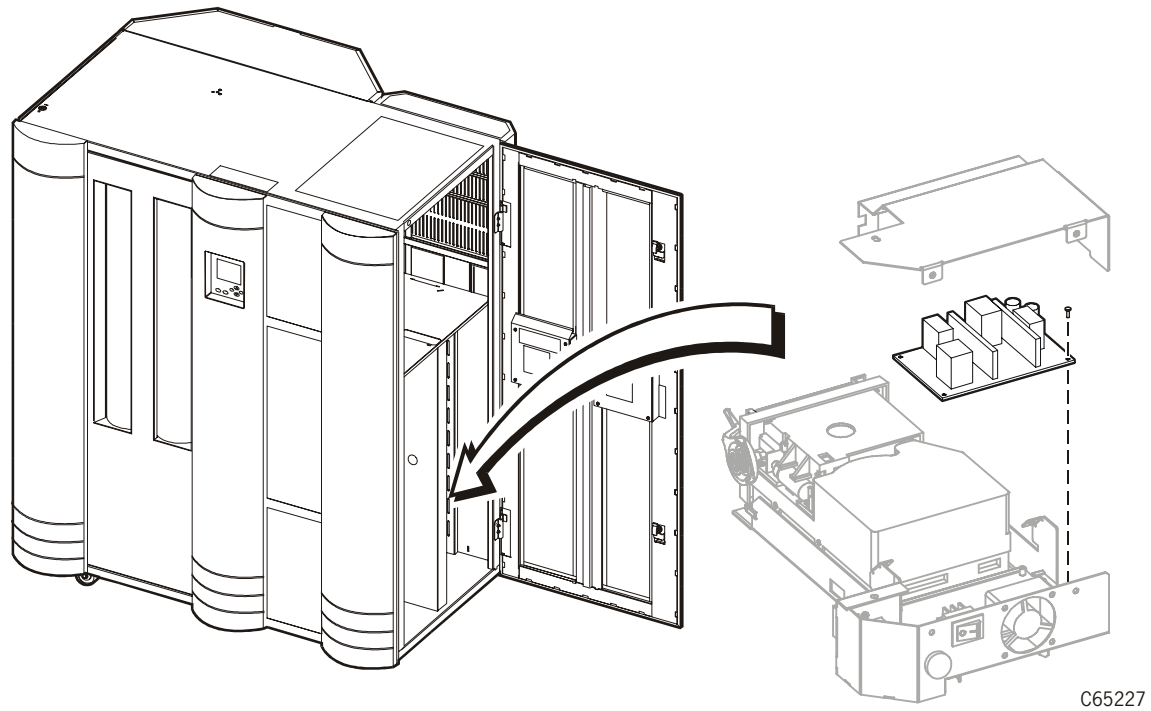


1. Cable clamp
2. SCSI cable screw locks
3. DLT thumbscrew

13. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.

## DLT Power Supply

Figure 5-20. DLT Power Supply (C65227)



### Removal

**WARNING:**

***Electrocution hazard.*** 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 unit is powered off. Do not apply power to the drive tray assembly when it is not installed in the library.

**Warnung:**

***Stromschlaggefahr!*** Berühren Sie auf keinen Fall die Bestandteile des Netzteils im Elektronikmodul oder an den Laufwerksschächten, da das Gerät auch nach dem Abschalten unter Spannung stehen kann. Schließen Sie den Laufwerksschacht nicht an das Stromnetz an, solange er nicht im Bandarchiv installiert ist.

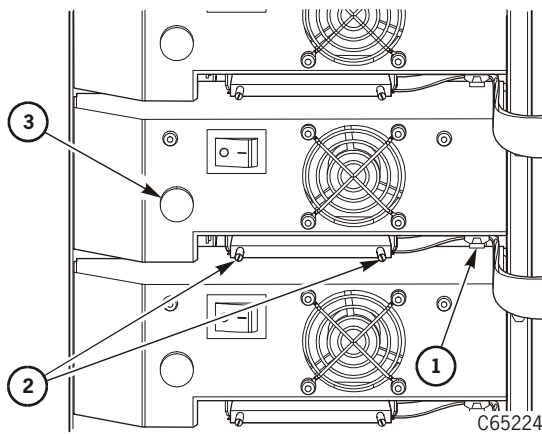
**AVERTISSEMENT:**

***Danger d'électrocution:*** Ne toucher aucun élément du bloc d'alimentation situé à l'intérieur du module électronique ou sur les porte-lecteurs. Ces éléments pourraient être sous tension, même lorsque l'appareil est hors tension.



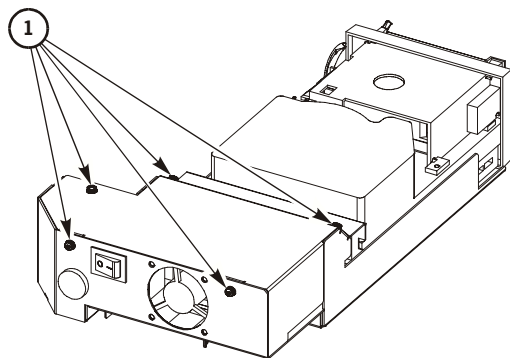
**Ne remettez pas l'ensemble de porte-lecteurs sous tension s'il n'est pas installé dans la bibliothèque.**

1. Review the information under [“Preparation” on page 5-1](#) and [“DLT Preparation” on page 5-69](#).
  2. Open the right side door of the tape library.
  3. Turn of the power to the drive by placing the switch in the off (O) position.
- 
4. Release the cable from the cable clamp.
  5. Carefully remove the SCSI cable from the rear of the drive by unscrewing the two SCSI cable screw locks.
  6. Loosen the thumbscrew on the left side of the DLT drive.



1. Cable clamp
2. SCSI cable screw locks
3. Thumbscrew

7. Using a Torx T-15 driver, remove the five power supply cover screws.



1. Power supply cover screws

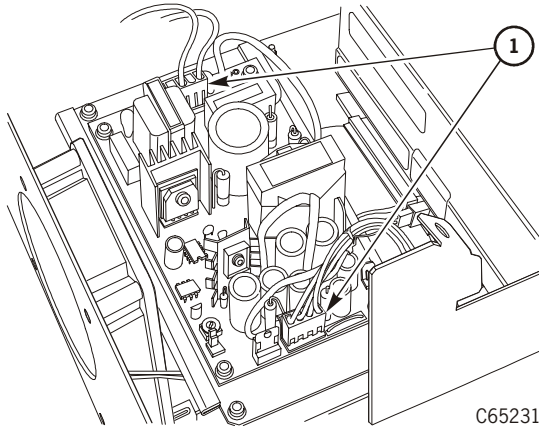
E65220

**CAUTION:**

**Burn hazard:** If the drive has been active, the power supply may be hot. Wait for the power supply to cool before touching it.

8. Disconnect the P1 and J1 connectors at the power supply.

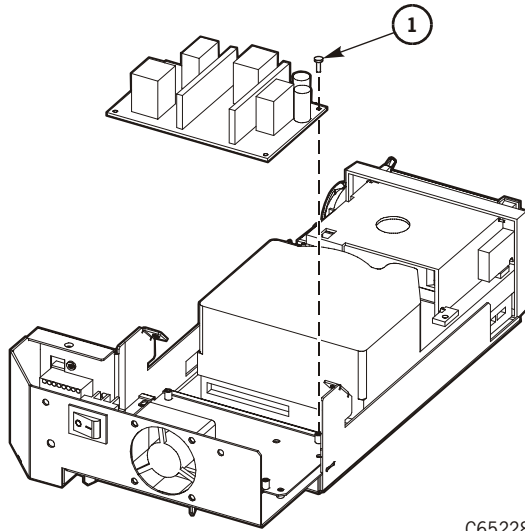
1. J1 and P1 connectors



C65231

9. Using a Torx T-15 driver, remove the four power supply screws and remove the power supply.

1. Screw (4X)

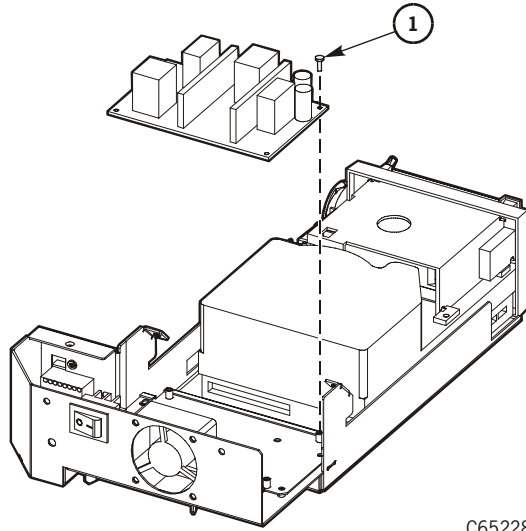


C65228

## Replacement

---

1. Using a Torx T-15 driver, attach the four power supply screws.

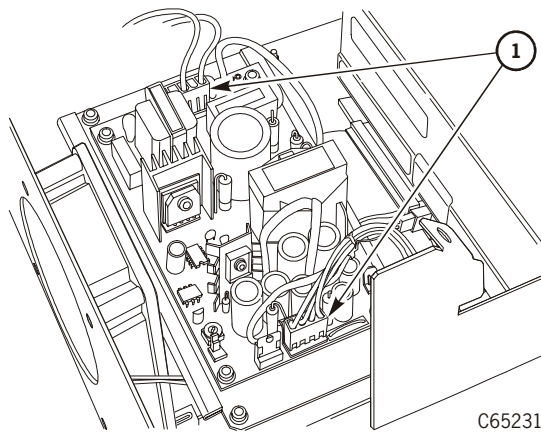


1. Screw (4X)

C65228

---

2. Connect the P1 and J1 connectors at the power supply.

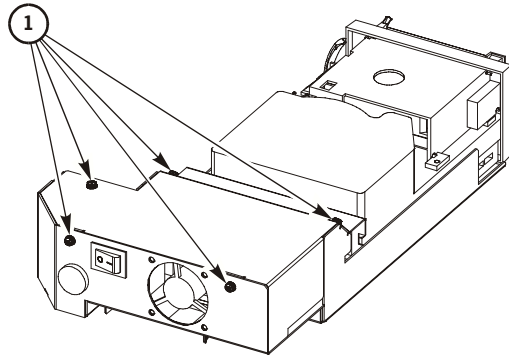


1. J1 and P1 connectors

C65231

---

- Using a Torx T-15 driver, attach the five power supply cover screws.



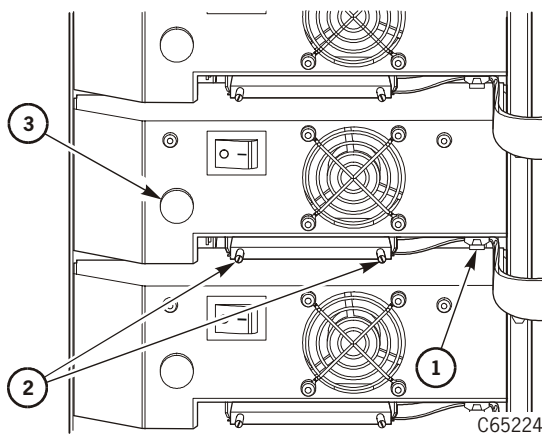
- Power supply screws

E65220

**CAUTION:**

**Possible equipment damage:** When sliding the tape drive into its slot, make sure the drive SCSI cable is out of the way. Do not force the drive into the slot.

- Slide the drive into its slot, being careful not to catch or crush any cables.
- Tighten the thumbscrew on the left side of the DLT drive.
- Connect the SCSI cable screw locks to the SCSI connector on the rear of the drive.
- Insert and secure the cable through the cable clamp.
- Turn on the drive power by placing the switch to the on (I) position.
- Close the right side door of the library.



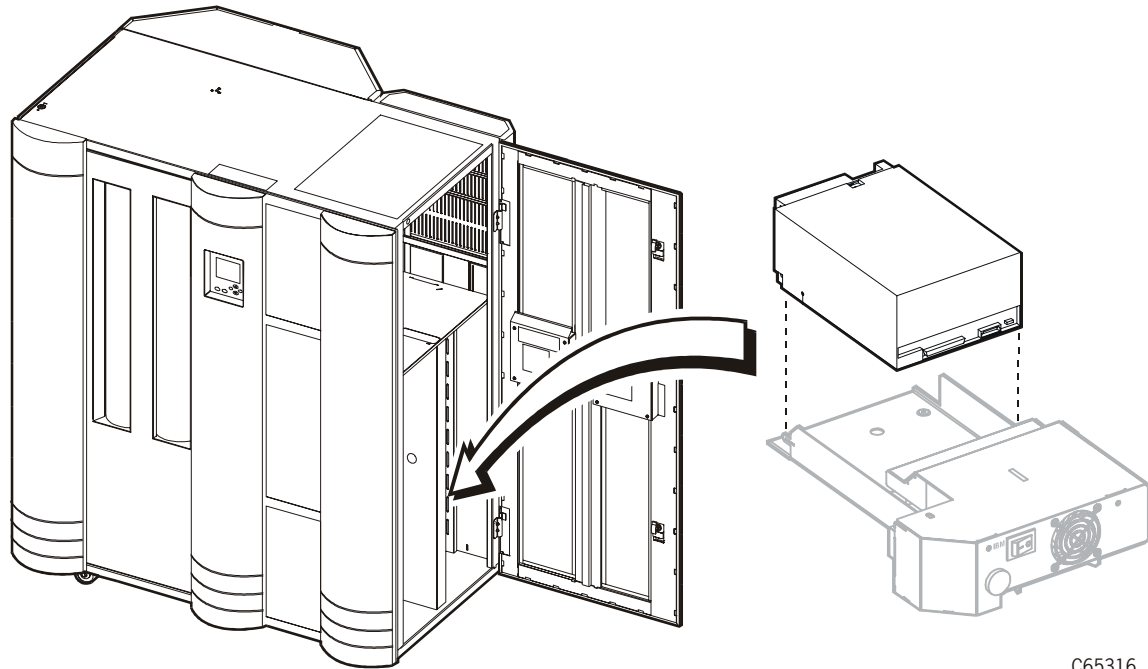
- Cable clamp
- SCSI cable screw locks
- Thumbscrew

C65224

- Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.

## IBM Ultrium Tape Drive

Figure 5-21. IBM Ultrium Tape Drive (C65316)



### IBM Ultrium Preparation

IBM Ultrium drives are available as SCSI interface or Fibre Channel.

**Note:** If the IBM Ultrium drive is connected to a Fibre channel and the library is operating with dynamic world-wide name (dWWN) enabled, refer to [“Tape Drive Removal/Replacement when dWWN Enabled”](#) on page 5-67 before attempting to remove/replace the drive.

**WARNING:**

***Electrocution hazard. 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 unit is powered off. Do not apply power to the drive tray assembly when it is not installed in the library.***

**WARNUNG:**

***Stromschlaggefahr!*** Berühren Sie auf keinen Fall die Bestandteile des Netzteils im Elektronikmodul oder an den Laufwerksschächten, da das Gerät auch nach dem Abschalten unter Spannung stehen kann. Schließen Sie den Laufwerksschacht nicht an das Stromnetz an, solange er nicht im Bandarchiv installiert ist.

**AVERTISSEMENT:**

***Danger d'électrocution:*** Ne toucher aucun élément du bloc d'alimentation situé à l'intérieur du module électronique ou sur les porte-lecteurs. Ces éléments pourraient être sous tension, même lorsque l'appareil est hors tension. Ne remettez pas l'ensemble de porte-lecteurs sous tension s'il n'est pas installé dans la bibliothèque.

Observe these precautions before beginning:

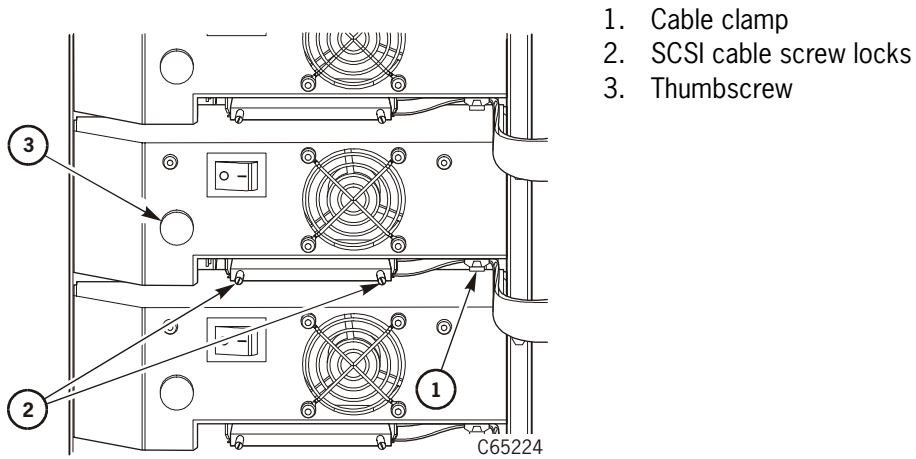
1. If the drives are daisy-chained, stop all data processing in the channel before disconnecting them.
2. Make sure there is no activity on the SCSI/Fibre Channel bus before disconnecting the external SCSI/Fibre Channel cables. The host must be quiesced; do not disconnect a hot bus.
3. Make sure any third-party software is quiesced.
4. Make sure all signals are terminated at each end of the SCSI bus. Also, do not mix terminator types.

**CAUTION:**

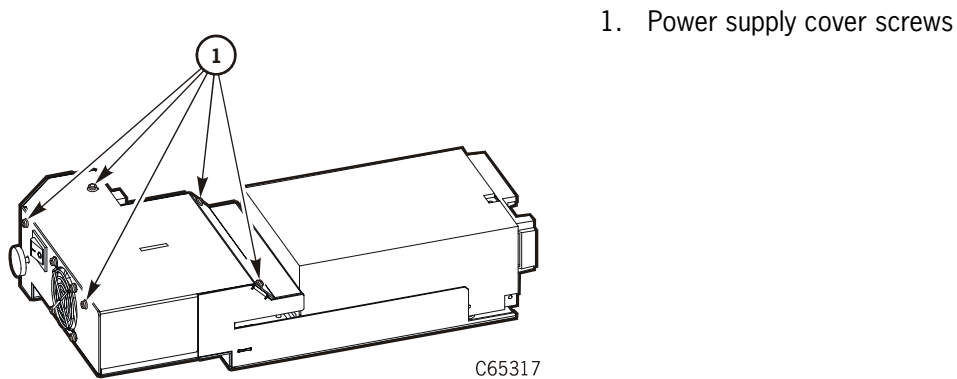
***System configuration problems:*** When adding or replacing a drive, always check and, if necessary, configure the drive's SCSI ID at the library's operator panel.

## Removal

1. Review the information under [“Preparation” on page 5-1](#).
  2. Open the right side door of the tape library.
- 
3. Turn off the power to the drive by placing the switch in the off (O) position.
  4. For SCSI drives, carefully remove the SCSI cable from the rear of the drive by unscrewing the two SCSI cable screw locks.
  5. Loosen the thumbscrew on the left side of the drive.



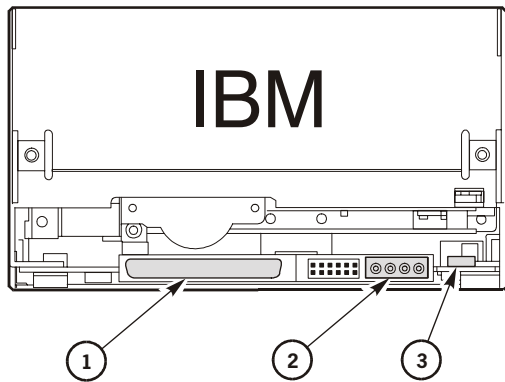
6. Grip the rear of the drive and, while pulling it toward you, place your other hand under the drive tray for support.
  7. Using both hands, remove the drive tray assembly from the slot, and place it on a flat, stable surface.
- 
8. Using a Torx T-15 driver, remove the five power supply cover screws.



- 
9. Remove the host interface cable, power connector, and TTI cable from the drive.

**Note:** For Fibre Channel drives that are terminated, note the terminator location below.

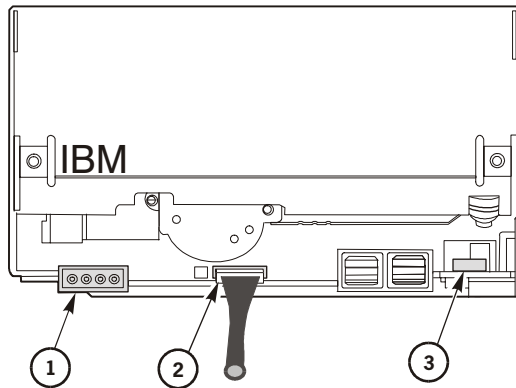
**IBM Ultrium SCSI Interface**



1. SCSI cable
2. Power connector
3. TTI cable

C65318

**IBM Ultrium Fibre Channel Interface**

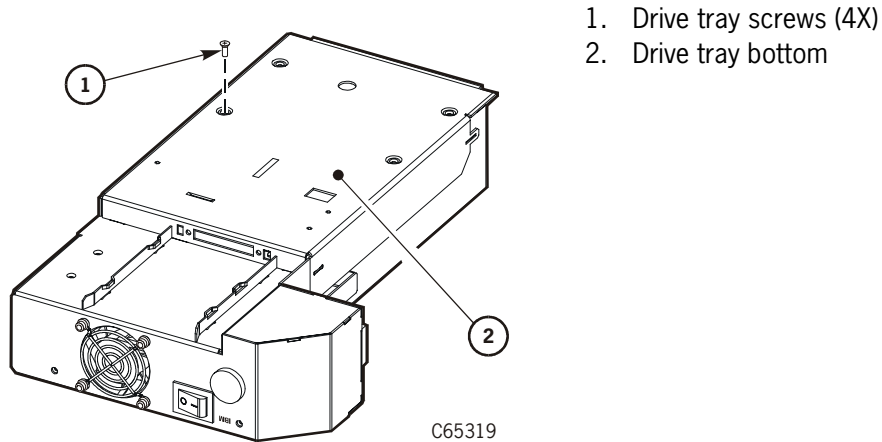


1. Power connector
2. Fibre Channel terminator
3. TTI cable

C65414



10. Turn the drive tray over to access the four screws on the bottom of the drive tray. Using a Torx T-10 driver, remove the four drive screws.
11. Lift and remove the drive tray.



---

## Replacement

---

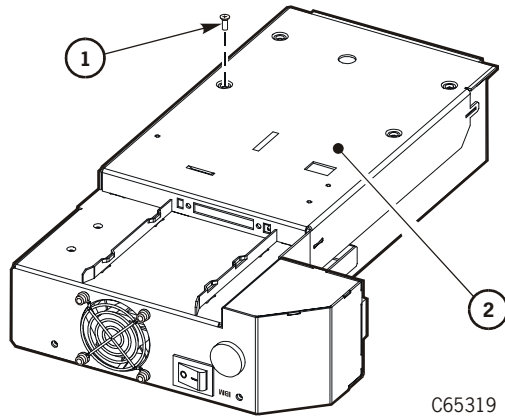
1. Set the drive on a flat work surface.

### CAUTION:

**Drive failure:** Be sure that switches 1 and 2 on the bottom of the replacement drive are both set to ON (library operation).

2. Carefully turn over the drive and set both microswitches to ON (Switch 1 = 9600 baud, Switch 2 = Two stop bits).
  3. Slide the drive tray over the drive.
  4. At the rear of the drive, set the terminating power and library jumpers to match the location in the drive you removed.
-

5. Using a Torx T-10 driver, attach the four screws on the bottom of the drive tray.



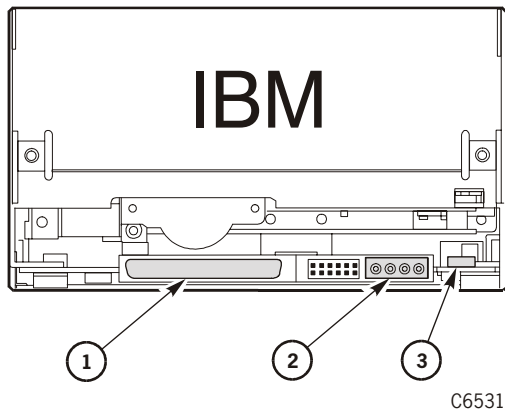
1. Drive screws (4X)
2. Drive tray bottom

C65319

6. Attach the host interface cable, power connector, and TTI cable to the drive.

**Note:** For Fibre Channel drives that are terminated, note the terminator location below.

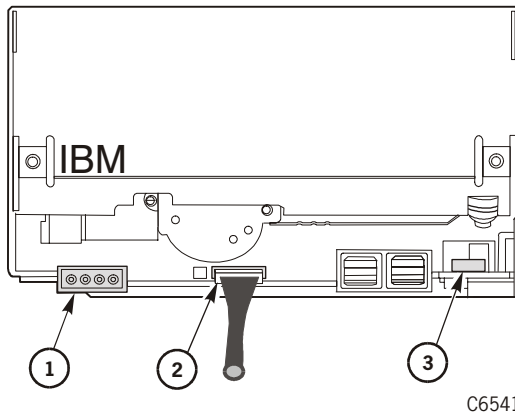
**IBM Ultrium SCSI Interface**



1. SCSI cable
2. Power connector
3. TTI cable

C65318

**IBM Ultrium Fibre Channel Interface**

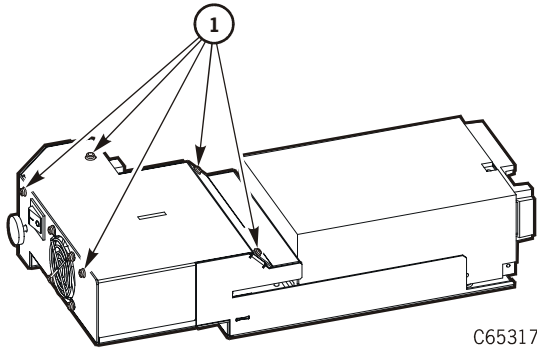


1. Power connector
2. Fibre Channel terminator
3. TTI cable

C65414

- 
7. Using a Torx T-15 driver, attach the five power supply cover screws.

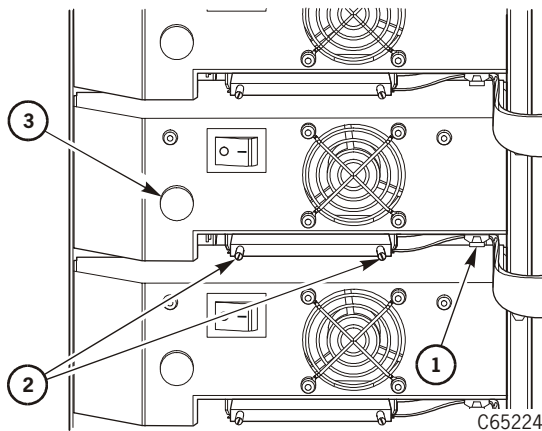
1. Power supply screws



**CAUTION:**

**Possible equipment damage:** When sliding the tape drive into its slot, make sure the drive SCSI cable is out of the way. Do not force the drive into the slot.

8. Slide the drive into its slot, being careful not to catch or crush any cables.
9. Tighten the thumbscrew on the left side of the drive.
10. For SCSI drives, connect the SCSI cable screw locks to the SCSI connector on the rear of the drive.
11. Turn on the drive power by placing the switch to the on (I) position.
12. Close the right side door of the library.

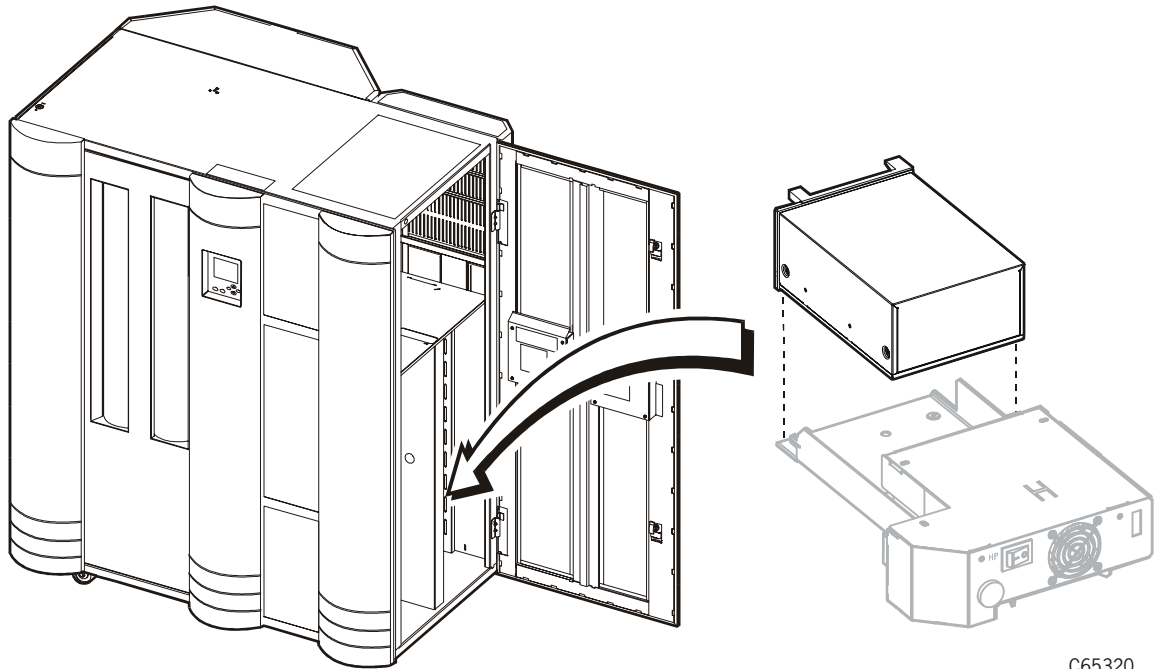


1. Cable clamp  
2. SCSI cable screw locks  
3. Thumbscrew

13. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
-

## HP Ultrium Tape Drive—HVD Version

Figure 5-22. HP Ultrium Tape Drive—HVD Version (C65320)



### HP Ultrium Preparation

**WARNING:**

***Electrocution hazard.*** 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 unit is powered off. Do not apply power to the drive tray assembly when it is not installed in the library.

**WARNUNG:**

***Stromschlaggefahr!*** Berühren Sie auf keinen Fall die Bestandteile des Netzteils im Elektronikmodul oder an den Laufwerksschächten, da das Gerät auch nach dem Abschalten unter Spannung stehen kann. Schließen Sie den Laufwerksschacht nicht an das Stromnetz an, solange er nicht im Bandarchiv installiert ist.

**AVERTISSEMENT:**

***Danger d'électrocution:*** Ne toucher aucun élément du bloc d'alimentation situé à l'intérieur du module électronique ou sur les porte-lecteurs. Ces éléments pourraient être sous tension, même lorsque l'appareil est hors tension. Ne remettez pas l'ensemble de porte-lecteurs sous tension s'il n'est pas installé dans la bibliothèque.

Observe these precautions before beginning:

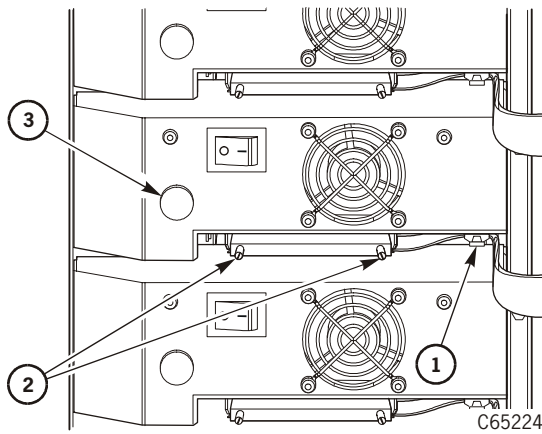
1. If the drives are daisy-chained, stop all data processing in the channel before disconnecting them.
2. Make sure there is no activity on the SCSI bus before disconnecting the external SCSI cables. The host must be quiesced; do not disconnect a hot bus.
3. Make sure any third-party software is quiesced.
4. Make sure all signals are terminated at each end of the SCSI bus. Also, do not mix terminator types.

**CAUTION:**

***System configuration problems:*** When adding or replacing a drive, always check and, if necessary, configure the drive's SCSI ID at the library's operator panel.

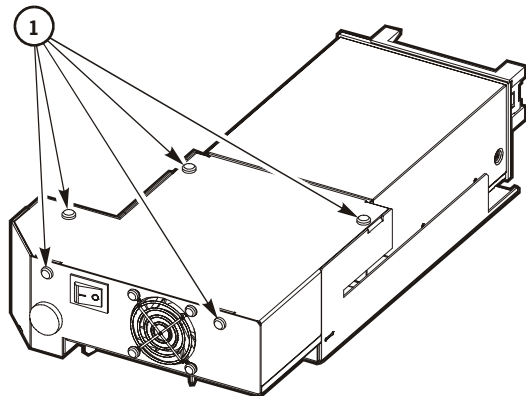
## Removal

- 
1. Review the information under [“Preparation” on page 5-1](#).
  2. Open the right side door of the tape library.
- 
3. Turn off the power to the drive by placing the switch in the off (O) position.
  4. Carefully remove the SCSI cable from the rear of the drive by unscrewing the two SCSI cable screw locks.
  5. Loosen the thumbscrew on the left side of the drive.



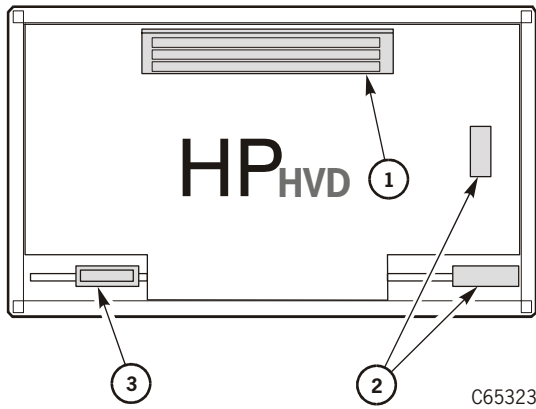
1. Cable clamp
2. SCSI cable screw locks
3. Thumbscrew

- 
6. Grip the rear of the drive and, while pulling it toward you, place your other hand under the drive tray for support.
  7. Using both hands, remove the drive tray assembly from the slot, and place it on a flat, stable surface.
- 
8. Using a Torx T-15 driver, remove the five power supply cover screws.



1. Power supply cover screws

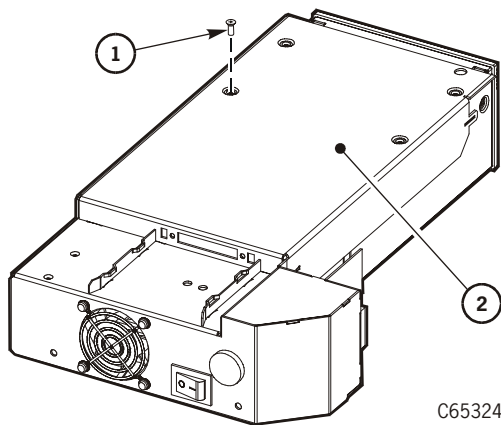
- 
9. Remove the SCSI cable, power connectors, and TTI cable from the drive.



1. SCSI cable
2. Power connectors
3. TTI cable

10. Turn over the drive tray to access the four screws on the bottom of the drive tray. Using a Torx T-10 driver, remove the four drive screws.

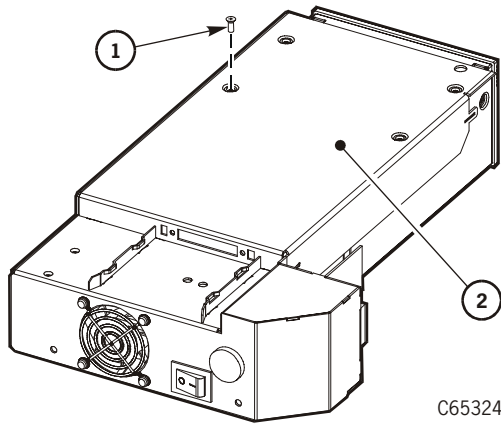
11. Lift and remove the drive tray.



1. Drive screw (4X)
2. Drive tray bottom

## Replacement

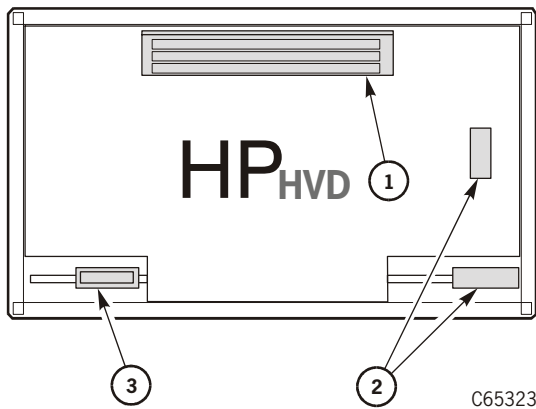
- 
1. Set the drive on a flat work surface.
- 
2. Slide the drive tray over the drive.
- 
3. Using a Torx T-10 driver, attach the four screws on the bottom of the drive tray.



1. Drive tray bottom
2. Drive screw (4X)

C65324

- 
4. Attach the SCSI cable, power connectors, and TTI cable to the drive.



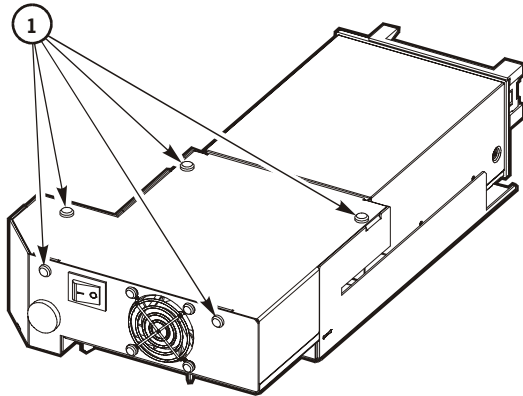
1. SCSI cable
2. Power connectors
3. TTI cable

C65323



- 
5. Using a Torx T-15 driver, attach the five power supply cover screws.

1. Power supply screws

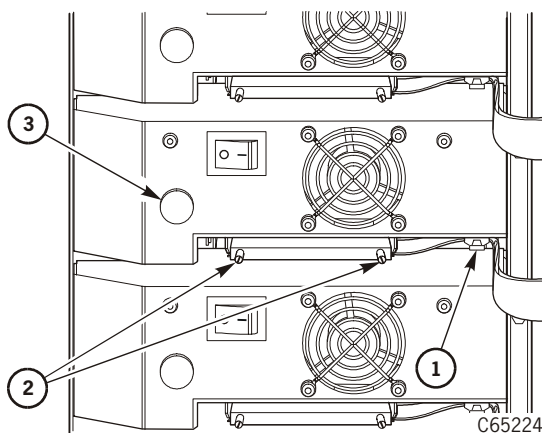


C65321

**CAUTION:**

**Possible equipment damage:** When sliding the tape drive into its slot, make sure the drive SCSI cable is out of the way. Do not force the drive into the slot.

6. Slide the drive into its slot, being careful not to catch or crush any cables.
7. Tighten the thumbscrew on the left side of the drive.
8. Connect the SCSI cable screw locks to the SCSI connector on the rear of the drive.
9. Turn on the drive power by placing the switch to the on (I) position.
10. Close the right side door of the library.



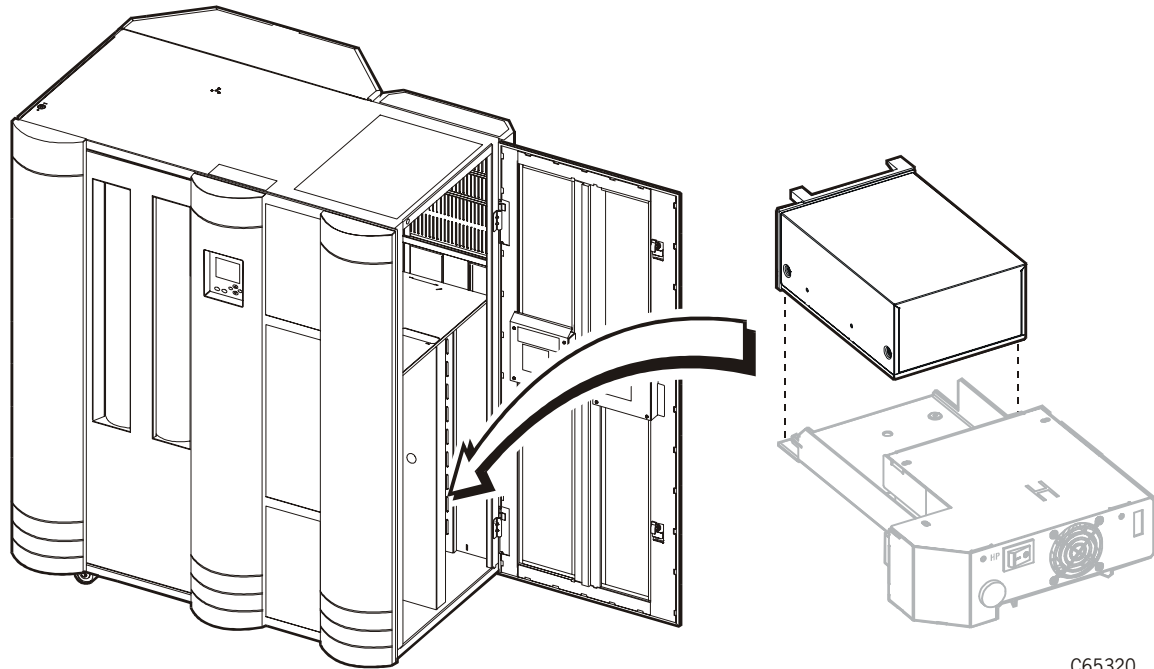
1. Cable clamp  
2. SCSI cable screw locks  
3. Thumbscrew

C65224

- 
11. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
-

## HP Ultrium Tape Drive—LVD Version

Figure 5-23. HP Ultrium Tape Drive—LVD Version (C65320)



### HP Ultrium Preparation

**WARNING:**

***Electrocution hazard.*** 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 unit is powered off. Do not apply power to the drive tray assembly when it is not installed in the library.

**WARNUNG:**

***Stromschlaggefahr!*** Berühren Sie auf keinen Fall die Bestandteile des Netzteils im Elektronikmodul oder an den Laufwerksschächten, da das Gerät auch nach dem Abschalten unter Spannung stehen kann. Schließen Sie den Laufwerksschacht nicht an das Stromnetz an, solange er nicht im Bandarchiv installiert ist.

**AVERTISSEMENT:**

***Danger d'électrocution:*** Ne toucher aucun élément du bloc d'alimentation situé à l'intérieur du module électronique ou sur les porte-lecteurs. Ces éléments pourraient être sous tension, même lorsque l'appareil est hors tension.

**Ne remettez pas l'ensemble de porte-lecteurs sous tension s'il n'est pas installé dans la bibliothèque.**

Observe these precautions before beginning:

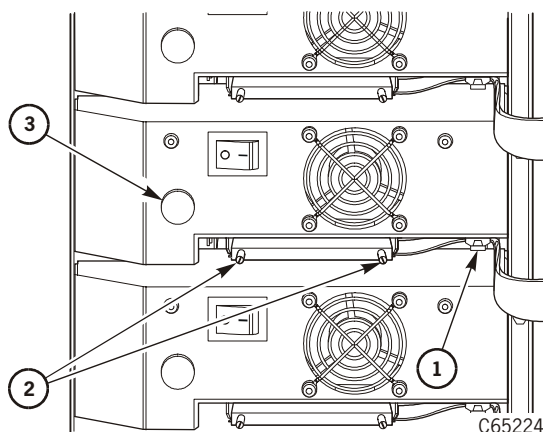
1. If the drives are daisy-chained, stop all data processing in the channel before disconnecting them.
2. Make sure there is no activity on the SCSI bus before disconnecting the external SCSI cables. The host must be quiesced; do not disconnect a hot bus.
3. Make sure any third-party software is quiesced.
4. Make sure all signals are terminated at each end of the SCSI bus. Also, do not mix terminator types.

**CAUTION:**

***System configuration problems:* When adding or replacing a drive, always check and, if necessary, configure the drive's SCSI ID at the library's operator panel.**

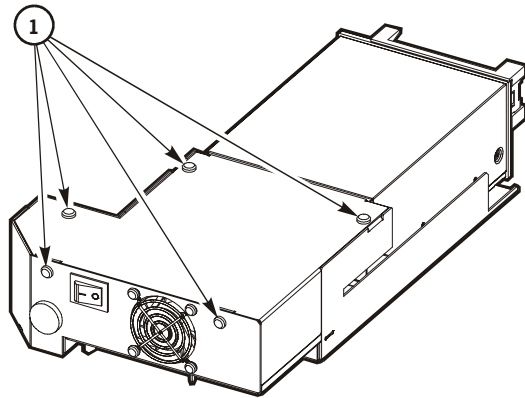
## Removal

- 
1. Review the information under [“Preparation” on page 5-1](#).
  2. Open the right side door of the tape library.
- 
3. Turn off the power to the drive by placing the switch in the off (O) position.
  4. Carefully remove the SCSI cable from the rear of the drive by unscrewing the two SCSI cable screw locks.
  5. Loosen the thumbscrew on the left side of the drive.



1. Cable clamp
2. SCSI cable screw locks
3. Thumbscrew

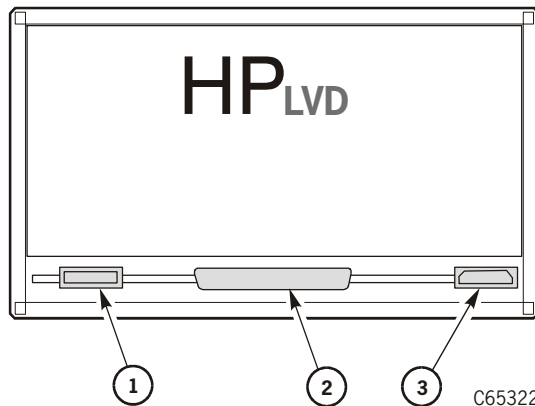
- 
6. Grip the rear of the drive and, while pulling it toward you, place your other hand under the drive tray for support.
  7. Using both hands, remove the drive tray assembly from the slot, and place it on a flat, stable surface.
- 
8. Using a Torx T-15 driver, remove the five power supply cover screws.
- 



1. Power supply cover screws

C65321

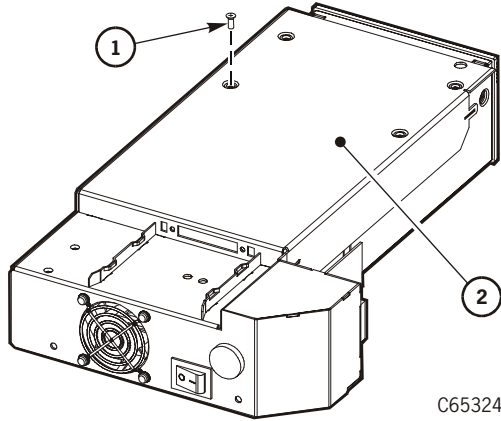
- 
9. Remove the SCSI cable, power connector, and TTI cable from the drive.



1. TTI connector
2. SCSI connector
3. Power connector

C65322

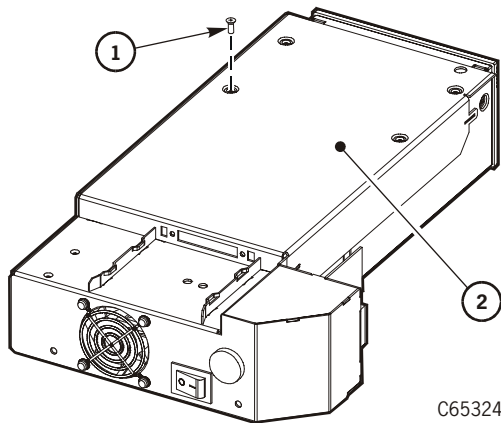
10. Turn the drive tray over to access the four screws on the bottom of the drive tray. Using a Torx T-10 driver, remove the four drive screws.
11. Lift and remove the drive tray.



1. Drive screw (4X)
2. Drive tray bottom

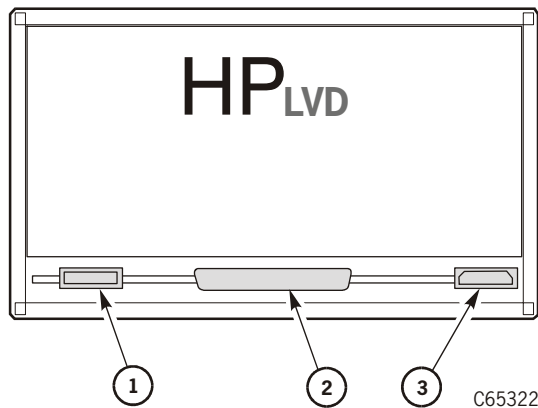
## Replacement

1. Set the drive on a flat work surface.
2. Slide the drive tray over the drive.
3. Using a Torx T-10 driver, attach the four screws on the bottom of the drive tray.



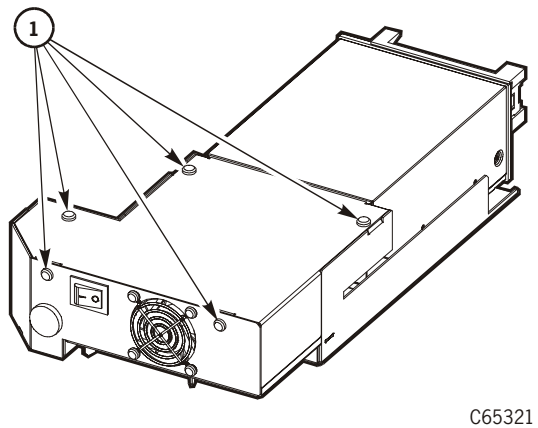
1. Drive screw (4X)
2. Drive tray bottom

- 
4. Attach the SCSI cable, power connector, and TTI cable to the drive.



1. TTI connector
2. SCSI connector
3. Power connector

- 
5. Using a Torx T-15 driver, attach the five power supply cover screws.

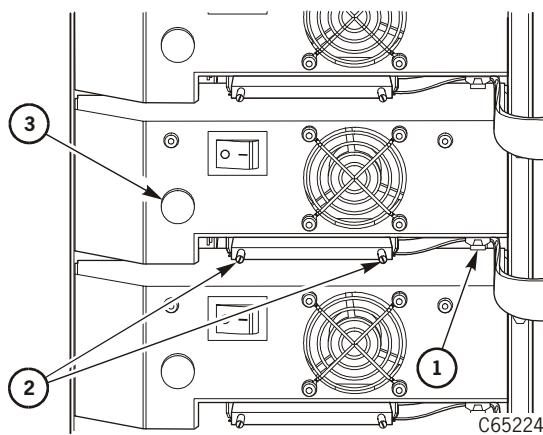


1. Power supply screws

**CAUTION:**

**Possible equipment damage:** When sliding the tape drive into its slot, make sure the drive SCSI cable is out of the way. Do not force the drive into the slot.

6. Slide the drive into its slot, being careful not to catch or crush any cables.
7. Tighten the thumbscrew on the left side of the drive.
8. Connect the SCSI cable screw locks to the SCSI connector on the rear of the drive.
9. Turn on the drive power by placing the switch to the on (I) position.
10. Close the right side door of the library.

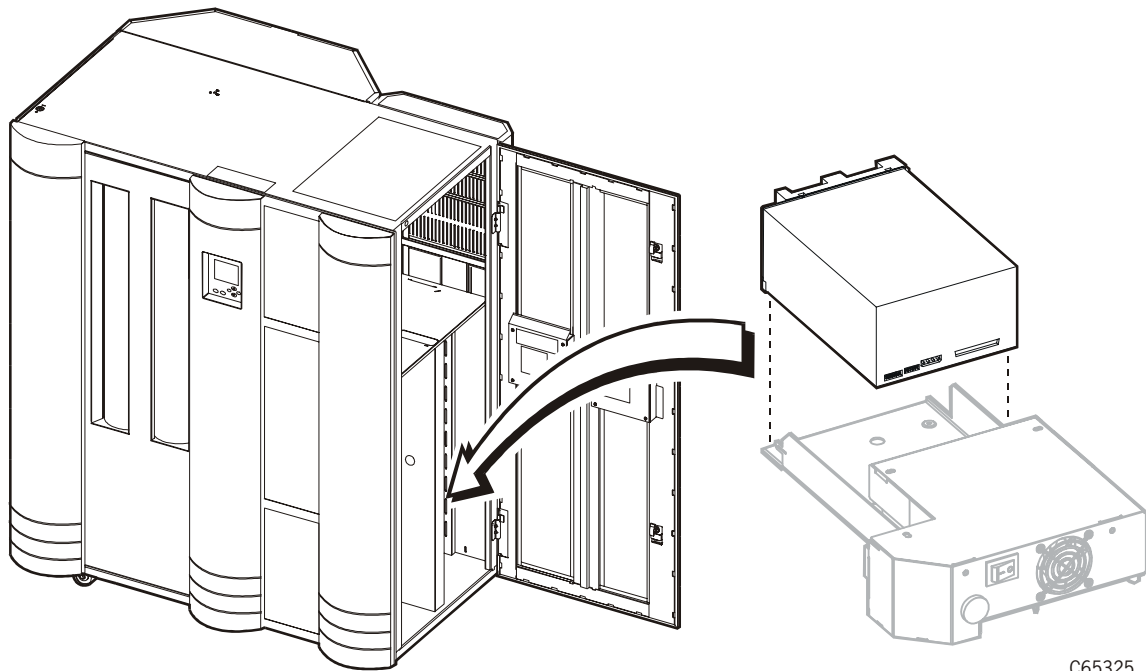


1. Cable clamp
2. SCSI cable screw locks
3. Thumbscrew

11. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.

## Seagate Ultrium Tape Drive

Figure 5-24. Seagate Ultrium Tape Drive (C65325)



### Seagate Ultrium Preparation

**Note:** If the Seagate Ultrium drive is connected to a Fibre channel and the library is operating with dynamic world-wide name (dWWN) enabled, refer to [“Tape Drive Removal/Replacement when dWWN Enabled”](#) on page 5-67 before attempting to remove/replace the drive.

**WARNING:**

***Electrocution hazard.*** 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 unit is powered off. Do not apply power to the drive tray assembly when it is not installed in the library.

**WARNUNG:**

***Stromschlaggefahr!*** Berühren Sie auf keinen Fall die Bestandteile des Netzteils im Elektronikmodul oder an den Laufwerksschächten, da das Gerät auch nach dem Abschalten unter Spannung stehen kann. Schließen Sie den Laufwerksschacht nicht an das Stromnetz an, solange er nicht im Bandarchiv installiert ist.

**AVERTISSEMENT:**

***Danger d'électrocution:*** Ne toucher aucun élément du bloc



**d'alimentation situé à l'intérieur du module électronique ou sur les porte-lecteurs. Ces éléments pourraient être sous tension, même lorsque l'appareil est hors tension.**

**Ne remettez pas l'ensemble de porte-lecteurs sous tension s'il n'est pas installé dans la bibliothèque.**

Observe these precautions before beginning:

1. If the drives are daisy-chained, stop all data processing in the channel before disconnecting them.
2. Make sure there is no activity on the SCSI bus before disconnecting the external SCSI cables. The host must be quiesced; do not disconnect a hot bus.
3. Make sure any third-party software is quiesced.
4. Make sure all signals are terminated at each end of the SCSI bus. Also, do not mix terminator types.

**CAUTION:**

***System configuration problems:* When adding or replacing a drive, always check and, if necessary, configure the drive's SCSI ID at the library's operator panel.**

## Seagate LTO Park Command

Previously, there was no way to issue a command to park the Seagate LTO drive's load arm and protect the head during shipment. Currently, 3.02 firmware allows you to park the head from a command through the library's CLI port when replacing a Seagate drive for return shipment.

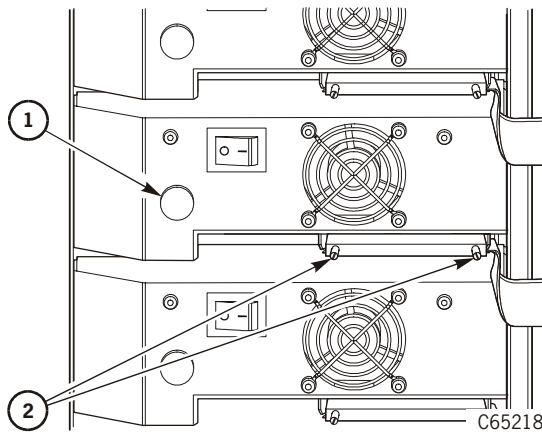
To park the Seagate drive head:

1. Have the operator take the drive offline.
2. Verify that the Seagate drive firmware version is v1460 or later.
3. Enter the park command through the CLI interface.
  - At the CLI prompt, enter `HELP DRIVE`
  - Look down the list and locate `DRIVE [PPRRCC] PARK`
  - Follow the syntax of the command to park the Seagate's load arm.
4. Remove the drive.
5. Install the replacement drive.

If a drive is mistakenly parked, the next mount to the drive will automatically unpark the drive.

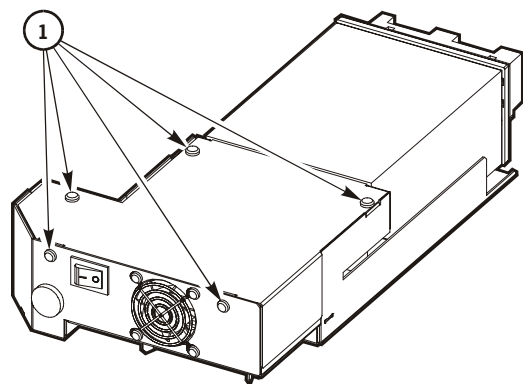
## Removal

- 
1. Review the information under [“Preparation” on page 5-1](#).
  2. Open the right side door of the tape library.
- 
3. Turn off the power to the drive by placing the switch in the off (O) position.
  4. Carefully remove the SCSI cable from the rear of the drive by unscrewing the two SCSI cable screw locks.
  5. Loosen the thumbscrew on the left side of the drive.



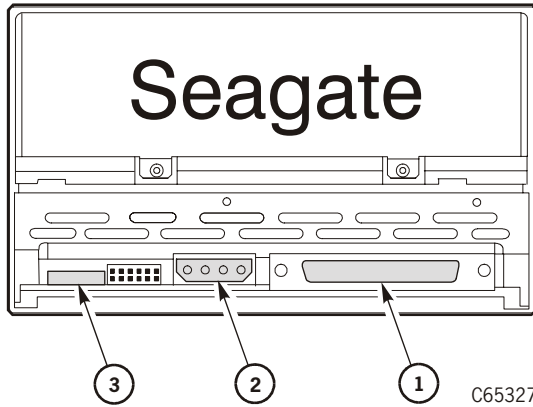
1. Cable clamp
2. SCSI cable screw locks
3. Thumbscrew

- 
6. Grip the rear of the drive and, while pulling it toward you, place your other hand under the drive tray for support.
  7. Using both hands, remove the drive tray assembly from the slot, and place it on a flat, stable surface.
- 
8. Using a Torx T-15 driver, remove the five power supply cover screws.



1. Power supply cover screws

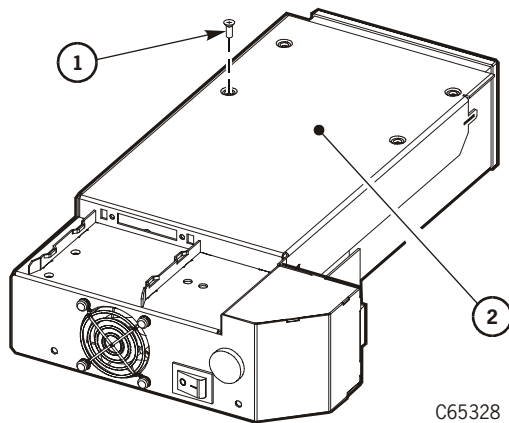
- 
9. Remove the SCSI cable, power connector, and TTI cable from the drive.



1. SCSI cable
2. Power connector
3. TTI cable

- 
10. Turn the drive tray over to access the four screws on the bottom of the drive tray. Using a Torx T-10 driver, remove the four drive screws.

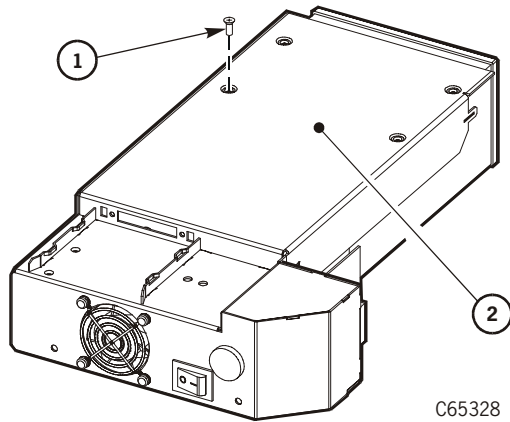
11. Lift and remove the drive tray.



1. Drive tray screw (4X)
2. Drive tray bottom

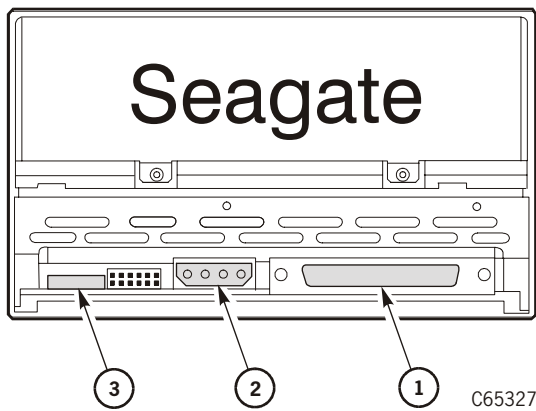
## Replacement

- 
1. Set the drive on a flat work surface
- 
2. Slide the drive tray over the drive.
- 
3. Using a Torx T-10 driver, attach the four screws on the bottom of the drive tray.



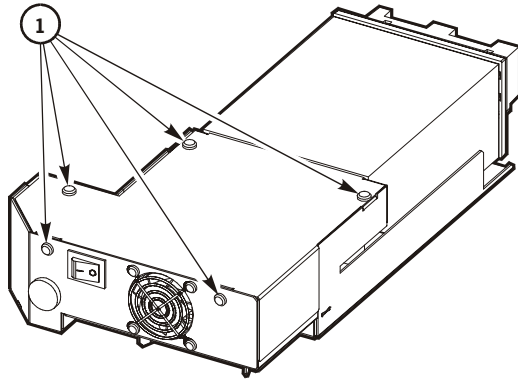
1. Drive tray screw (4X)
2. Drive tray bottom

- 
4. Remove any jumpers from the rear of the defective drive and place them in the same locations on the replacement drive.
- 
5. Attach the SCSI cable, power connector, and TTI cable to the drive.



1. SCSI cable
2. Power connector
3. TTI cable

- 
6. Using a Torx T-15 driver, attach the five power supply cover screws.



1. Power supply screws

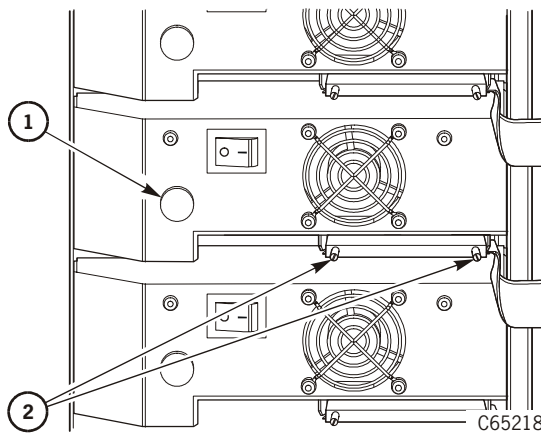
C65326

---

**CAUTION:**

**Possible equipment damage:** When sliding the tape drive into its slot, make sure the drive SCSI cable is out of the way. Do not force the drive into the slot.

7. Slide the drive into its slot, being careful not to catch or crush any cables.
8. Tighten the thumbscrew on the left side of the drive.
9. Connect the SCSI cable screw locks to the SCSI connector on the rear of the drive.
10. Turn on the drive power by placing the switch to the on (I) position.
11. Close the right side door of the library.



1. Cable clamp  
2. SCSI cable screw locks  
3. Thumbscrew

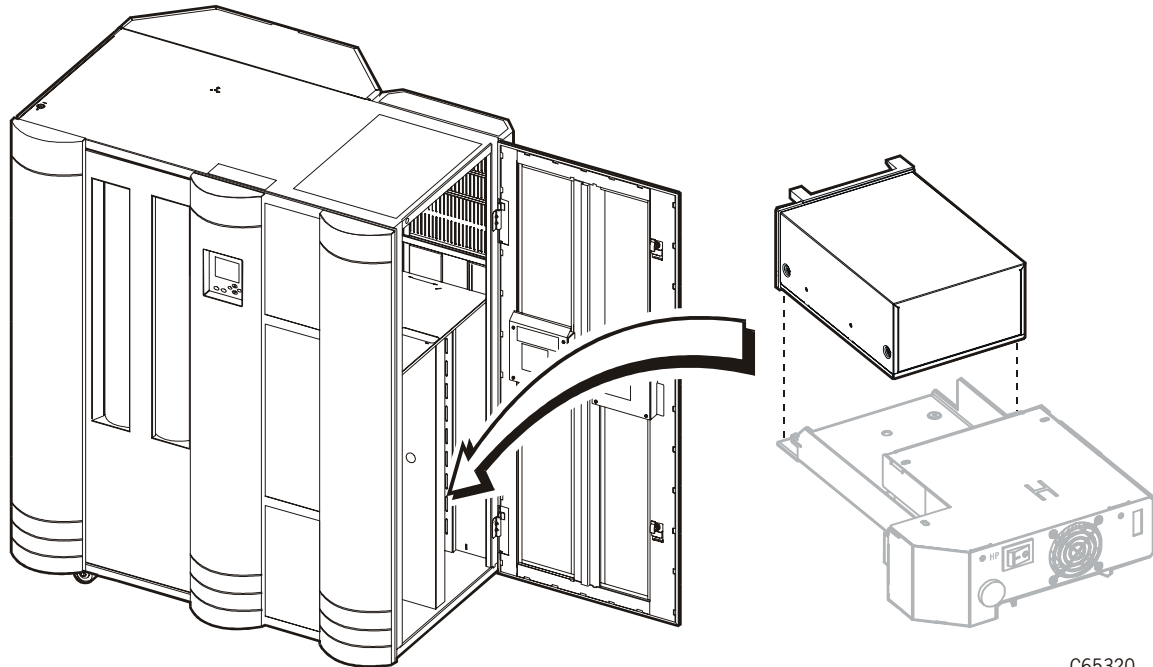
C65218

---

12. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
-

## SDLT Tape Drive

Figure 5-25. SDLT Tape Drive (C65320)



C65320

### SDLT Preparation

**WARNING:**

***Electrocution hazard.*** 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 unit is powered off. Do not apply power to the drive tray assembly when it is not installed in the library.

**WARNUNG:**

***Stromschlaggefahr!*** Berühren Sie auf keinen Fall die Bestandteile des Netzteils im Elektronikmodul oder an den Laufwerksschächten, da das Gerät auch nach dem Abschalten unter Spannung stehen kann. Schließen Sie den Laufwerksschacht nicht an das Stromnetz an, solange er nicht im Bandarchiv installiert ist.

**AVERTISSEMENT:**

***Danger d'électrocution:*** Ne toucher aucun élément du bloc d'alimentation situé à l'intérieur du module électronique ou sur les porte-lecteurs. Ces éléments pourraient être sous tension, même lorsque l'appareil est hors tension.

**Ne remettez pas l'ensemble de porte-lecteurs sous tension s'il n'est pas installé dans la bibliothèque.**

Observe these precautions before beginning:

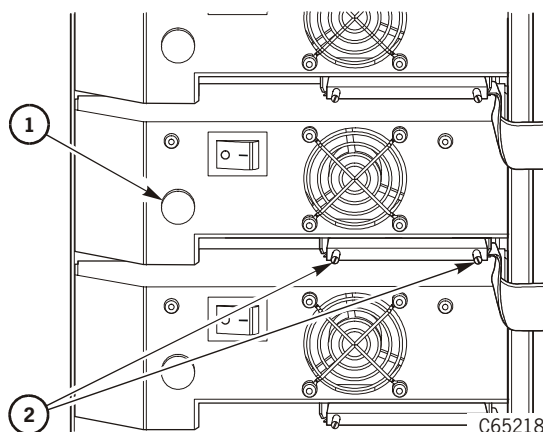
1. If the drives are daisy-chained, stop all data processing in the channel before disconnecting them.
2. Make sure there is no activity on the SCSI bus before disconnecting the external SCSI cables. The host must be quiesced; do not disconnect a hot bus.
3. Make sure any third-party software is quiesced.
4. Make sure all signals are terminated at each end of the SCSI bus. Also, do not mix terminator types.

**CAUTION:**

***System configuration problems:* When adding or replacing a drive, always check and, if necessary, configure the drive's SCSI ID at the library's operator panel.**

## Removal

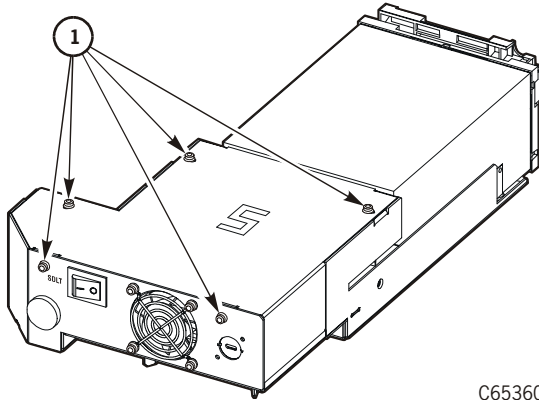
- 
1. Review the information under [“Preparation” on page 5-1](#).
  2. Open the right side door of the tape library.
- 
3. Turn off the power to the drive by placing the switch in the off (O) position.
  4. Carefully remove the SCSI cable from the rear of the drive by unscrewing the two SCSI cable screw locks.
  5. Loosen the thumbscrew on the left side of the drive.



1. Thumbscrew
2. SCSI cable screw locks

- 
6. Grip the rear of the drive and, while pulling it toward you, place your other hand under the drive tray for support.
  7. Using both hands, remove the drive tray assembly from the slot, and place it on a flat, stable surface.
- 
8. Using a Torx T-15 driver, remove the five power supply cover screws.
- 

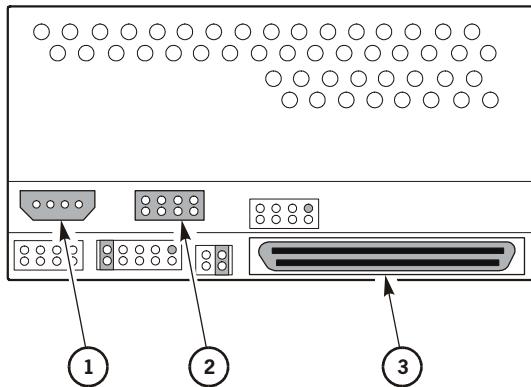
1. Power supply cover screws



C65360

- 
9. Remove the power connector, TTI cable, and SCSI cable from the drive.

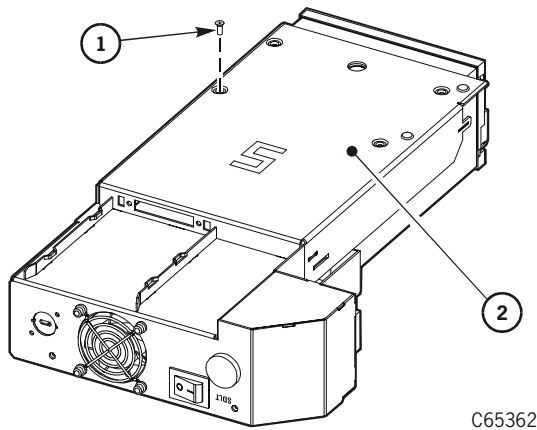
1. Power connector
2. TTI cable
3. SCSI cable



C65361



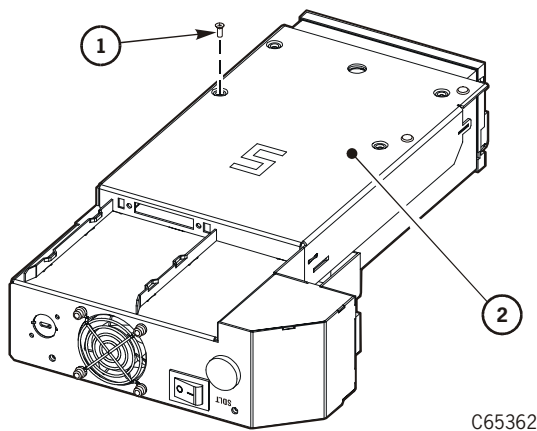
10. Turn the drive tray over to access the four screws on the bottom of the drive tray. Using a Torx T-10 driver, remove the four drive screws.
11. Lift and remove the drive tray.



1. Drive tray screw (4X)
2. Drive tray bottom

## Replacement

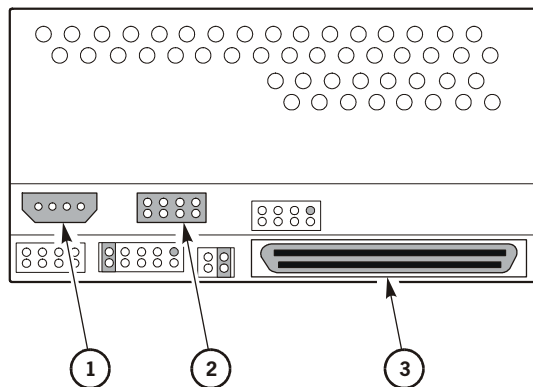
1. Set the drive on a flat work surface
2. Slide the drive tray over the drive.
3. Using a Torx T-10 driver, attach the four screws on the bottom of the drive tray.



1. Drive tray screw (4X)

4. Remove any jumpers from the rear of the defective drive and place them in the same locations on the replacement drive.

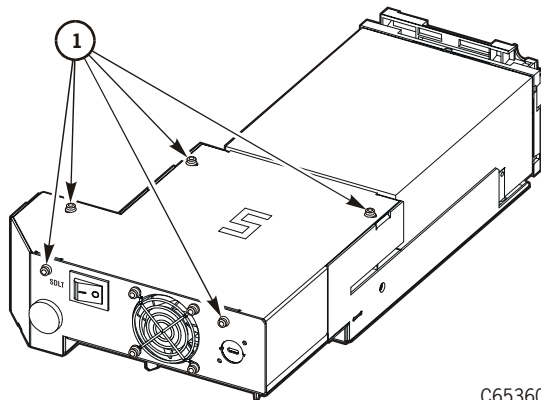
- 
5. Attach the power connector, TTI cable, and SCSI cable to the drive.



1. Power connector
2. TTI cable
3. SCSI cable

C65361

- 
6. Using a Torx T-15 driver, attach the five power supply cover screws.



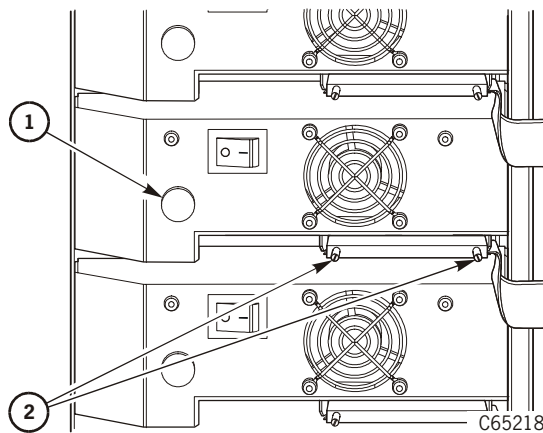
1. Power supply screws

C65360

**CAUTION:**

**Possible equipment damage:** When sliding the tape drive into its slot, make sure the drive SCSI cable is out of the way. Do not force the drive into the slot.

7. Slide the drive into its slot, being careful not to catch or crush any cables.
8. Tighten the thumbscrew on the left side of the drive.
9. Connect the SCSI cable screw locks to the SCSI connector on the rear of the drive.
10. Turn on the drive power by placing the switch to the on (I) position.
11. Close the right side door of the library.

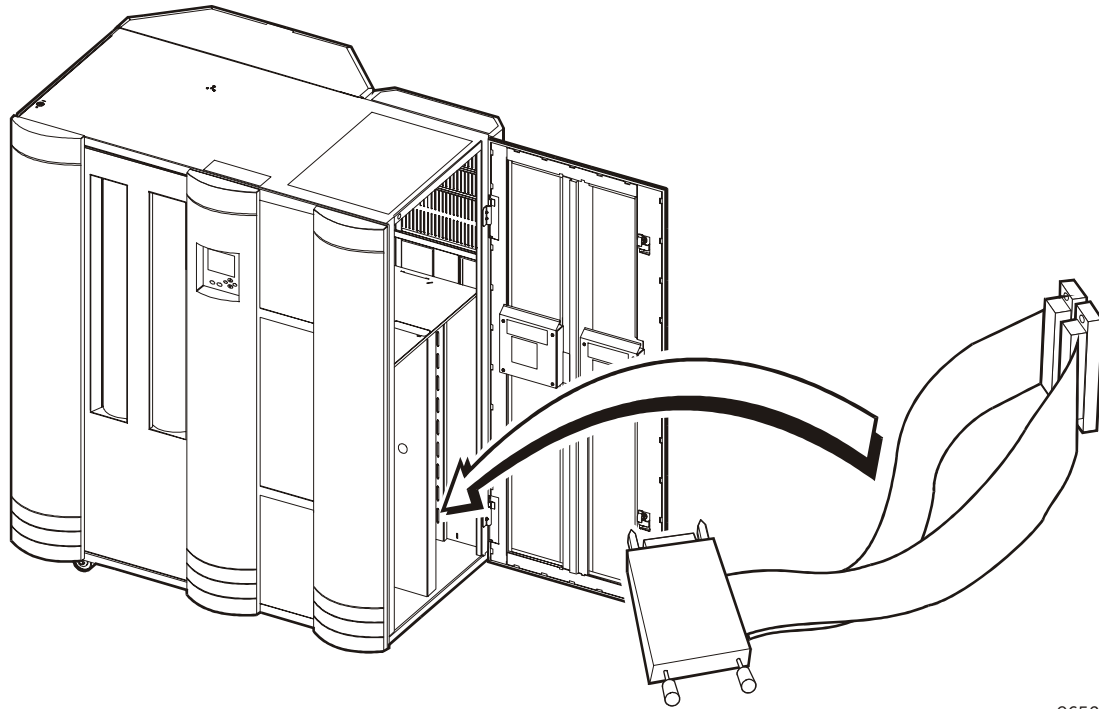


12. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.

## SCSI Y Cable

Figure 5-26. SCSI Y Cable (C65233)

---

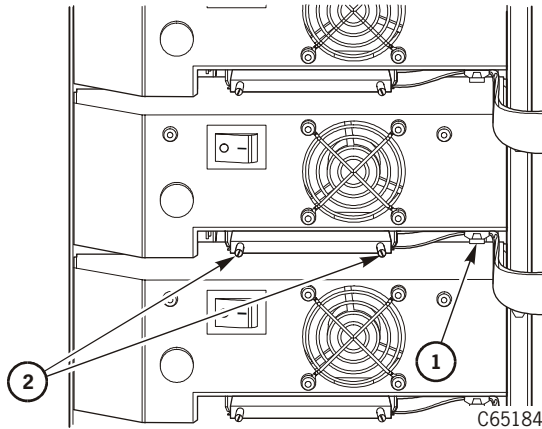


C65233

---

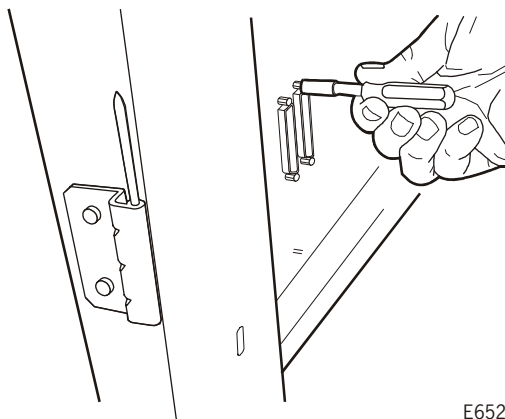
## Removal

1. Review the information under “Preparation” on page 5-1.
2. Open the right side door of the tape library.
3. Open the cable clamp on the bottom of the drive tray.
4. Disconnect the SCSI Y cable from the drive by unscrewing the two thumb- screws on the clamshell.



1. Cable clamp
2. SCSI cable screw locks

5. For the *standard* drive column: move to the rear of the library and open the rear door. For the *optional* drive column: open the small access door (located on the frame member between the two drive columns) by turning the five snap ring fasteners to gain access to the connectors.
6. Using a 3/16-in. hex driver, remove the four jackscrews on the bulkhead from the Y cable connectors.
7. Remove the Y cable.

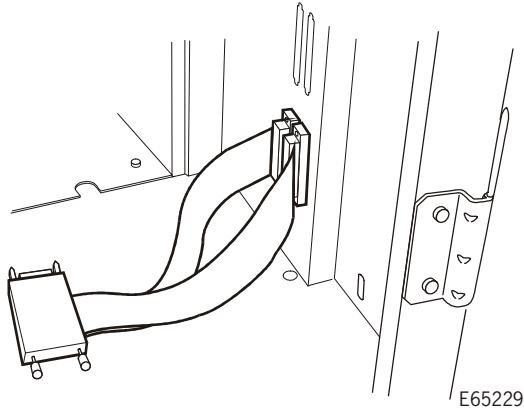


(Exterior bulkhead shown)

## Replacement

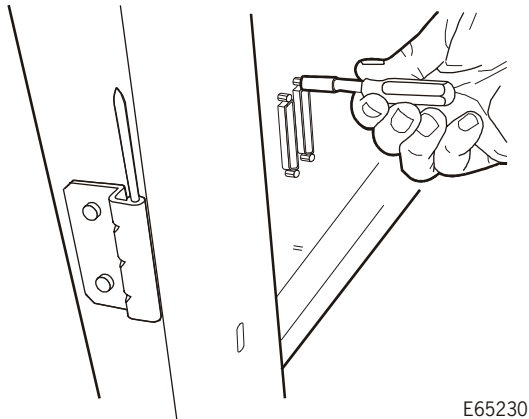
- 
1. Thread the bottom jackscrews in completely then back them off 1/4 turn.
  2. Insert the Y cable in the bulkhead, setting the bottom jackscrews into the bulkhead cutouts.
- 

(Interior bulkhead shown)

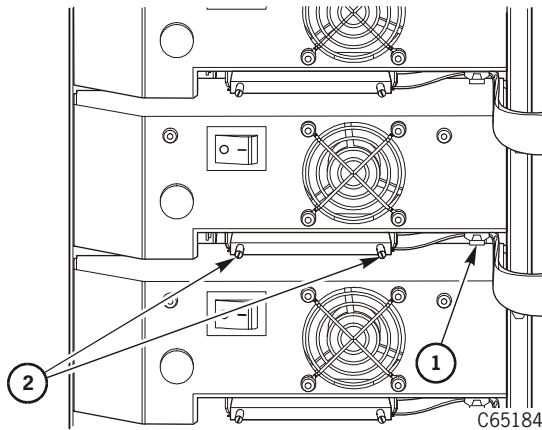


- 
3. Using a 3/16-in. hex driver, attach the top two jackscrews and tighten the bottom two jackscrews.

(Exterior bulkhead shown)



- 
4. Slide the clamp-shell into the SCSI connector and connect the SCSI Y cable by screwing in the two screw locks on the clamp-shell.



1. Cable clamp
2. SCSI cable screw locks

- 
5. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
- 

## T9x40 Tape Drive

Refer to the *T9x40 Service Reference Manual* for information on removing and replacing T9x40-related FRUs.

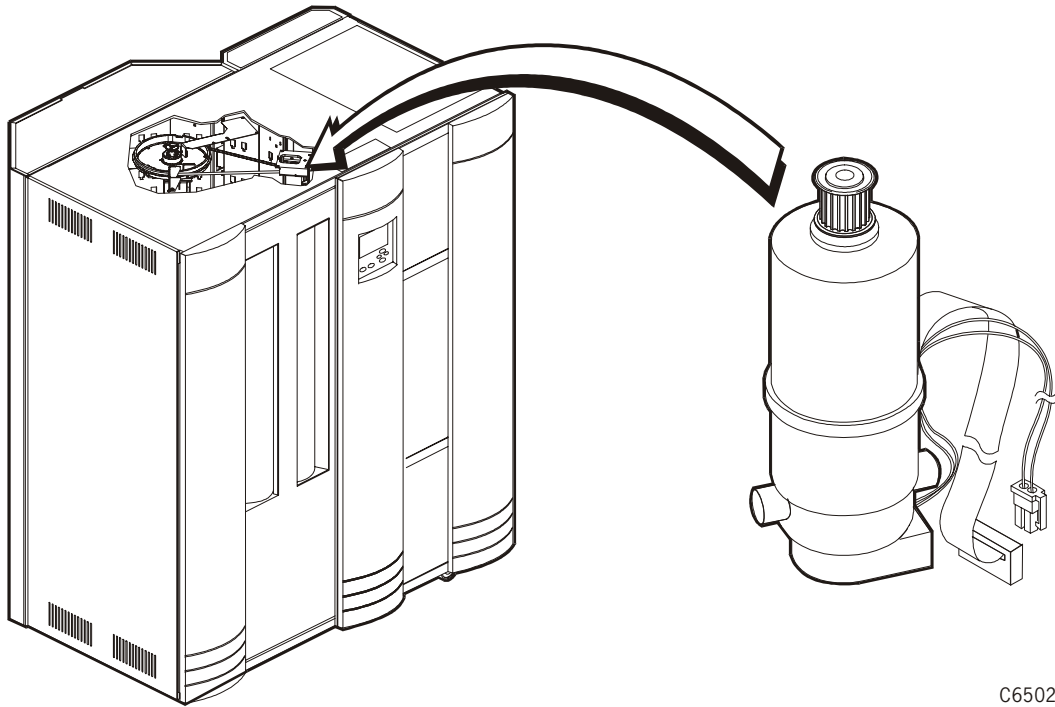
**Note:** If the T9x40 drive is connected to a Fibre channel and the library is operating with dynamic world-wide name (dWWN) enabled, refer to [“Tape Drive Removal/Replacement when dWWN Enabled”](#) on page 5-67 before attempting to remove/replace the drive.

**CAUTION:**  
**System configuration problems:** When adding or replacing a drive, always check and, if necessary, configure the drive’s SCSI ID at the library’s operator panel.

## ■ Theta Motor

The procedures for removal and replacement of the theta motor are shown below.

**Figure 5-27. Theta Motor (C65029)**

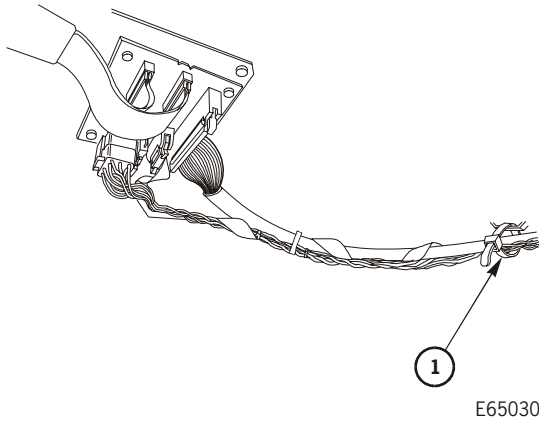




## Removal

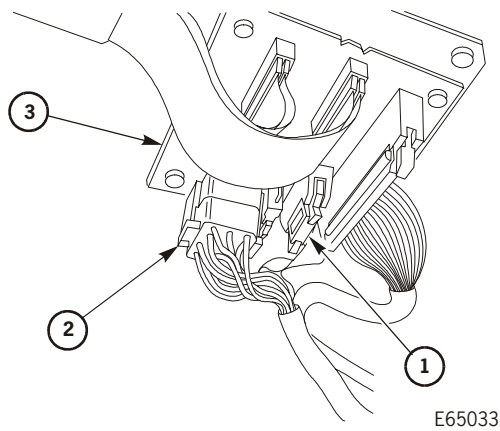
- 
1. Review the information under “Preparation” on page 5-1.
  2. Cut the tie wrap that holds the theta motor wire bundles to the library roof.
- 

1. Tie wrap

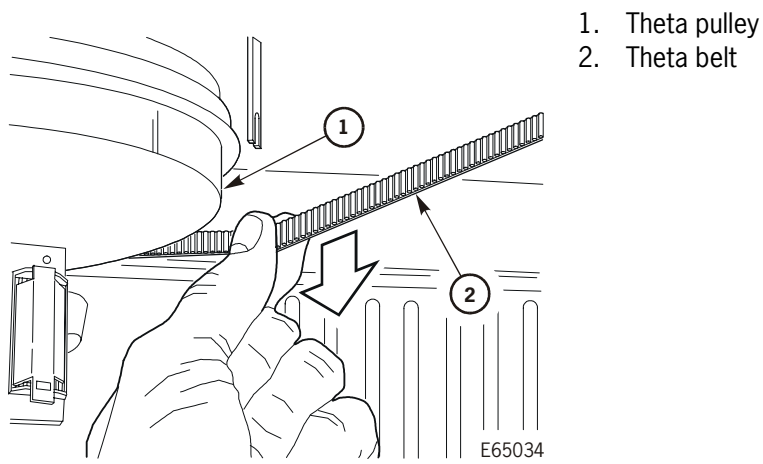


- 
3. Disconnect the P/J663 and P/J664 connectors from the PRY card.

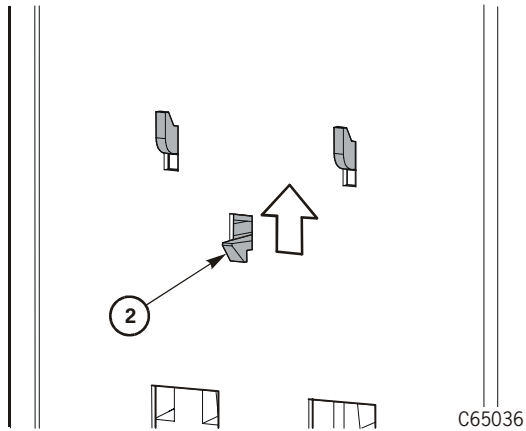
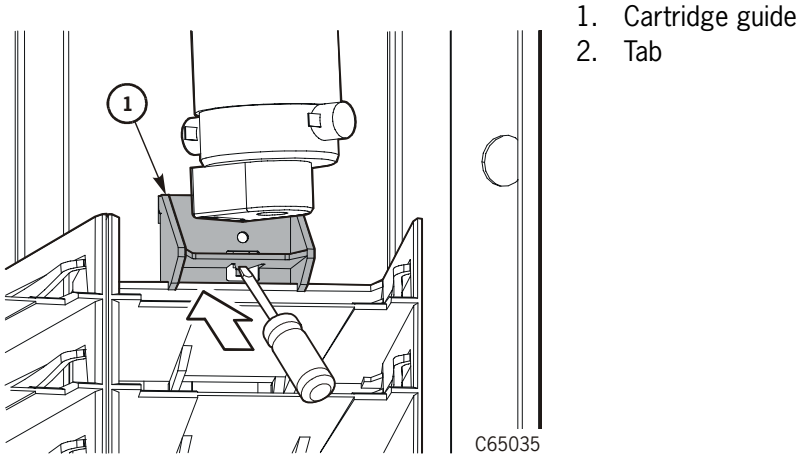
1. P/J664
2. P/J663
3. PRY card



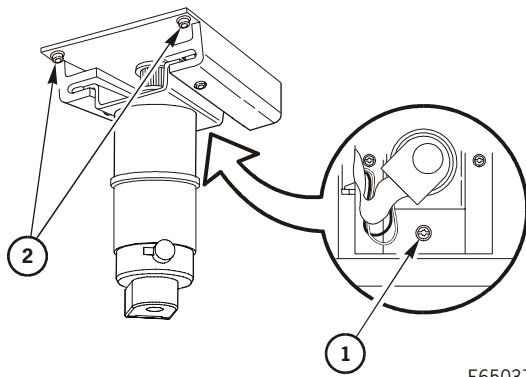
4. Rotate the Z column assembly clockwise as far as possible.
5. Pull down on the right side of the theta belt to remove it from the theta pulley.



- 6. Remove the cartridge guide nearest the theta motor assembly (Panel 0, Column 4) by using a flat head screw driver to release the tab above the guide.
- 7. Remove the array.



- 
8. Remove the rear theta motor assembly screw.
  9. Grasp the theta motor assembly and remove the two forward theta motor assembly screws.
  10. Remove the theta motor assembly.

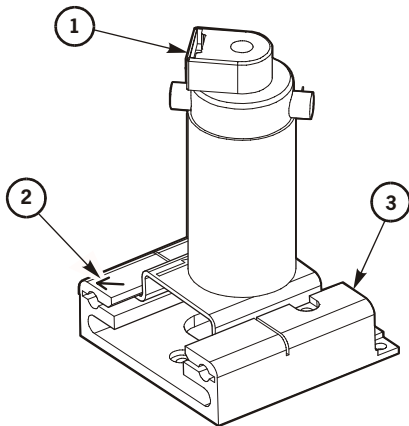


1. Rear theta motor assembly screw
2. Forward theta motor assembly screws

E65037

- 
11. Place the theta motor assembly upside down on a work surface. Note the alignment of the theta encoder relative to the base.

Make an arrow mark on the base with a marker or tape. This will allow you to properly install the assembly during replacement.

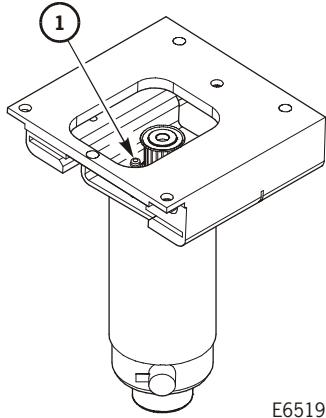


1. Theta encoder
2. Arrow mark
3. Base

E65197

- 
12. Rest the theta encoder on a cushioned surface and, using a Torx T-15 driver, remove the four screws that attach the theta motor to the bracket.
  13. Remove the theta motor.

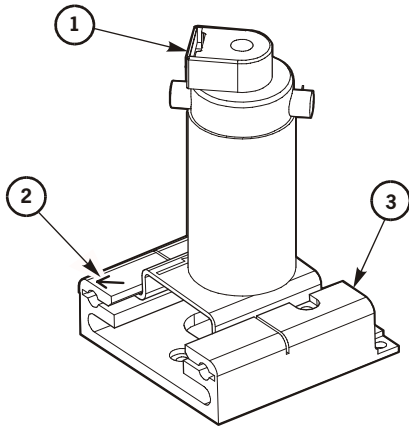
1. Screw (4X)



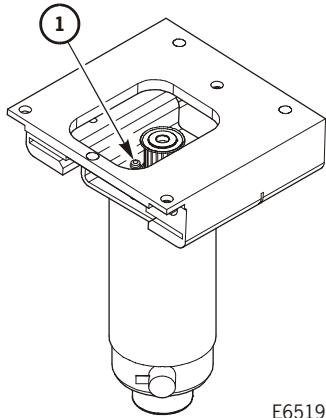
## Replacement

---

1. Note the alignment of the encoder to the arrow mark on the base and, using a Torx T-15 driver, attach the theta motor to the bracket.

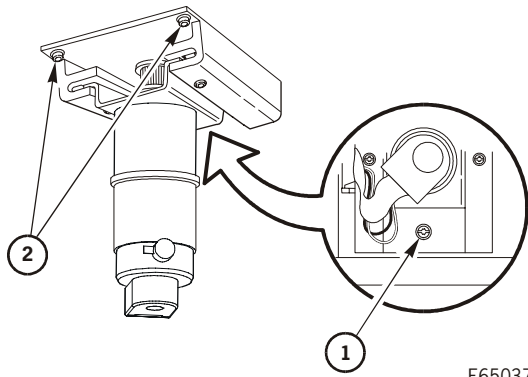


1. Theta encoder
2. Arrow mark
3. Base



1. Screw (4X)

- 
2. Using a Torx T-15 driver, attach the three screws from the theta motor bracket to the roof.



1. Rear theta motor assembly screw
2. Forward theta motor assembly screws

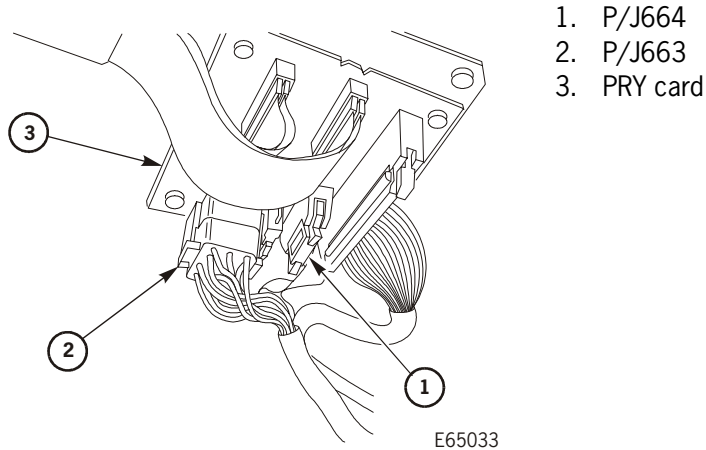
- 
3. Attach the array and bracket nearest the theta motor assembly (Panel 0, Column 4).

---

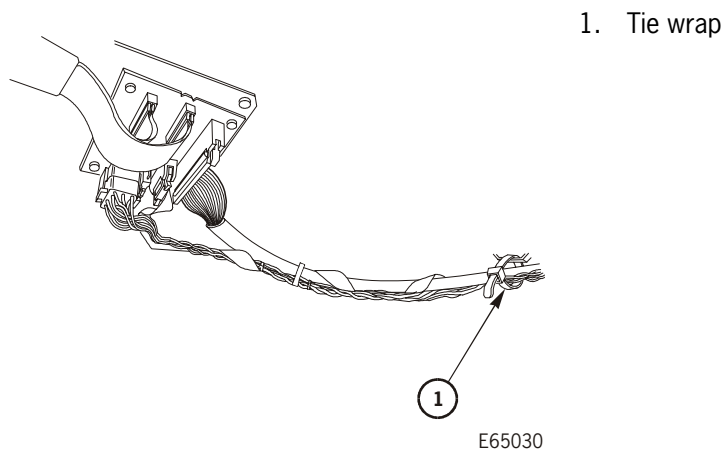
  4. Replace the theta belt on the theta pulley. Rotate the pulley to aid replacement.

---

  5. Connect the P/J663 and P/J664 connectors to the PRY card.



- 
6. Use a tie wrap to attach the PRY card cables to the ceiling

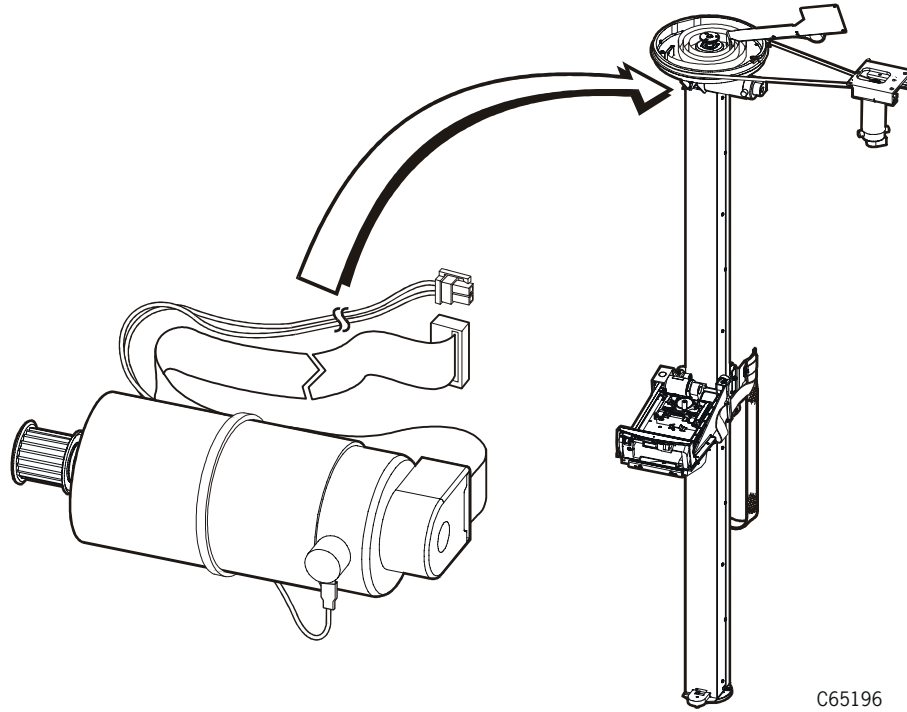


- 
7. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
-

## ■ Z Column Components

### Z Motor

Figure 5-28. Z Motor (C65196)

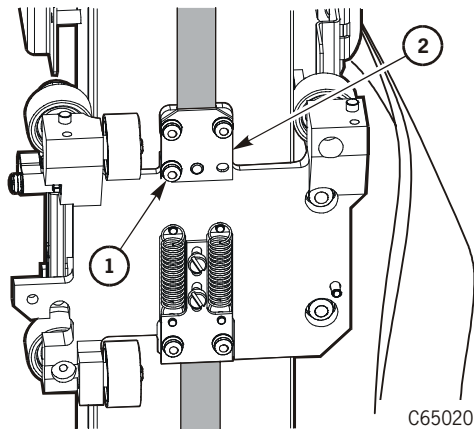




## Removal

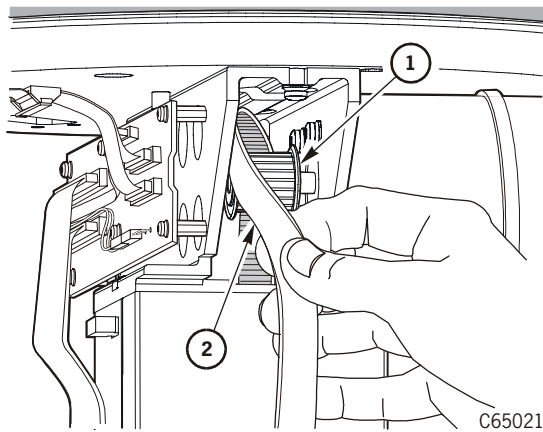
1. Review the information under [“Preparation”](#) on page 5-1.
2. Remove the hand-camera assembly. Refer to [“Hand-Camera Assembly”](#) on page 5-14 for more information.
3. Using a Torx T-15 driver, remove the lower left belt clamp plate screw on the upper the belt clamp plate.

**Note:** Do not remove the two upper belt clamp screws.



1. Belt clamp plate screw
2. Upper belt clamp plate

4. Remove the Z belt from the Z motor pulley.

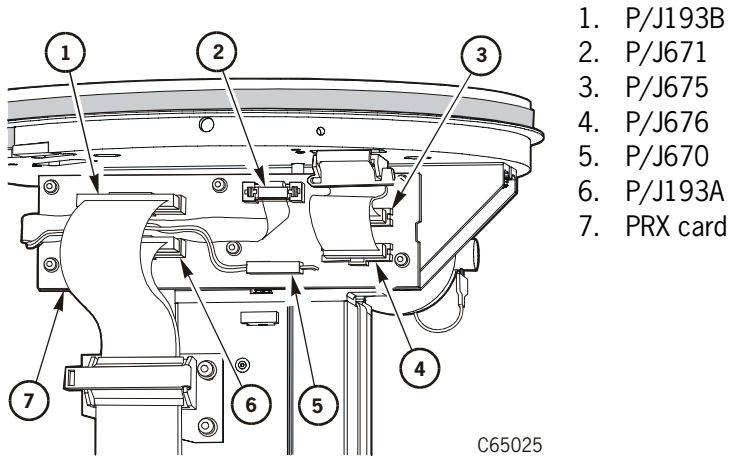


1. Z motor pulley
2. Z belt

**CAUTION:**

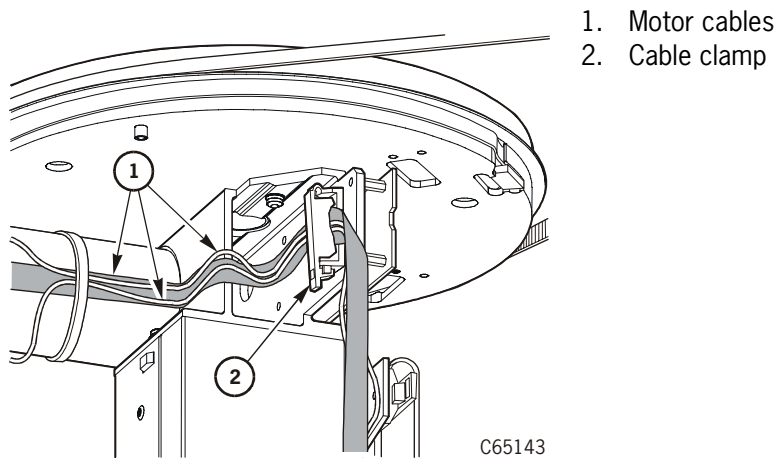
**Possible equipment damage:** Make sure to note to which bracket each cable attaches. Connecting the cables incorrectly can seriously damage the hand-camera components.

5. Disconnect the P/J675, P/J676, P/J670, P/J671, P/J193A, and P/J193B connectors from the PRX card.



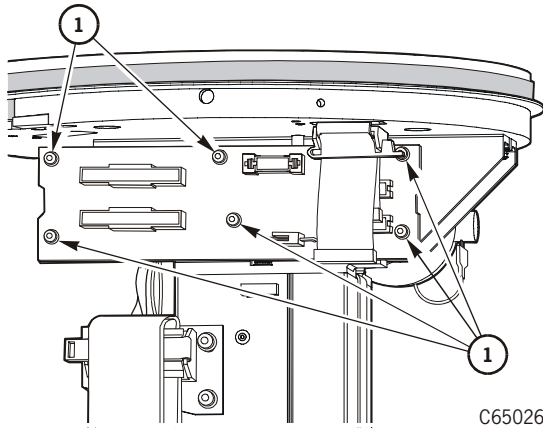
**Note:** Do *not* disconnect the cables from the motor; they are part of the FRU.

6. Open the cable clamp on the rear of the PRX card bracket and release the motor cables.



7. Using a Torx T-15 driver, remove the six PRX screws that attach the card to the bracket and remove the card.

1. PRX screws

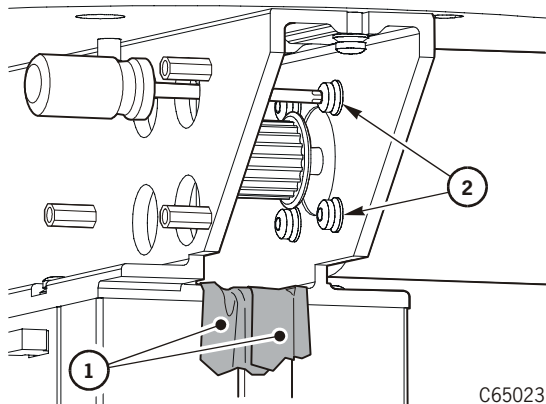


**CAUTION:**

**Possible component damage:** Place masking tape over the hole in the Z column to prevent screws from falling into it. Use a magnetic Torx driver to remove the following screws. If any screws fall into the Z column, you must remove the Z column and remove the screw. If you do not, the screw could cause a servo error.

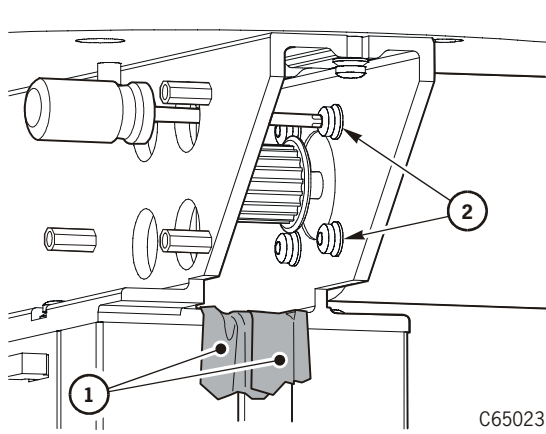
8. Note the orientation of the motor. The encoder cables run along the right side of the motor. Using a Torx T-15 driver, remove the four Z motor screws by inserting the driver through the holes in the PRX bracket.

1. Tape  
2. Z motor screws (4X)



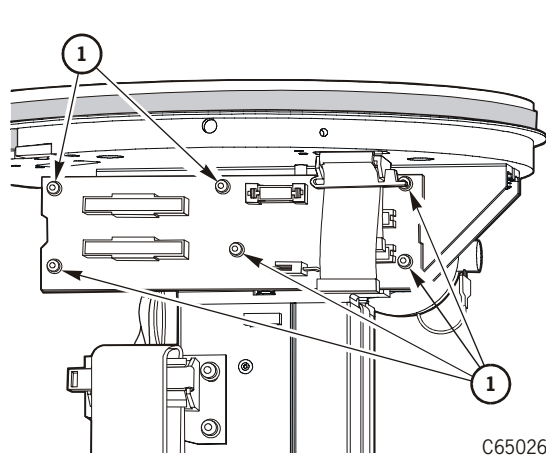
## Replacement

1. Orient the motor so the encoder cables run along the right side of the motor. Using a Torx T-15 driver, attach the four Z motor screws by inserting the driver through the holes in the PRX bracket.



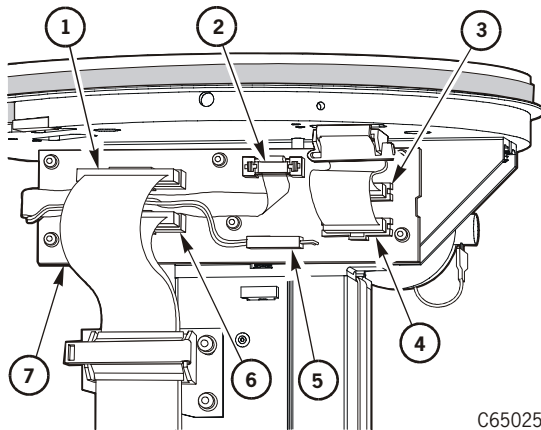
1. Tape
2. Z motor screws (4X)

2. Using a Torx T-15 driver, thread the six PRX screws through the PRX card into the bracket, then tighten. Do not overtighten.



1. PRX screw (6X)

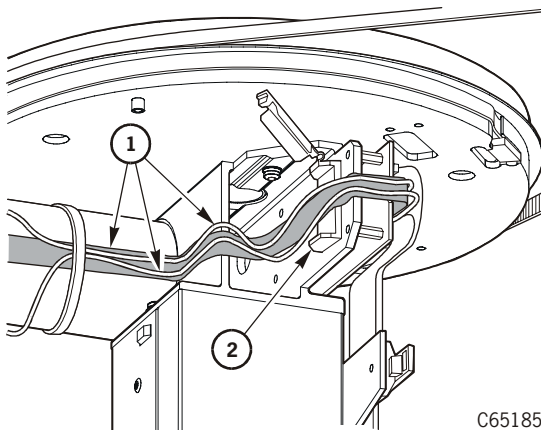
3. Connect the P/J675, P/J676, P/J670, P/J671, P/J193A, and P/J193B connectors to the PRX card, making sure that P/J193A and P/J193B are in the correct position.



1. P/J193B
2. P/J671
3. P/J675
4. P/J676
5. P/J670
6. P/J193A
7. PRX card

C65025

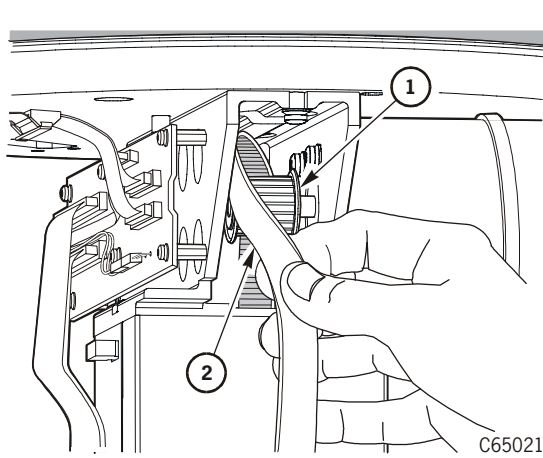
4. Route the Z motor cables through the cable clamp on the back of the PRX card bracket and close the clamp.



1. Motor cables
2. Cable clamp

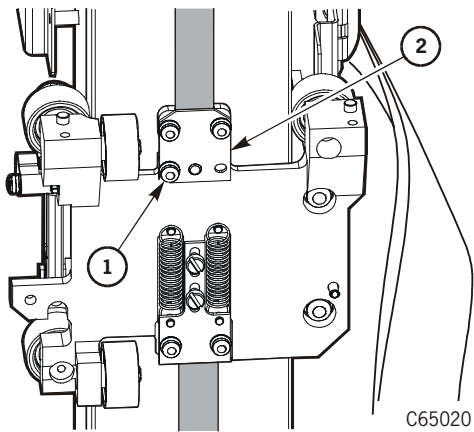
C65185

5. Place the Z belt over the Z motor pulley.



1. Z motor pulley
2. Z belt

6. Using a Torx T-15 driver, attach the belt clamp plate.



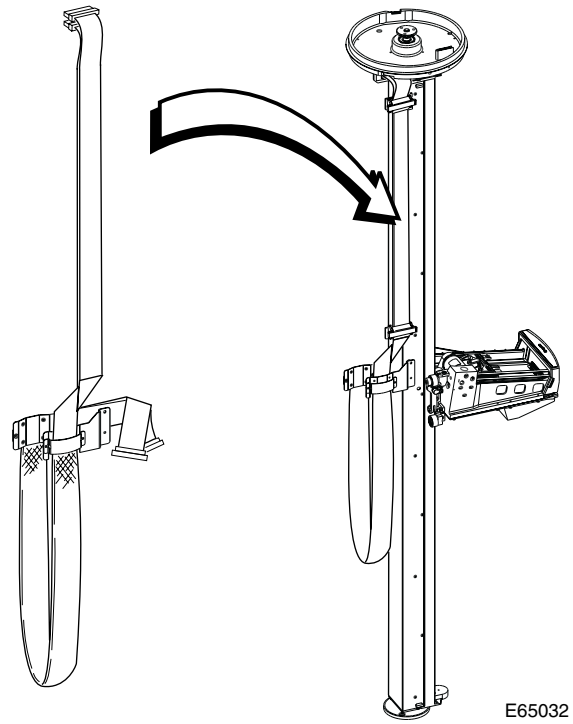
1. Belt clamp plate screw
2. Belt clamp plate

7. Attach the hand-camera assembly. Refer to [“Hand-Camera Assembly”](#) on page 5-14 for more information.

8. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
-

## Z Flex Cable

Figure 5-29. Z Flex Cable (E65032)



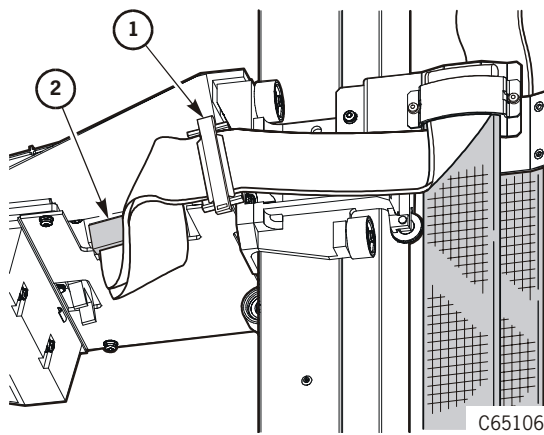
## Removal

- 
1. Review the information under “Preparation” on page 5-1.
- 
2. Open the cable clamp on the left side of the hand-camera assembly.

**CAUTION:**

**Possible equipment damage: Make sure to note to which bracket each cable attaches. Connecting the cables incorrectly can seriously damage the hand-camera components.**

3. Disconnect the P/J194A and P/J194B connectors from the bottom of the hand-camera assembly by pressing the tabs on the cables.



1. Cable clamp
2. Z flex cable connector (2X)

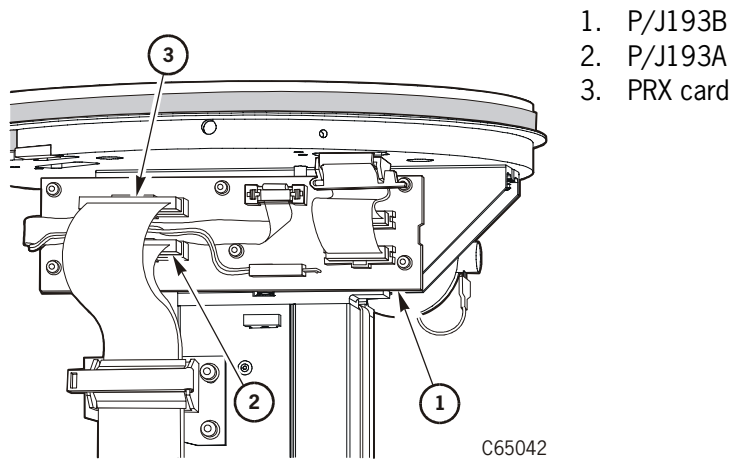
- 
4. Carefully rotate the Z column to access the Z cable side of the column.
-



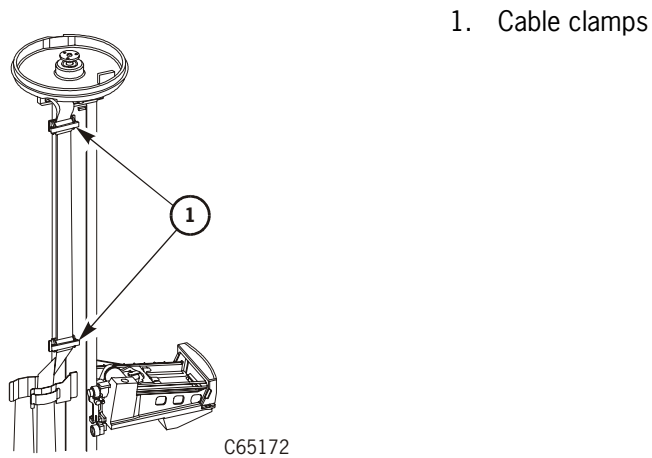
**CAUTION:**

**Possible equipment damage:** Make sure to note to which bracket each cable attaches. Connecting the cables incorrectly can seriously damage the hand-camera components.

5. Disconnect the P/J193A and P/J193B connectors from the PRX card at the top of the Z column.

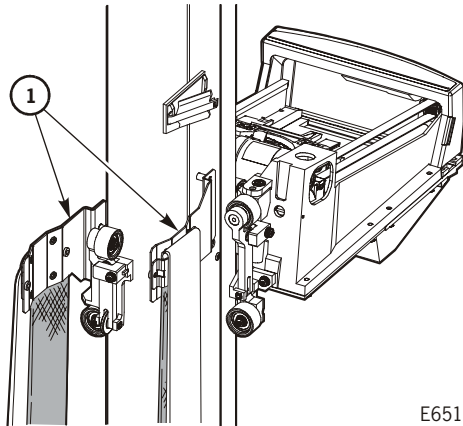


6. Open the two cable clamps on the Z column and release the Z cables.



- 
- Using a Torx T-15 driver, remove the two screws attaching the two Z flex cable brackets to the Z column and remove the cable.

- Z flex cable brackets



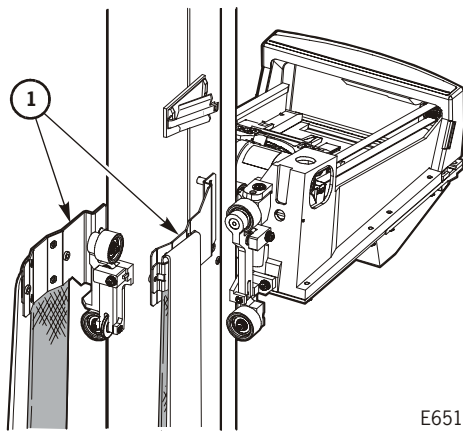
E65168

---

## Replacement

- Using a Torx T-15 driver, attach the two screws attaching the two Z flex cable brackets to the Z column.

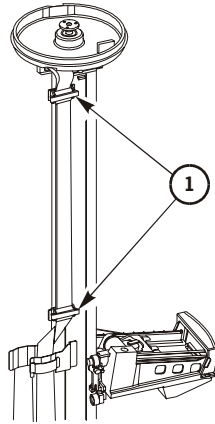
- Z flex cable brackets



E65168

- 
2. Route the cables through the cable clamps on the Z column and close the clamps.

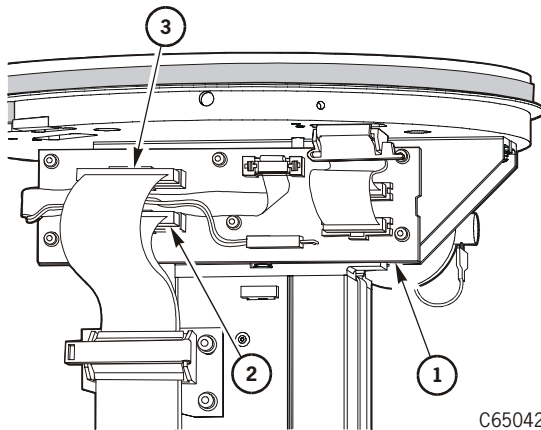
1. Cable clamps



C65172

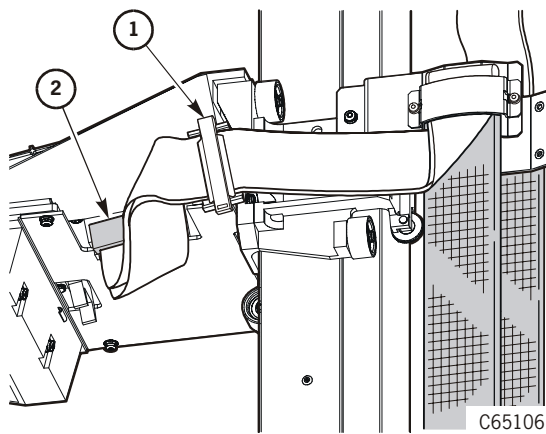
- 
3. Connect the P/J193A and P/J193B connectors to the PRX card at the top of the Z column.

1. P/J193B
2. P/J193A
3. PRX card



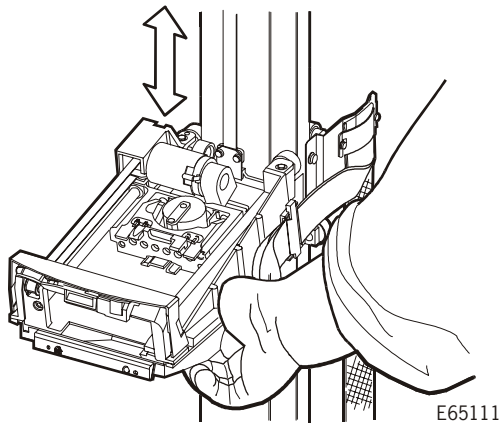
C65042

4. Rotate the Z column clockwise to access the PRH card connectors.
5. Connect the P/J194A and P/J194B connectors to the PRH card.
6. Close the cable clamp on the left side of the hand-camera assembly.



1. Cable clamp
2. Z flex cable connector (2X)

7. Carefully move the hand camera assembly along its full range of motion to make sure the Z cables have full movement.



8. Return the system to operation. See [“Restoring Library Operation”](#) on page 5-140.
-

## ■ Pass-thru Port (PTP)

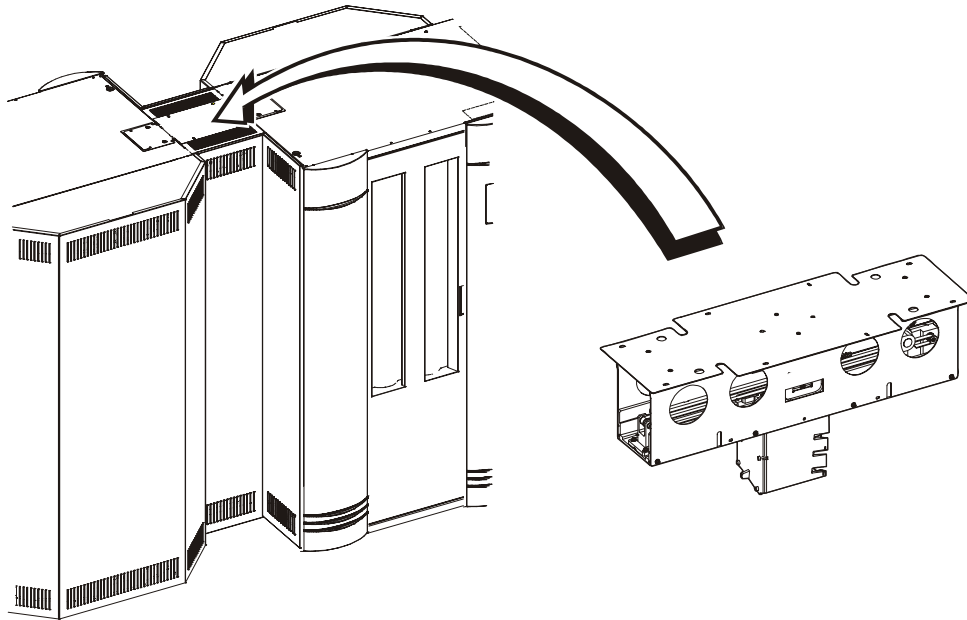
The PTP is replaced as a unit.

**Note:** You may need a small stepladder to remove and replace the PTP assembly.

**CAUTION:**

**Personal injury:** Be sure that both libraries are idle before replacing the PTP.

Figure 5-30. Pass-thru Port (PTP) (C65404)



C65404

### Removal

1. Review the information under [“Preparation” on page 5-1](#).
2. Determine which library is the Master. Open the right access door to locate either the CSE connector in the door frame or the PTP power cable to the MPC/MPCL card.
3. At the Master library, turn off power at the main circuit breaker.

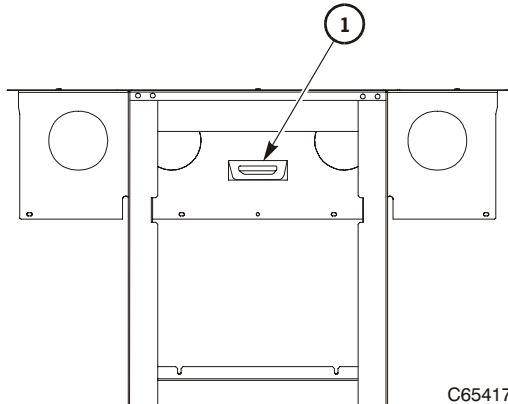
**CAUTION:**

**Lifting hazard:** Be careful when removing the exterior panel; follow the directions in [“Lifting Techniques” on page xxv](#).

4. At the PTP frame, lift up and remove the exterior panel (parallel to the Master’s access door) that conceals the MPB card and PTP cables.

- 
5. Disconnect connector PMJ from the PTP assembly.

1. PMJ



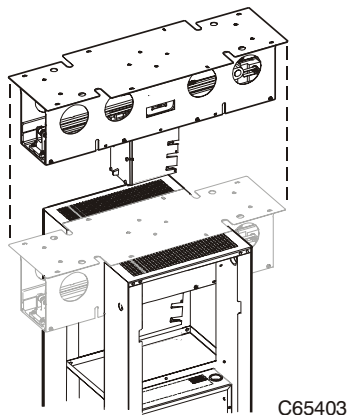
- 
6. At the PTP assembly, remove the eight 6 x 32 (T-15) screws that attach the PTP assembly to the tops of the libraries
- 

**CAUTION:**

**Array damage:** Be sure to position the PTP array as shown below or you might damage it.

7. Move the PTP array to the middle of the PTP frame.

1. Array position



---

**CAUTION:**

**Lifting hazard:** The PTP assembly weighs 8.16 Kg (18 lbs). Be careful when removing the PTP assembly. Follow the directions in [“Lifting Techniques”](#) on page xxv.

8. Lift the PTP assembly straight up to remove it from the PTP frame.
-

## Replacement

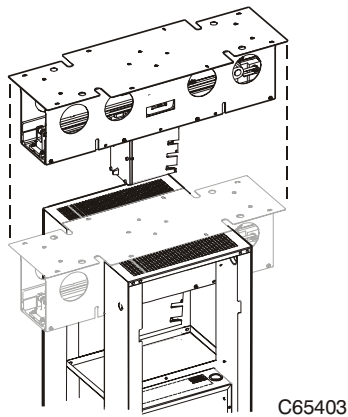
### CAUTION:

**Lifting hazard:** The PTP assembly weighs 8.16 Kg (18 lbs). Be careful when installing the PTP assembly. Follow the directions in [“Lifting Techniques”](#) on page xxv.

**Array damage:** Be sure to position the PTP array as shown below or you might damage it.

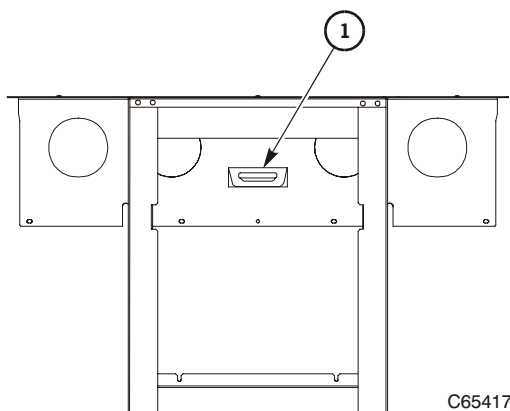
1. Move the PTP array to the middle of the PTP frame.
2. Insert the PTP assembly straight down into its position in the PTP frame.

1. Array position



3. At the PTP assembly, insert the eight 6 x 32 (T-15) screws that attach the PTP assembly to the tops of the libraries.
4. Attach the PMJ connector at the PTP assembly.

1. PMJ



**CAUTION:**

***Lifting hazard:*** Be careful when replacing the exterior panel; follow the directions in [“Lifting Techniques” on page xxv](#).

5. Replace the exterior panel that conceals the MPB card and PTP cables.
  6. Return the system to operation. See [“Restoring Library Operation” on page 5-140](#).
- 

## ■ Restoring Library Operation

Perform the following steps to ensure the library is safe to resume operation:

1. Be sure all cards are installed and properly seated.
2. Be sure all cables are installed and their connectors are tight.
3. Be sure all cable strain reliefs are secure.
4. Check the library for loose parts, connectors, and tools.
5. Close and lock the library doors.
6. Apply power.
7. Run diagnostic tests for the library and, if applicable, the PTP. Refer to [“Diagnostic Tests” on page 2-54](#).
8. Inform the customer when the system is available.



# Theory of Operation

# A

This section discusses the components and theory of operation for the tape library. It also provides detailed diagrams to assist you in understanding the tape library.

## ■ Power System

The basic tape library contains an AC Power Distribution Unit (PDU) and a DC power supply. Other optional power features include a second AC PDU, second DC supply, and redundant AC power configuration.

Redundant (backup) power is available:

- for the library *only* through a second, optional DC supply.
- for the library *and* drives through an optional redundant AC power option (see [“Redundant AC Power Option” on page A-2](#)) manufactured by America Power Conversion

Tape Library DC power supply specifications are listed below.

**Table A-1. DC Power Supply (MPF) Specifications**

Input voltage range	100 – 254 VAC
Output voltage	+43 VDC, $\pm 15$ VDC, and +5 VDC
Power consumption	120 W (library only)
Maximum heat output	410 Btu/hr (library only)

The AC PDUs supply voltage to the drive columns and library DC power supplies. Consider the following requirement and recommendation:

1. No more than 10 DLT drives or six T9x40 drives may be connected to one PDU. If there are two drive columns in the library, it is required to also have two PDUs to distribute voltage to the drives.
2. If your library contains two PDUs, an additional DC power supply is recommended to provide power redundancy for the library.

## Redundant AC Power Option

The APC uninterruptible power supply (UPS) is an optional feature designed to prevent blackouts, brownouts, sags and surges in AC power. This UPS also filters out small fluctuations and disturbances in AC line voltage.

The UPS comes with a power strip that allows you to connect up to eight additional components to the UPS. If power fails, the UPS will supply power to the equipment connected to the power strip until the batteries are exhausted. While running on battery power, periodic beeps will sound.

- Press the TEST/ALARM DISABLE button to turn off this alarm.
- A continuous beep will sound *two* minutes before the UPS will shutdown.

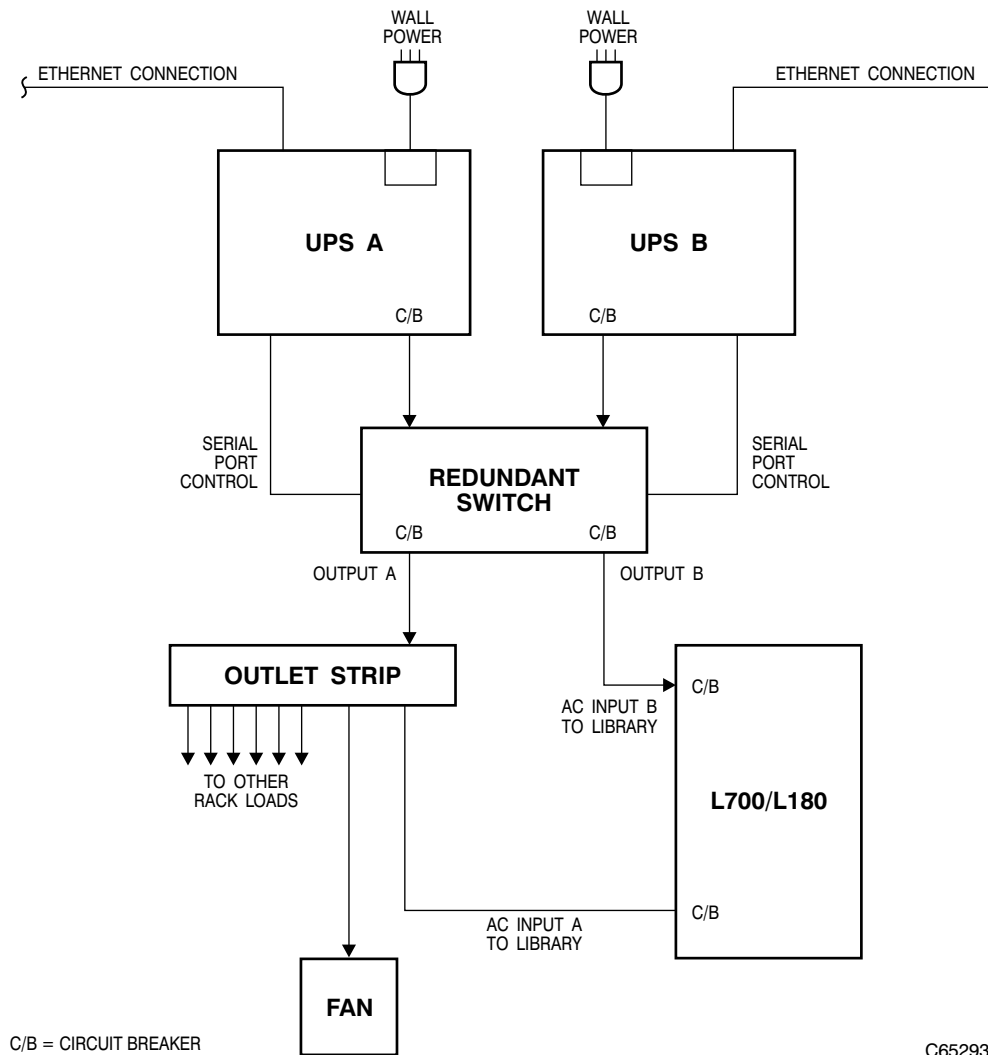
[Figure A-1 on page A-3](#) shows the cable diagram for the UPS and the library: [Table A-2](#) shows APC runtimes during a site outage.

**Note:** The UPS requires additional cooling if installed in the library. This cooling fan is also an optional feature for the library.

**Table A-2. APC Runtimes**

Load/Watts	VA	APC Runtime (per APC unit)
65	100	5 hours, 52 minutes
130	200	3 hours, 31 minutes
195	300	2 hours, 27 minutes
260	400	1 hour, 50 minutes
325	500	1 hour, 26 minutes
390	600	1 hour, 10 minutes
455	700	58 minutes
520	800	44 minutes
585	900	41 minutes
650	1000	36 minutes
780	1200	26 minutes
910	1400	21 minutes
1040	1600	16 minutes
1300	2000	10 minutes
1430	2200	9 minutes
1625	2500	5 minutes

Figure A-1. Redundant AC Power Option (C65293)



## Drive Column Power

There are two drive column power cable configurations for the library:

- Single power cable
- Two power cables

To determine the type you have for your machine, check the cables behind the PDU; single power cables will have only one cable, two power cable models will have connectors marked *PWR1* and *PWR2*.

## Drive Column—Single Power Cable

The diagram for the single drive column power cable is shown in [“Overall Diagram: Single Drive Column Power Cable” on page A-24](#).

Some power configuration examples for single power cable drive columns are:

- If you have two drive columns, two PDUs, and a total of six DLT drives, you might place three drives in one column and three drives in the other column. If one AC power circuit should fail, you would still have three operational drives.
- For two client operation, if you have two drive columns, two PDUs, and a total of 12 DLT drives you might place:
  - Three drives for Client 1 and three drives for Client 2 in one column
  - Three drives for Client 1 and three drives for Client 2 in the second column

If one AC power circuit should fail, you would still have three working drives to each client.

## Drive Column—Two Power Cables

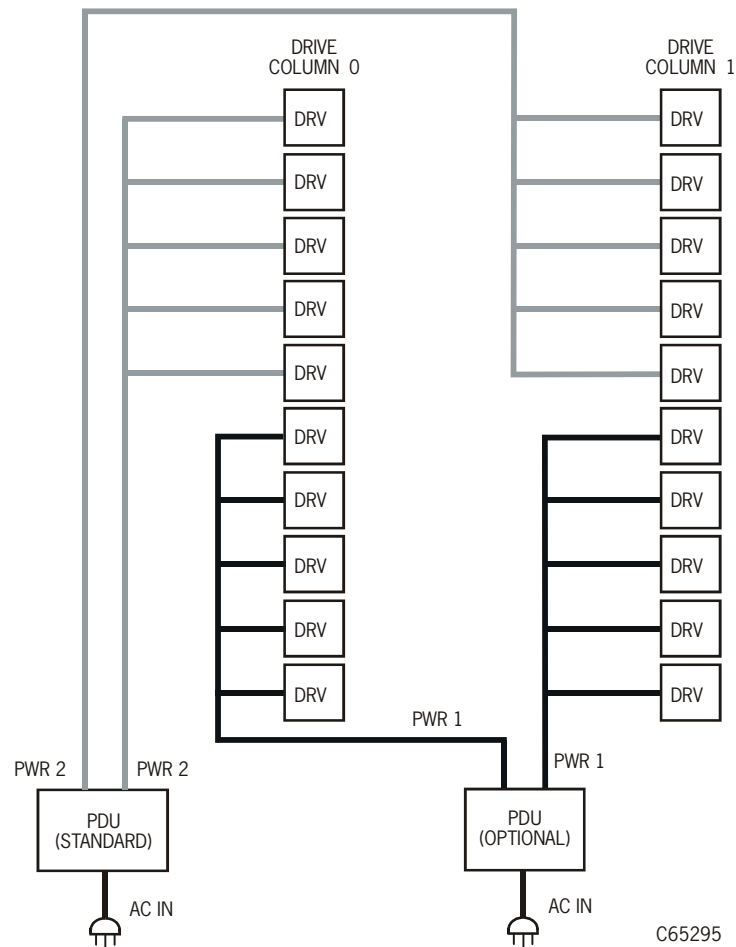
Newer machines incorporate *two* power cables into each drive column. This enables more power configurations for the customer. The diagram for the two drive column power cables is shown in [“Overall Diagram: Two Drive Column Power Cables” on page A-25](#).

Newer models may be configured so that half of the drives in one column are connected to one PDU and the other half are connected to another PDU. An example configuration is shown in [“Drive Column Power Configuration Example \(Two Column Power Cables\)” on page A-5](#).

## Drive Power Cables—Connections

If there is *one* power line running from each drive column, the plug for the column is connected at the rear of the PDU. The diagram for the single PDU is shown in [Figure A-6 on page A-24](#).

If there are *two* power lines running from each drive column. The plug labeled *PWR1* denotes the lower half of the drive column; *PWR2* denotes the upper half of the column. You may cross-couple the power plugs at the rear of the PDUs. One example of this configuration is shown in [Figure A-2 on page A-5](#). The diagram for the single PDU is shown in [Figure A-7 on page A-25](#).

**Figure A-2. Drive Column Power Configuration Example (Two Column Power Cables) (C65295)**


The standard AC power distribution unit (PDU), located behind the right door, distributes AC line voltage to the tape library and the standard column of drives (Drive column 0).

If a second PDU is installed, it serves as a redundant supply for the library. It can also either provide voltage to the entire second column of drives (Drive column 1) or, more appropriately, may be cross-coupled to the standard PDU (as shown above).

If an error is detected in either PDU, the following events will occur:

1. The power to the drive column controlled by the PDU will shut down.
2. The MPC/MPCL card posts an error to the FSC log.

The tape library DC power supply (MPF card) converts AC input voltage from the AC PDU into the following voltages:

- +43 V for library servo motors and reach motor
- $\pm 15$  V power for the operational amplifiers on the MPC/MPCL card
- +5 V power for logic cards and CAP door motors

Cooling for the MPF card is supplied by two +43 VDC fans. These fans, mounted to a tray between the MPF card and DC powers supply, are replaceable while the machine is operating.

The MPC/MPCL card contains a +5 V sense circuit that monitors the +5 V on the controller card. If +5 V is out of established ranges, the MPC/MPCL card sends a shut down request to the MPF supply and DC power is shut down. If a second DC supply is present, it automatically assumes control of library power.

All motors return tachometer pulses to the MPC/MPCL card. The MPC/MPCL monitors the tachometer ranges (determined during the tape library initialization process) for proper positioning. If the processor detects that a motor is out-of-range, it generates a Servo Power Interrupt (SPI), disconnecting drive current to that motor.

The SPI prevents a servo runaway condition. As a built-in safety feature, an SPI is also generated if the left front door to the tape library is opened when the tape library is operating.

In the dual DC power supply configuration, you can replace the defective DC power components—DC power supply, the AC PDU, or both—while the other power supply/PDU is operating.

## ■ Cooling

Cooling for the DC supply, is provided by two +43VDC fans. These fans are located in a tray between the MPC/MPCL card and the DC power supply (see [Figure A-3 on page A-13](#)). Air flow from the fans provides cooling for the power supply (MPF card) components. The fans and mounting tray are replaceable while the tape library is operating.

Cooling for the drives is supplied by two, large +43 VDC fans. These fans are mounted on the right side door of the tape library. Air flow from these fans provides cooling for the drives installed inside the tape library. These fans may also be replaced while the tape library is operating.

Depending upon the heat and power dissipation, cooling for the rack may be required if equipment is installed in this section of the machine. A separate power cable must be ordered to accommodate these assemblies. A clearance of 150 mm (6 in.) above the library and 100 mm (4 in.) on the sides should be available for adequate cooling ventilation.

Optional cooling fans are available. These are used if the components within the rack space generate too much heat or if the UPS is installed in the library. These fans install on

the rear door of the library and are replaced as a single unit. These fans are *not* monitored by the MPC/MPCL microprocessor.

All other library fans are monitored by the MPC/MPCL microprocessor. If a fan fails, a Hall-effect sensor detects the lack of motion in the fan blades, an event is posted to the FSC log, and the SERVICE REQUIRED LED on the operator panel flashes.

**WARNING:**

***Heat within rack area: Cooling considerations should be made based upon the power dissipation within the rack space, as well as the external library room ambient conditions. Cooling must be provided for moderate power dissipation within the rack space.***

**To aid in this cooling, charts are provided in the *L700e Installation Manual* and the *L700 Systems Assurance Guide* to assist you and the customer in deciding whether the appropriate conversion bill (see [Table 1-5 on page 1-7](#)) for your site is required.**

## ■ Client Indirect Operation

For client indirect connections to the tape library, a Unix-based server or a RISC System/6000 (using the Advanced Interactive Executive [AIX] operating system) connects between the client and the tape library.

An example of an indirect connection would be

- A tape library connected to a Unix server
- The server is then connected to an Ethernet LAN network
- A cable is then run from the Ethernet LAN to the client

**Note:** If the customer is using Automated Cartridge System Library Software (ACSL), its level must be Version 5.3.2 or higher.

If a PTP is installed, the ACSL version must be 6.0.1 or higher *and* contain the special program enhancement (SPE) for PTP operation.

If T9840B drives are installed on ESCON channels, the ACSL version must be 6.0.1 or higher.

The connection from the server to the tape library is a SCSI Type-3 68-pin cable. The server may have its own control-side path or may be daisy-chained to a shared data bus with one or more drives.

The two data interfaces available for the DLT and T9x40 drives are:

- A multi-initiator Small Computer System Interface (SCSI)
- Fibre Channel (using the fibre channel option cards)

All Ultrium drives may use the SCSI interface, while the StorageTek, IBM and Seagate Ultrium drives may operate on a Fibre Channel interface.

## ■ Client Direct SCSI Operation

For client direct connection, a SCSI host is connected to the tape library and drives. The drives may share the same SCSI bus as the library (termed “on bus”) or operate on their separate SCSI bus (termed “off bus”).

The connection from the client to the tape library and/or drives is a SCSI Type-3 68-pin cable. This cable may be a unique channel from the host or it may be daisy-chained to a shared data bus with the tape library or one or more drives.

## ■ SCSI HVD or LVD Considerations

With the advent of Ultrium tape drives, customers now have choices as to the type of SCSI interface on which they wish to operate: High Voltage Differential (HVD) or Low Voltage Differential (LVD). As shown in [Table 1-3](#), the HVD interface allows longer cable lengths but throughput is lower than LVD; the LVD interface restricts cable lengths, but provides faster throughput.

As a service representative you must understand these cabling requirements as well as:

- How LVD Ultrium drives are different internally from HVD Ultrium drives
- How the library (that is, the control path) is converted to LVD operation
- What the Host Bus Adapter (HBA) requirements are
- What the consequences for mixing SCSI types on a bus are.

## SCSI Cable Restrictions

The library and drives support *only* SCSI Type-3 connectors. If you use SCSI Type-1 or -2 connectors, you must use a SCSI Type-1- or SCSI Type-2-to-SCSI Type-3 adapter.

**Note:** If you are connecting the library or drives to an LVD SCSI bus, the cable can be no longer than 12 m (39.4 ft).

[Table 1-3](#) lists additional restrictions for SCSI connections that you should keep in mind.

**Table 1-3. SCSI Cable Restrictions**

Application	Length Restriction
Single-Ended (Library only)	Stub length: 0.1 m (4 in.) 5 to 10 Mb data transfer rate: 3 m (10 ft) 1 to 5 Mb data transfer rate: 6 m (20 ft)
High Voltage Differential	Stub length: 0.2 m (10 in.) 1 to 10 Mb data transfer rate: 25 m (82 ft)
Low Voltage Differential	Stub length: 0.1 m (3.9 in.) 108 GB data transfer rate: 12 m (39.37 ft)



## Modifications Required

Native operation for both IBM and Hewlett Packard Ultrium tape drives is the LVD interface. To operate either drive as HVD, converter cards (Rancho and Paralan respectively) must be installed on their drive trays. There is no converter card for HVD operation on Seagate drives; their model number dictates the type of operation.

When installing an Ultrium drive, you must match the cable types and terminators with the bus type. Cables specifically for LVD operation are listed in [Table A-5 on page A-10](#); terminators are listed in [Table A-6 on page A-10](#).

## HBA Requirements

### CAUTION:

***Mismatching SCSI operation types: The HBA in the customer's server must match the library's SCSI bus type. If the interface to the library is HVD, then the customer's server must contain an HVD-compatible HBA. Likewise, if the interface to the library is LVD, then the server must contain an LVD-compatible HBA.***

The table below lists the different types of operation available and the required modifications for each operation type.

**Table A-4. HVD and LVD Modifications**

Low Voltage Differential	High Voltage Differential
Library – MPW card attached to MPV card <sup>1</sup>	Library – None
IBM Ultrium – None <sup>2</sup>	HP Ultrium – Rancho converter <sup>2</sup>
HP Ultrium – None <sup>2</sup>	HP Ultrium – Paralan converter <sup>2</sup>
Seagate Ultrium – Set by model number <sup>2</sup>	Seagate Ultrium – Set by model number <sup>2</sup>
Host Server – LVD Host Bus Adapter	Host Server – HVD Host Bus Adapter

### Notes:

1. For MPC cards only; MPCL cards may be jumpered for native LVD operation. See [Table 1-7 on page 1-8](#) for library feature number.
2. See [Table 1-12 on page 1-13](#) for drive feature number.

## Precautions

You must use caution when connecting LVD or HVD interfaces. Potential equipment damage or bus-disabling situations that may arise if the two types are intermixed.

**CAUTION:**

**Potential equipment damage: The single-ended, LVD, and HVD alternatives are not compatible and cannot be mixed on the same SCSI bus.**

Symptoms of mismatched devices/buses are listed in [Table 3-3 on page 3-12](#) in [Chapter 3](#).

## SCSI Low Voltage Differential Cables/Terminators

Supported Universal SCSI LVD cables for the library are listed below.

**Table A-5. Universal LVD-specific 68-Pin MD to 68-Pin MD**

Length	Part
300 mm (11.8 in.) (Drive-to-drive)	10083675
500 mm (19.7 in.)	10083676
3 m (9.8 ft)	10083679
5 m (16.4 ft)	10083680
10 m (32.8 ft)	10083681

Supported SCSI terminators for the library are listed below.

**Table A-6. SCSI Terminators**

Part	Terminator Type
10148002	SCSI Single-ended
10148003	SCSI High Voltage Differential
10097653	SCSI LVD/SE

## ■ Fibre Channel

The L700/700e supports the following topologies with a single N\_Port (N=Node) attachment:

- Arbitrated Loop—private loop
- Arbitrated Loop—public loop

The Arbitrated Loop provides:

- Multiple connections for devices that share a single loop
- Only point-to-point connections between an initiator and target during communications

The library supports both public and private loop configurations (see the following sections).

In a Fibre Channel arbitrated loop, as with the SCSI protocol, devices must arbitrate and win the connection before *bus* communications can begin. After a device is powered on and initialized on the loop, it must arbitrate and win to be able to communicate with other *devices* on the loop.

**Note:** If Fibre Channel operation is selected for the library or drives and the dWWN feature is also enabled, special care must be taken when replacing components. See “[Dynamic Worldwide Name](#)” on page 2-36 and the removal and replacement procedures in [Chapter 5](#).

## Private Arbitrated Loop

If the arbitrated loop is not attached to a Fibre Channel fabric, it is a private loop. A private arbitrated loop can connect up to 126 N-type ports. On this loop:

- Only point-to-point communication is possible between one initiator and one target at any time. (Other links on the loop act as repeaters.)
- Both initiator and target of the communication must reside within the same loop.

While the library supports this Fibre Channel topology, StorageTek does not recommend it. Its best implementation includes a Fibre Channel hub.

## Public Arbitrated Loop

If the Fibre Channel arbitrated loop contains at least one F-type (F=Fabric) port—that is, is attached to a Fibre Channel fabric—it is a public loop. A public loop can contain up to 126 N-type ports and one F-type port. If the fabric connects to another arbitrated loop, then an initiator on one public loop might be able to communicate with a target on another.

## Fibre Channel Cable Considerations

Table A-7 lists the cable and connector specifications that the L700/700e library supports.

**Note:** Open Fiber Control (OFC) cables incorporate a safety mechanism that prevents damage to the human eye when the connection (link) is disconnected.

**Table A-7. Fibre Channel Cables and Connectors**

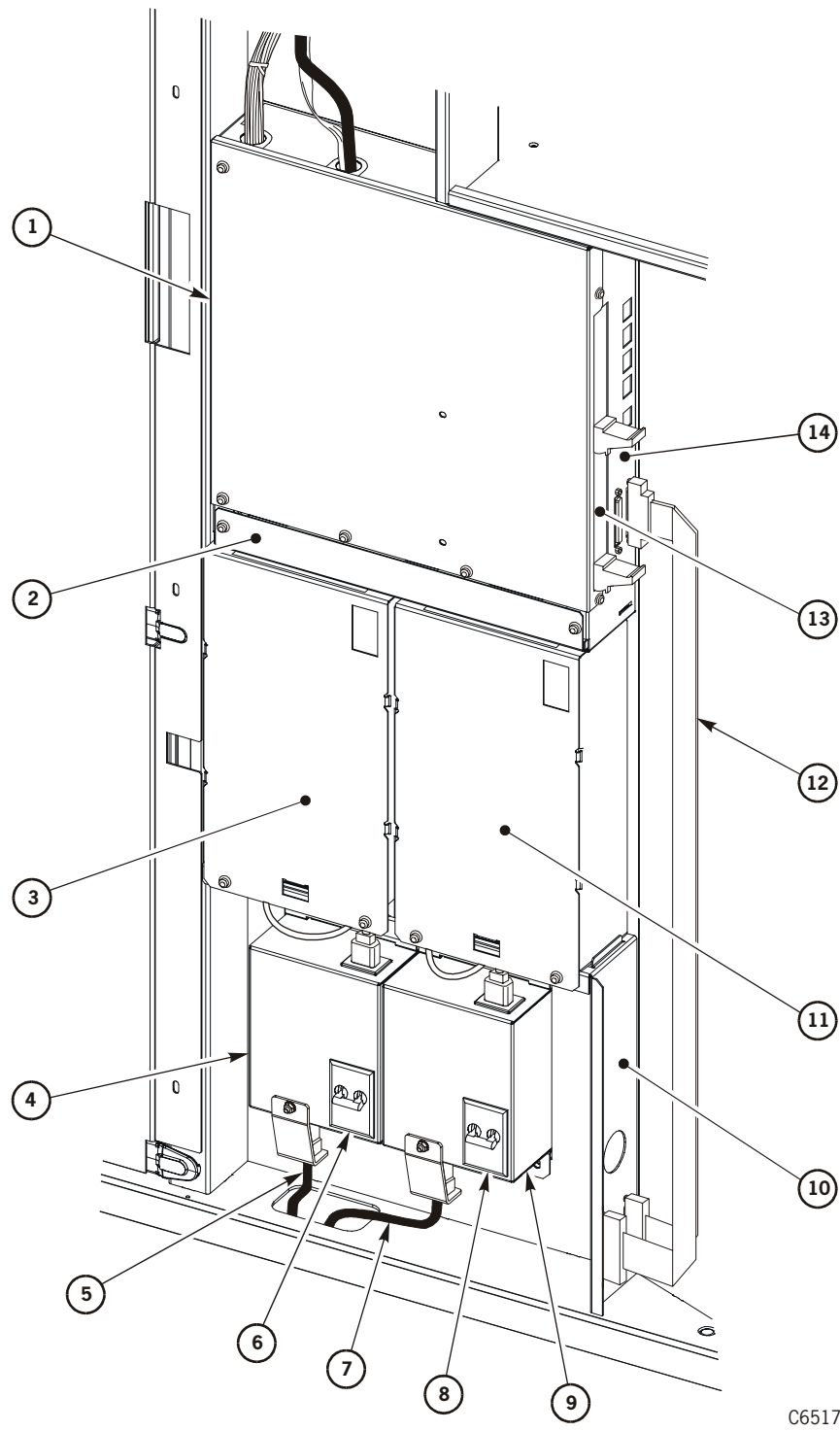
Distance		FC-0 Code	Cable	Type	Connector
Meters	Feet				
2–300	6.5–985	100-M6-SN-I	62.5 $\mu$ m Multimode	780 nm Shortwave laser without OFC	Keyed Duplex SC
2–500	6.5–1640	100-M5-SN-I	50 $\mu$ m Multimode	780 nm Shortwave laser without OFC	Keyed Duplex SC

## ■ Communication Interfaces

Communication interfaces for the tape library are:

- An operator panel that communicates tape library status, configuration, diagnostic sequences, and error information. The operator panel provides keys for running diagnostic tests and examining the 20 most recent tape library errors.
- A CSE port (see “[Library-to-CSE Port](#)” on page A-31 for detailed information).
- A SER1 port (see “[Library-to-SER1 Port](#)” on page A-32 for detailed information).
- A port that communicates PTP status between libraries joined by a PTP; this connection is at J282 on the MPC/MPCL card of each library.
- An Ethernet Web-based service port for:
  - Machine configuration (using the optional “StorageTek L-Series Library Admin”). Netscape<sup>®</sup> and Microsoft<sup>®</sup> Explorer are supported browsers.
  - Monitoring status information using SNMP (see [Appendix B, “SNMP”](#))

Figure A-3. Major Electronic Components (C65174)



C65174

**Figure A-3. Major Electronic Components (Continued)** (C65174)

- 
1. MPC/MPCL and associated logic cards
  2. Fan tray assembly
  3. Standard DC power supply
  4. Standard AC power distribution unit (PDU)
  5. AC power cables
  6. Standard PDU circuit breaker
  7. Optional second power cable
  8. Optional second PDU circuit breaker
  9. Optional AC PDU
  10. Bulkhead
  11. Optional second DC power supply
  12. Library-to-client SCSI control cables
  13. MPU (Fibre Channel, MPC or MPCL) or MPW (LVD SCSI) card (MPC card only)
  14. MPC/MPCL card
- 

## ■ Robot

The tape library contains a robot, arrays of cells for storing cartridges, DLT, Ultrium, and T9x40 drives, and a CAP for importing cartridges into or exporting cartridges from the tape library.

The robot (shown in [Figure A-4 on page A-15](#)) is located at the left center of the base unit and contains three major components:

- Theta motor (controls lateral movement)
- Z column (controls vertical movement)
- Hand-camera assembly

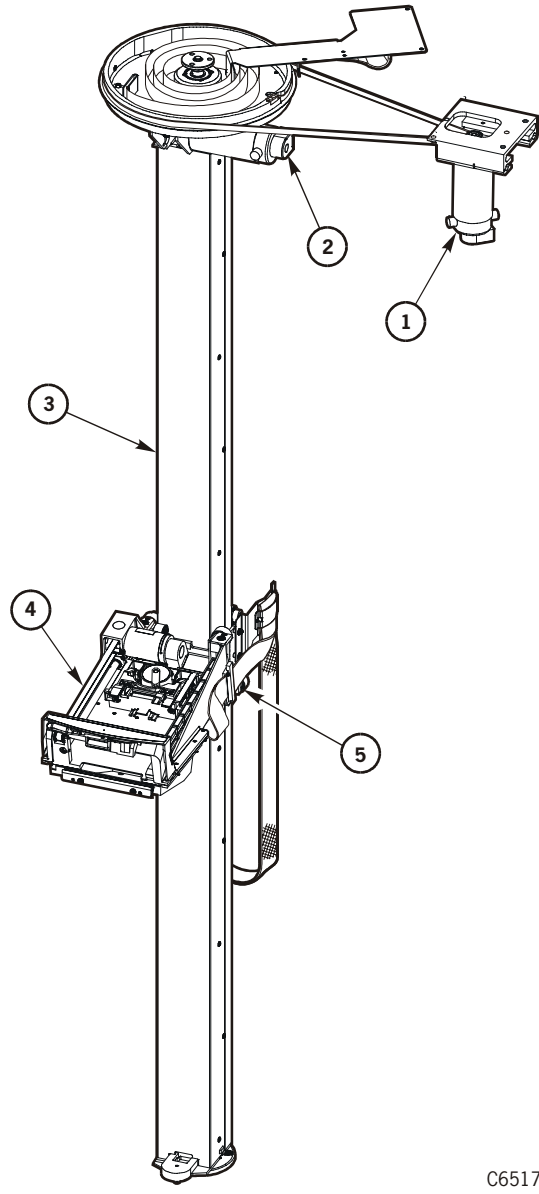
The robot moves cartridges from the storage cells by rotating the Z column, moving the hand-camera assembly up and down the Z channel, and reaching into a storage cell to grip a tape cartridge.

When the library initializes, the hand extension is tested below the calibration label at the bottom of tape drive column 0.

The robot stores tape cartridges in cell arrays that hold six tape cartridges each. The cell arrays are stacked in columns; the columns are arranged in a circle around the robot.

Figure A-4. Robotic Components (C65173)

---



C65173

- 1. Z motor
  - 2. Theta motor
  - 3. Z column
  - 4. Hand-camera assembly
  - 5. Z carriage
-

## Theta Mechanism

The theta mechanism is composed of the +43V theta motor, the PRY logic card, and the theta drive belt. The theta mechanism, under microprocessor control by the MPC/MPCL card, moves the hand-camera assembly laterally within the library. A closed-loop servo feedback configuration controls theta positioning.

During initialization, the MPC/MPCL card applies drive voltage to the theta motor to obtain the motor's range of motion. The MPC/MPCL card tracks the position of the motor by reading the lines etched on the motor tachometer disk into microprocessor memory.

The starting point for these counts begins at the first theta crash stop and ends at the second crash stop. All subsequent positioning of the motor is based on these reference points. The size of the library (1/3, 2/3, or full) is determined at the end of initialization, based on the total number of theta tachometer line counts.

Accurate positioning of the theta motor is achieved by first applying +43V power to the motor (coarse positioning). When the position of the destination cell is near, +43 V power is turned off and the  $\pm 15$  V operational amplifiers on the MPC/MPCL card are energized.

The MPC/MPCL card locks the motor disk at the determined tachometer line by alternately energizing the two voltages until the line position is fixed (fine positioning). The final position is set when a zero voltage is felt at the tachometer line. This zero potential is held by the +15 V on one side of the tachometer line and -15 V on the other side of the line.

When the MPC/MPCL card requires the motor to move to a new destination, the operational amplifiers are turned off, +43 V is gated to the motor, and the tachometer disk begins to turn until the new, coarse position is found. Fine positioning is then accomplished by the  $\pm 15$  V operational amplifiers.

If the motor fails to lock into correct position, the MPC/MPCL card posts an FSC to the operator panel and the FSC log of the library.

## Z Mechanism

The Z mechanism is composed of the +43 V Z motor, the PRX logic card, and the Z drive belt. The Z mechanism, under microprocessor control by the MPC/MPCL card, moves the hand-camera assembly vertically within the library. Like the theta, a closed-loop servo feedback configuration controls Z positioning.

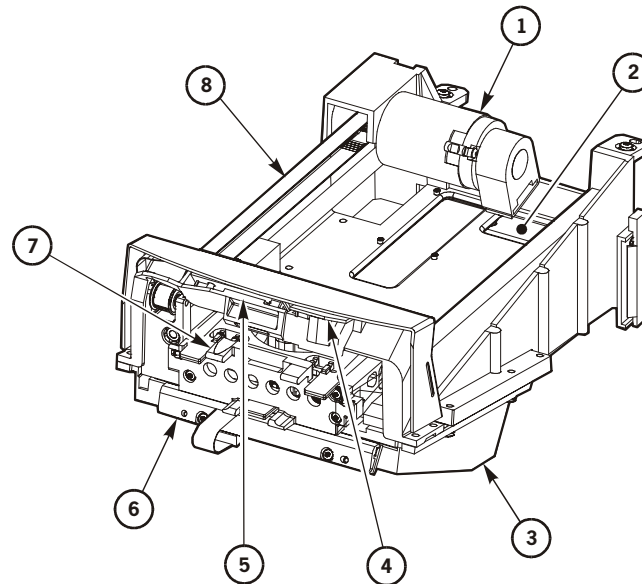
The operation of the Z mechanism is virtually the same as the theta operation described above. The only difference between the two operations is that the Z motor uses the PRX logic card to interface with the MPC/MPCL card. The Z motor and the theta motor are identical.



## Hand-Camera Assembly

Hand-Camera assembly components are shown in [Figure A-5](#).

**Figure A-5. Hand-Camera Assembly (C65012)**



C65012

1. +24V reach motor
2. MPE logic card (replaces MPH card with obsolete CPLD chip)
3. MPD Imager card (replaces MPJ card with obsolete CCD imager - within housing)
4. MPZ flex cable, MPS section (reach safe sensor - within housing)
5. MPZ flex cable, MPP section (cartridge proximity sensor - within housing)
6. MPZ flex cable, MPL section (illumination LEDs)
7. Gripper
8. Drive belt

Under control of the MPC/MPCL card, the hand-camera assembly gets tape cartridges from a cell, CAP, or drive and puts tape cartridges into a storage cell, the CAP, or a drive. Hand-camera assembly signals to and from the MPC/MPCL card are routed through the flexible cable connectors (at P/J 801 and 802) on the Z channel.

When robotic initialization begins, the first command from the MPC/MPCL card is to retract the reach mechanism. The retract command precedes any motion by the theta or Z mechanisms. This ensures that the reach mechanism is not extended before robotic motion begins, thereby preventing damage to customer cartridges.

The vision system, composed of the MPD card (CCD imager) and the MPZ flex cable's MPL section (LED illumination), is initialized at the calibration label, located at the bottom of the standard drive column 0, wall panel 0. The label

image is read by the camera and then digitized by the MPE card. The digital image is then compared to the information that is stored in the memory of the MPC/MPCL processor card.

After the vision system is calibrated, the gripper assembly extension and hand-to-camera calibration are accomplished. The gripper assembly is extended below the calibration block, where the gripper assembly reach range and hand-to-camera alignment are verified.

If any hand-camera assembly failure occurs, the MPC/MPCL card posts an event to the operator panel and the FSC log of the library.

## ■ Pass-thru Port

The PTP transports up to two cartridges at a time between two, connected L700e libraries. One library only supplies power to the PTP and this library is referred to as the “Master.” The Master designation does not mean that it *controls* the PTP, since either library may initiate a pass-thru operation. The new MPC controller logic card (part 308390511 or higher) or MPCL controller card, however, is required for *both* libraries.

The entire PTP is a field replaceable unit.

## Components

Components associated with the PTP are:

- 2-cell array for cartridges
- +5 VDC Motor
- Belt
- MPB logic card (in PTP frame assembly)
- Signal (RS423, serial) and power cables
- MPC logic cards (part 308390511 or higher) or MPCL cards in both libraries
- New door interlock switches—these contain connections between both libraries, to suspend PTP operation if either library door is opened.
- Serial connections to both MPC/MPCL cards in both libraries to communicate PTP activities
- CSE port connector at the Master library’s access door
- Applicable software:
  - For Microsoft Windows-based servers, you must use StorageTek Library Manager (version 2.0 or higher)
  - For ACSLS servers, version 6.0.1 software with the SPE for PTP operation

## Operation

The PTP is automatically configured when the libraries power on and initialize; the MPC/MPCL card will detect the presence of the MPB card. When libraries are joined by a PTP, both operator panels will display L700E instead of L700.

Modifications to element numbering is required to account for the two-cell PTP array within each library (see [Figure A-14 on page A-37](#) through [Figure A-17 on page A-40](#)).

The function of the PTP is to satisfy a cartridge mount operation when all drives are busy within a library. The PTP transfers the cartridge to the other library, where an idle drive can perform the mount operation.

During library initialization, the 2-cell array within the PTP will move from one end of the PTP assembly to the other end to validate its operation.

The following terms are associated with PTP operation:

- **Master:** the library that powers the MPB card. The PTP motor resides within this library. The “Master” designation, however, does not mean that it controls pass-thru operations.
- **Standby:** the attached library that does *not* power the MPB card.
- **Source (or Home) Cell:** the cell containing the cartridge that must be passed
- **Destination:** the location where the cartridge is to be passed (most frequently a tape drive),

Either Horizon L-Series Library Manager or ACSLS software coordinates the sequence of PTP operation which involves:

1. Moving a cartridge from its source cell, into a PTP cell
2. In the other library, moving the cartridge from the PTP cell to the destination.

## ■ Audit

When the theta, Z, and hand-camera assembly mechanisms complete their initialization and calibration routines, the MPC/MPCL card begins an audit of the library contents. The theta and Z mechanisms position the hand-camera assembly at the arrays in a column, the camera reads the VOLSERs of the tapes, and the VOLSERs and array positions of the tapes are transferred into MPC/MPCL memory.

**Note:** Important information concerning the audit process that you must be aware of:

- Cartridges located within drives are not audited
- Host software determines the status of upside down, unlabeled, and unreadable cartridges

**CAUTION:**

**System Degradation:** Client software determines how unlabeled, unreadable cartridges or cartridges placed upside down in the CAP are handled.

Importing unlabeled and unreadable cartridges into the library should be discouraged, as problems will arise every time the library audits the cartridges.

Importing a cartridge upside down could result in damage to the hand-camera assembly and tape drive.

- Whenever an audit is performed, the customer must request a host update of the audit results. This must be done to maintain identical audit information between the library and host.
- Cartridge VOLSERS are read by the camera *only* during an audit or a CAP entry. Once the audit or CAP entry is completed, cartridge movement is done strictly by reference to MPC/MPCL memory.

## ■ Tape Drives

Tape drives may be directly connected to the client interface, daisy-chained with other drives, or on the same bus as the library. Performance, however, must be considered when connecting several devices on a common bus.

The library supports replacement of a drive while other drives and/or the library remain online. This supports the ANSI SCSI-3 level 3 “hot swap” specification.

The procedures for troubleshooting drive faults and hot swapping of drives are discussed in “TIP 5000: Tape Drives” in Chapter 3, “Trouble Isolation Procedures.”

## Ultrium Logic Cards

Ultrium logic cards are supplied for LVD-to-HVD conversion. These are listed in [Table A-8](#)

**Table A-8. Ultrium Tape Drive Logic Cards**

Converter Card	Location	Function
Yes	Between drive power supply and drive	Converts LVD operation on IBM Ultrium drive to HVD
Yes	Between drive power supply and drive	Converts LVD operation on HP Ultrium drive to HVD

## Media Statistics Table

With Version 3.02 library firmware, VOLID reporting at load time to T9x40 drives is available. This information will be supplied in the T9x40 drive error log and is *only* available for the StorageTek drives listed in [Table A-9 on page A-21](#).

**Table A-9. VOLID Reporting**

Drive	Firmware Version
T9840A	1.32.102D (or later)
T9840B	1.32.3xx (or later)
T9940A	1.32.213C (or later)
T9940B	1.32.414 (or later)

The Media Statistics Table is a new feature (with version 3.02 firmware) that allows you to periodically check for media or a drive that is causing operational issues. The table lists cartridge VOLID label, drive serial number, Fault Type (Load, Unload, Media), the number of occurrences, and the date/time stamp of the last occurrence. Due to memory constraints, the table is limited to 30 entries. A new entry in the table is made whenever the VOLID, Drive, or Type differ from entries already in the table. If the identical VOLD, Drive, and Type already exists in the table, the number of occurrences for the matching line item is incremented by one.

## ■ Logic Cards

The library MPC/MPCL (L700) card is the controller of the library. It monitors all motors, the Tape Transport Interfaces (TTI), and execute host commands for all library operations. The MPC/MPCL card in the Master library also controls the PTP mechanism.

The MPC/MPCL card and associated logic cards are listed below. An overall diagram of the L700/700e is shown in [Figure A-6 on page A-24](#). The MPC/MPCL card and its connectors are shown in [Figure A-8 on page A-26](#).

**Table A-10. Logic Cards: Functions and Locations**

<b>Card</b>	<b>Function</b>	<b>Location</b>
MPB	Interface card between two L700e libraries connected by a PTP	PTP frame
MPC/MPCL	Maintains robot, servo, vision control. Provides serial port interfaces for control and debug operations. Monitors motor positions. Supplies +5 V to MPO card. Stores configuration data. Maintains audit database. Gates +43 V to theta motor and Z motor. Provides $\pm 15$ V to operational amplifiers and to camera.  PTP operation requires MPC part 308390511 or higher (contains a higher value fuse for PTP operation) or MPCL card.	Electronics module
MPD/MPJ	Contains CCD imager, S/H circuit, and signal filtering.	Camera
MPE/MPH	Contains vision circuitry. Interfaces between camera and MPC card. Supplies +5V to theta and Z tachometers.	Hand assembly
MPF	Converts AC input voltage from the AC PDU into +43 VDC for library servo motors and the reach motor on the hand, $\pm 15$ V for the operational amplifiers on the MPC card, and +5 V for logic cards and CAP door motor.	DC power supply
MPK	Also known as the personality module. Stores unique vendor information and StorageTek L-Series Library Admin configuration information.	Between MPC card and electronics compartment
MPO	Interfaces between MPC and display.	Operator panel
MPU	Fiber interface between channel and MPV card.	Electronics module
MPV	CPCI interface between MPU (fiber operation for MPC/MPCL) or the MPW (LVD interface for MPC cards only).	Electronics module
MPW*	For the <i>MPC card only</i> , converts HVD to LVD for the library interface.  For MPCL cards, LVD/SE operation is accomplished by moving the jumper at J16 on the MPCL card to the "LVD/SE" position.	Electronics module
MPZ - MPL section	Provides LED light source.	Hand assembly
MPZ - MPP section	Indicates if cartridge is in current cell (proximity sensor).	Hand
MPZ - MPS section	Indicates the hand can be safely moved after gripper operation (hand reach safe sensor).	Hand

**Table A-10. Logic Cards: Functions and Locations (Continued)**

<b>Card</b>	<b>Function</b>	<b>Location</b>
PRX	Interface between theta cable and Z flex cable.	Top of Z column
PRY	Interface between theta cable and MPC/MPCL card.	Z column pulley assembly

**Note:** When configuring for LVD operation, you must place the library at the end of the SCSI bus and use a single, shielded cable.

Note: Figure A-6 is representative of earlier machines.

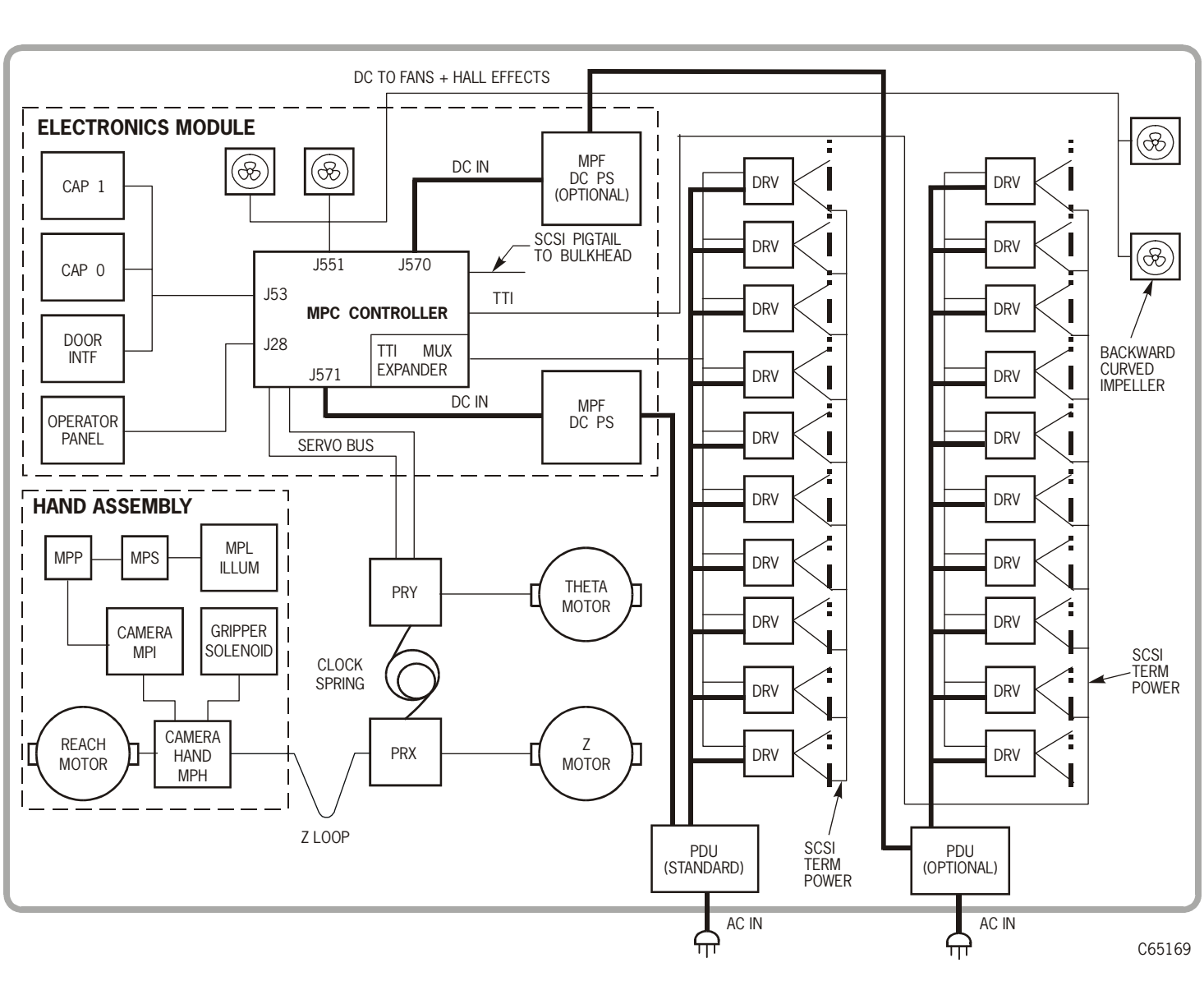


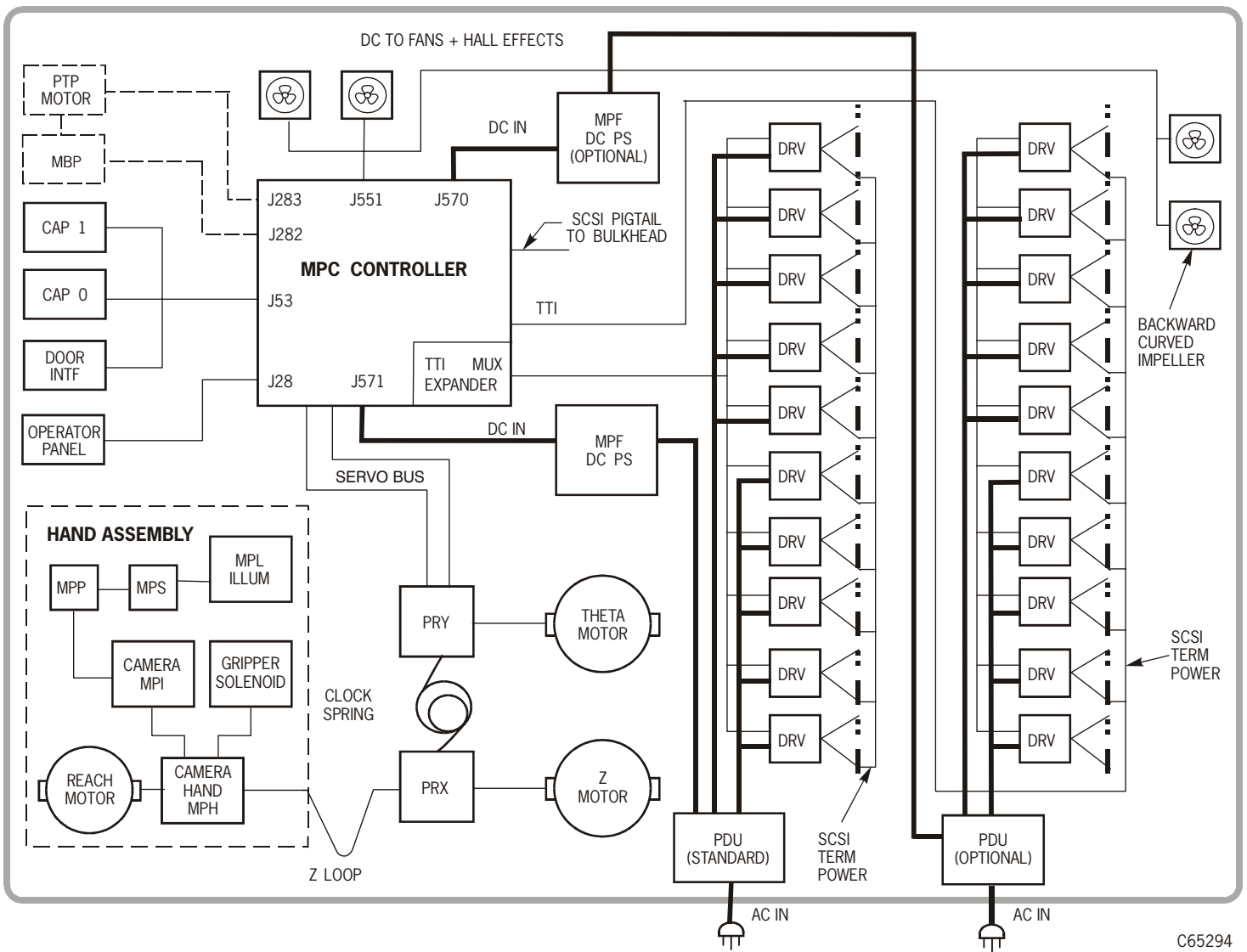
Figure A-6. Overall Diagram: Single Drive Column Power Cable (C65169)

C65169

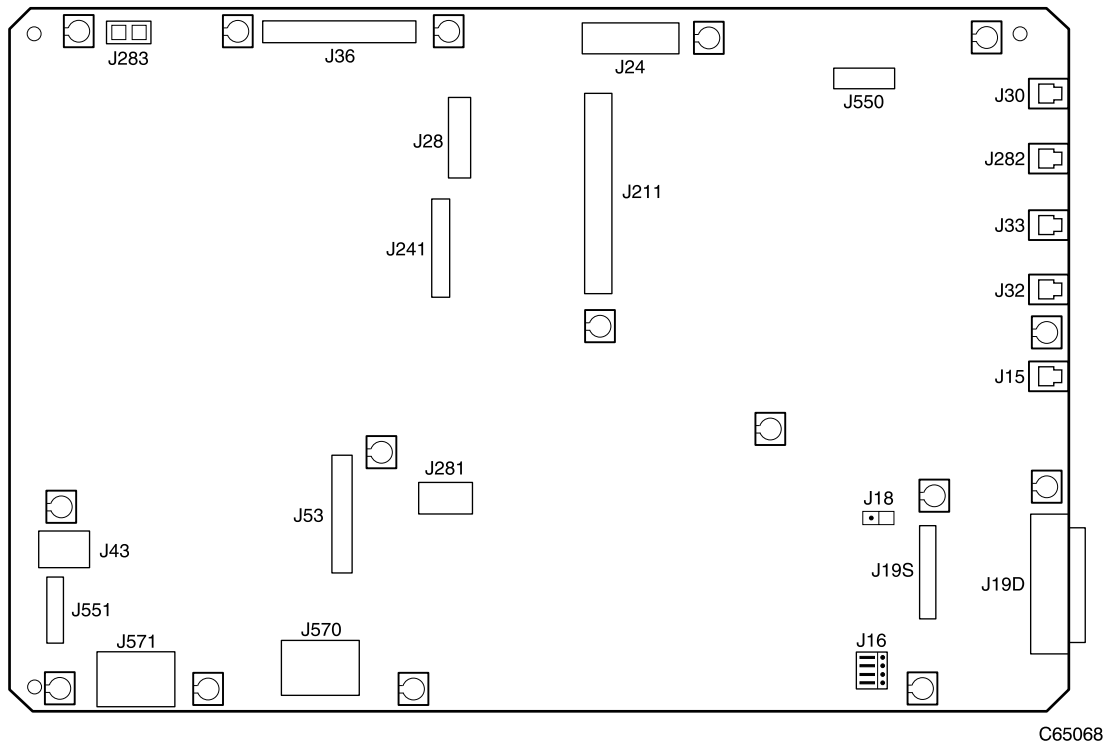


Note: Figure A-7 is representative of machines manufactured after April 2000.

Figure A-7. Overall Diagram: Two Drive Column Power Cables (C65294)



**Figure A-8. MPC/MPCL Card Connections (C65068)**



**Note:** PTP connectors and PTP-capable firmware ports are noted in italics.

**Table A-11. MPC/MPCL Card Connections**

Connector	Function
<i>J283</i>	<i>PTP power (Unused in standalone library)</i>
J36	Servo signal lines
J24	Tape Transport Interface (TTI) for Drives 1 to 10
J550	Library personality/StorageTek L-Series Library Admin (MPK card)—as required.
J30 CSE Port RS 423	<ul style="list-style-type: none"> <li>Pre-3.00 firmware: Dumb terminal port, used only to load pre-2.00 firmware.</li> <li><i>3.00 and later firmware: Command Line Interface (CLI). Laptop connection: 38,400 baud rate. Used for Hyperterminal downloading port for firmware, running diagnostic tests, and examination of FSC log.</i></li> </ul>
J282 TEST Port RS423	<ul style="list-style-type: none"> <li>Pre-3.00 firmware: Engineering use only.</li> <li><i>3.00 and later firmware: Pass-thru port serial connection (Unused in standalone library)</i></li> </ul>

**Table A-11. MPC/MPCL Card Connections (Continued)**

Connector	Function
J33 SER1 Port RS423	<ul style="list-style-type: none"> <li>Pre-3.00 firmware: Used for laptop command line interface (CLI) connection: 38,400 baud rate. Used for Hyperterminal downloading port for firmware (editions 2.20 and later), running diagnostic tests, and examination of FSC log.</li> <li>3.00 and later firmware: <i>Engineering use only.</i></li> </ul>
J32 SER1 Port RS423	Not used.
J15 ENET Port	Ethernet connector (TCP/IP)
J19D	SCSI HVD
J19S	SCSI Single-ended (MPC) or SCSI LVD/SE (MPC/MPCL)
J16	Single-ended or HVD selection jumpers (MPC card); LVD/SE or HVD selection jumpers (MPCL card)
J18	Terminating power jumper
J211	Connector for PCI (MPV) expansion card (MPU attaches for fiber; MPW attaches for SCSI LVD on MPC only)
J28	Operator panel
J241	Tape Transport Interface (TTI) connection to MPM multiplexor card for Drives 11 to 20
J281	Engineering use only
J53	CAP and door
J570	DC power in from second MPF (DC power) supply
J571	DC power in from first MPF (DC power) supply
J551	DC fans
J43	Servo power to robot and hand-camera assembly

## ■ Library Interfaces

All interfaces to the library are monitored on the MPC/MPCL logic card. These interfaces are:

- Client-to-CAP
- Library-to-client
- Library-to-drives
- Library-to-LVD interface
- Library-to-Fibre channel
- Library-to-personality module and StorageTek L-Series Library Admin

- Library-to-operator panel
- Library-to-CSE port
- Library-to-TEST (PTP) port
- Library-to-SER1 port
- Library-to-SER2 port

The interfaces are discussed in the following sections.

## Client-to-CAP

Cartridges are imported into and exported from the CAP. Each CAP has four magazines, numbered one through four, from the top location to the bottom. Each cell location in a CAP is assigned an element number (see [Figure A-10 on page A-33](#) through [Figure A-13 on page A-36](#)).

There is no restriction on the order in which cartridges are placed into a magazine or CAP; when the CAP door is closed, the robot will audit all CAP cell locations for cartridges.

For exporting cartridges, however, the robot will place the target cartridge into the lowest available element number first. Therefore, an export process for a library that has two CAPs, for instance, will begin at the optional CAP (CAP B) since it has the lowest element number.

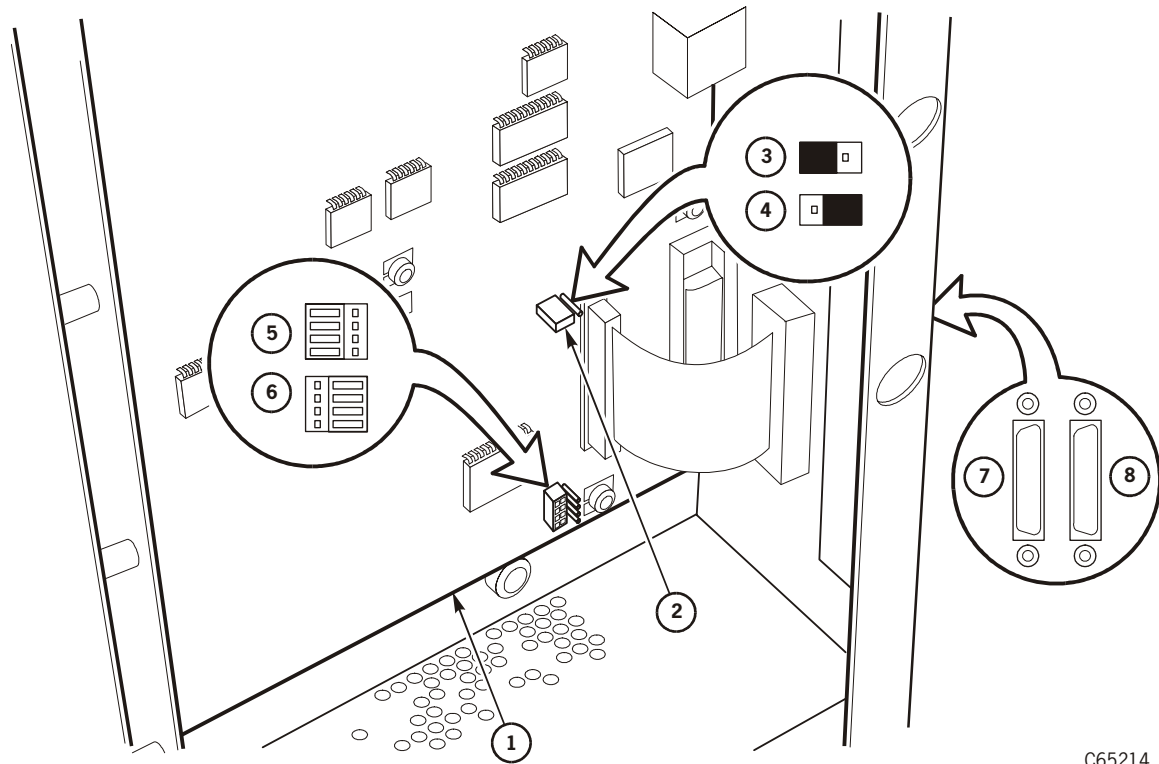
## Library-to-Client

The MPC card is jumpered at the factory for SCSI HVD operations at J16. If SCSI single-ended operation is desired, the jumper is moved and the “Y” cable from the MPC card to the bulkhead is repositioned at the MPC card “single-ended” connector. If LVD operation is required, you must install Conversion bill 101368, which contains the MPW and MPV cards.

The MPCL card, likewise, is jumpered at the factory for HVD operation at J16. If SCSI LVD/SE operation is desired, the jumper is moved and the “Y” cable from the MPCL card to the bulkhead is repositioned at the MPCL card “LVD/SE” connector.

Both SCSI operations require 68-pin connectors. Terminating power is supplied at J18. This is set at the factory to supply terminating power at the library end of the bus, but the jumpers may be re-positioned to turn terminating power to “off.” The jumpers for operation type and terminating power are shown in [Figure A-9 on page A-29](#).

**Note:** There are two serial ports on the MPC/MPCL card, but they are not used for host interface connections.

**Figure A-9. Terminating Power and Operation Jumpers (C65214)**


C65214

1. MPC/MPCL card
2. Terminating power jumper (J18)
3. Terminating power ON position
4. Terminating power OFF position
5. HVD operation setting (J16)
6. Single-ended operation setting (J16 for MPC or LVD/SE for MPCL)
7. Single-ended connection (for MPC) or LVD/SE (for MPCL)–(front)
8. HVD connection–(rear)

## Library-to-Drives

The connection between the library MPC/MPCL card and drives is a four-pin, RS422 interface. The connector for the tape drives is contained within the quick-disconnect connector for the drive tray. The cable for these lines runs from the drive connector to the MPC/MPCL card at P/J24 (for drive column 0) or J241 (for optional drive column 1). If a second drive column exists, communication signals are multiplexed through the MPM card.

**Note:** Special consideration must be made for the library-to-drives interface when Dynamic Worldwide Name is enabled (see [“Implications for an MPC/MPCL Replacement”](#) on page 2-37)

## Library-to-LVD Interface

The MPW card attaches to the compact peripheral component interconnect (CPCI) assembly which contains the MPV card. It converts library operation from HVD to LVD for the *MPC card only*. This enables the library to match operation mode with Ultrium drives that are also operating on an LVD interface.

For MPCL cards, the library-to-LVD interface is configured by simply setting the J16 jumper to LVD/SE—the card will then operate as a native LVD/SE interface *without* the need for an MPW card.

For any library that operates LVD:

1. The single, shielded cable (part 3136668xx) with a feed-through terminator must be installed between the MPC/MPCL card single-ended connector and the bulkhead.
2. The library must be the last device on a SCSI bus.
3. The cables used must be those listed in [“SCSI Low Voltage Differential Cables/Terminators” on page A-10](#)

## Library-to-Fibre Channel

Library Fibre Channel operation is directed through the MPU card, which in turn, is connected to the MPV card. The MPU card slides into the lower slot of the compact peripheral component interconnect (CPCI) assembly, which contains the MPV card. This lower slot is designated “0” by the firmware and is the default location that must currently be used.

The MPV card, which operates as the CPCI backplane for the Fibre channel interface, attaches to the MPC/MPCL at J211. The client path for fiber operation is: Client → Fiber Hub →MPU→MPV→MPC/MPCL.

**Note:** The MPU Card is attached to the MPV Card. The MPU card contains a Class 1 laser product that complies with sections 21CFR 1040.10 and 1040.11 of the Food and Drug Administration (FDA) regulations. Class 1 laser products do not require any special safety precautions.

## Library-to-Personality Module and StorageTek L-Series Library Admin

The MPK card, located above right of the MPC/MPCL card, contains an EEPROM that:

- Identifies the machine for a specific vendor (if required). When installed, the operator panel will display that vendor’s name.
- Enables the StorageTek L-Series Library Admin feature

If the MPK card is present and the MPC/MPCL card must be replaced, you must re-connect the MPK card to the new MPC/MPCL card. The vendor information and the StorageTek L-Series Library Admin feature will remain effective. *However*, the customer's password and IP address *must* be re-entered during configuration.

## Library-to-Operator Panel

The operator panel communicates tape library status, configuration, diagnostic sequences, and FSC information. The operator panel provides keys for running diagnostics and examining the 20 most recent tape library events. Event information includes fault symptom codes (FSCs) to help you determine the problem.

## ■ CSE, TEST, and SER1 Ports

The CSE, TEST, and SER1 port functions are summarized in [Table A-12](#). Refer to the sections below for a more detailed explanation of these ports.

**Table A-12. CSE, TEST, and SER1 Port Functions**

MPC/ MPCL Port	Pre-3.00 Firmware	3.00 and Higher Firmware
CSE	Flash 97 download	Command Line Interface (CLI)
TEST	Engineering use	PTP control
SER1	Command Line Interface (CLI)	Engineering use

## Library-to-CSE Port

The function of the CSE port has changed with various editions of firmware. See [Table A-12](#) for its use with your firmware edition. This interface is through an RJ45 connection.

- 2.00 firmware only: used as Flash 97 download port
- 3.00 and higher firmware: Command Line Interface (CLI) port.

*For 3.00 and higher firmware*, the CSE port provides a command line interface to the MPC/MPCL card, allowing you to download firmware (using Zmodem protocol—see [“CLI Port - Hyperteminal Method” on page 2-11](#)), clear (purge) the FSC log, and run diagnostic tests through a laptop. The baud rate is 38,400 and the interface is through an RJ45 connection.

**CAUTION:**

***System Interruption:* Be sure that the library and drives are offline before using the Command Line interface. Any diagnostic command will take the library offline without posting a warning message.**

## Library-to-Test (PTP)

Prior to 3.00 firmware, this port was designated “for engineering use only.”

For 3.00 or higher firmware, when connected by a PTP, both libraries use this port to interface with the MPB card in the PTP frame. Two serial cables originate from the MPB card to J282 (TEST port) on both libraries’ MPC/MPCL card. These interfaces are required to maintain the control of cartridges being transported between the libraries.

For libraries without a PTP, this port is for engineering use only.

## Library-to-SER1 Port

The function of the SER1 port has also changed with various editions of firmware. See [Table A-12](#) for its use with your firmware edition. Like the CSE port, this interface is through an RJ45 connection, with a baud rate of 38,400.

- 2.00 through 2.xx firmware editions only: Command Line Interface (CLI) port
- 3.00 and higher firmware: Engineering use only

## Library-to-SER2 Port

This port is not used.

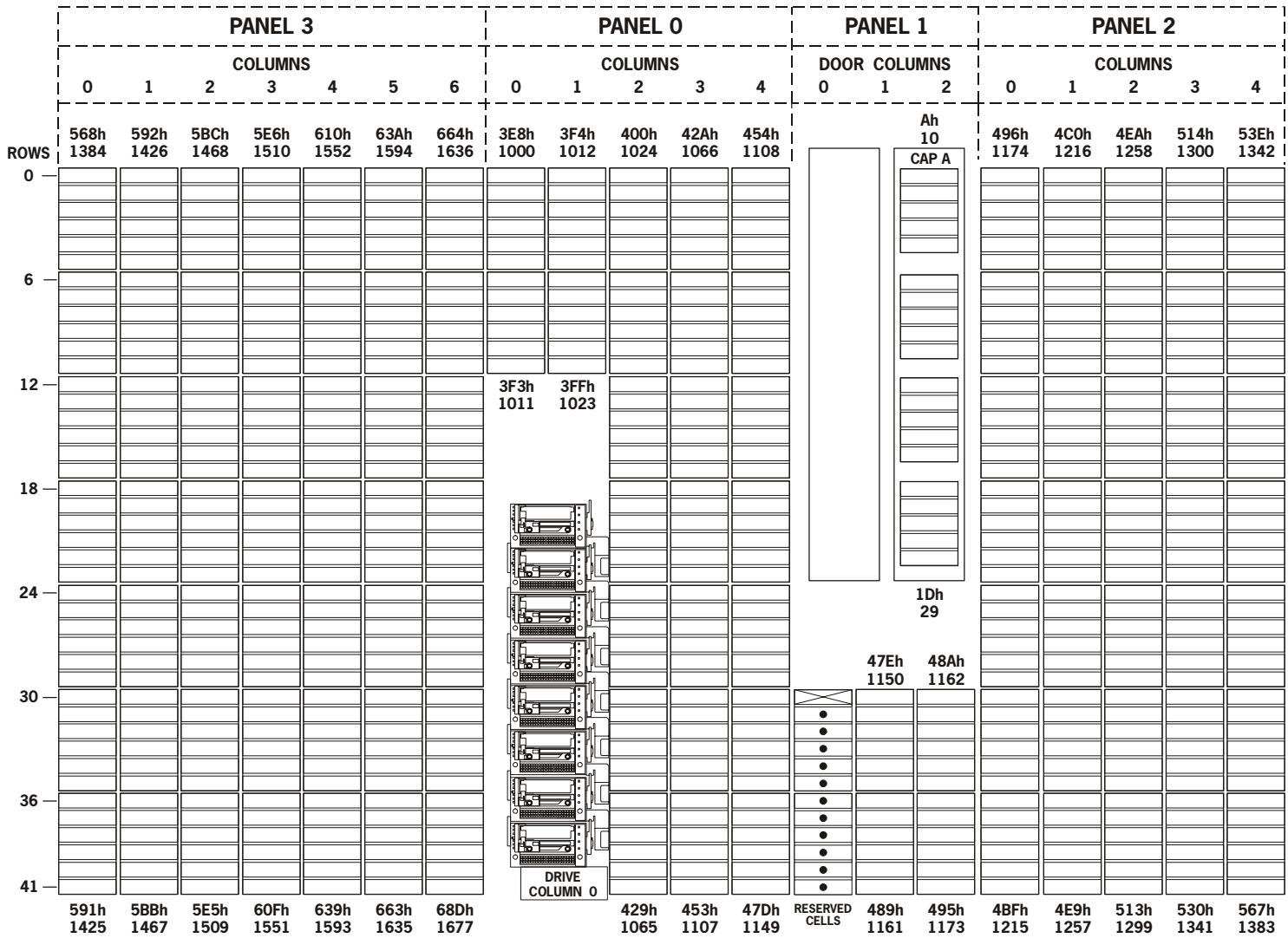
## ■ Wall Elements

The wall element illustrations depict the SCSI element designations for all cell locations. The designations are noted at the top of the columns in hexadecimal (denoted by the “h” at the end of the number) and decimal.

Drive types and locations will vary with your library options. Each drive column displaces 60 element (cell) locations.

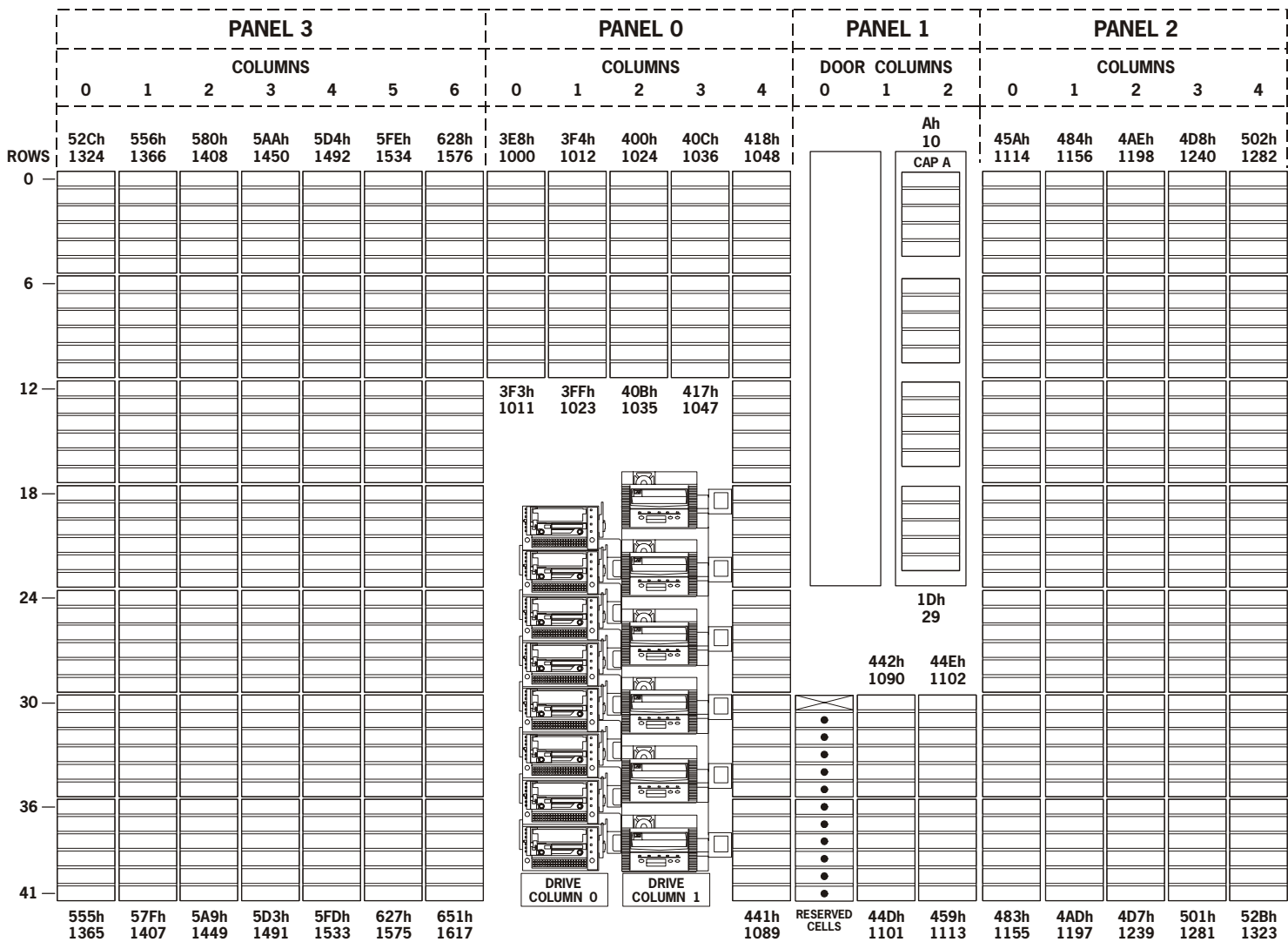


Figure A-10. Standalone Library Elements—One CAP, One Drive Column, C65043



C65043

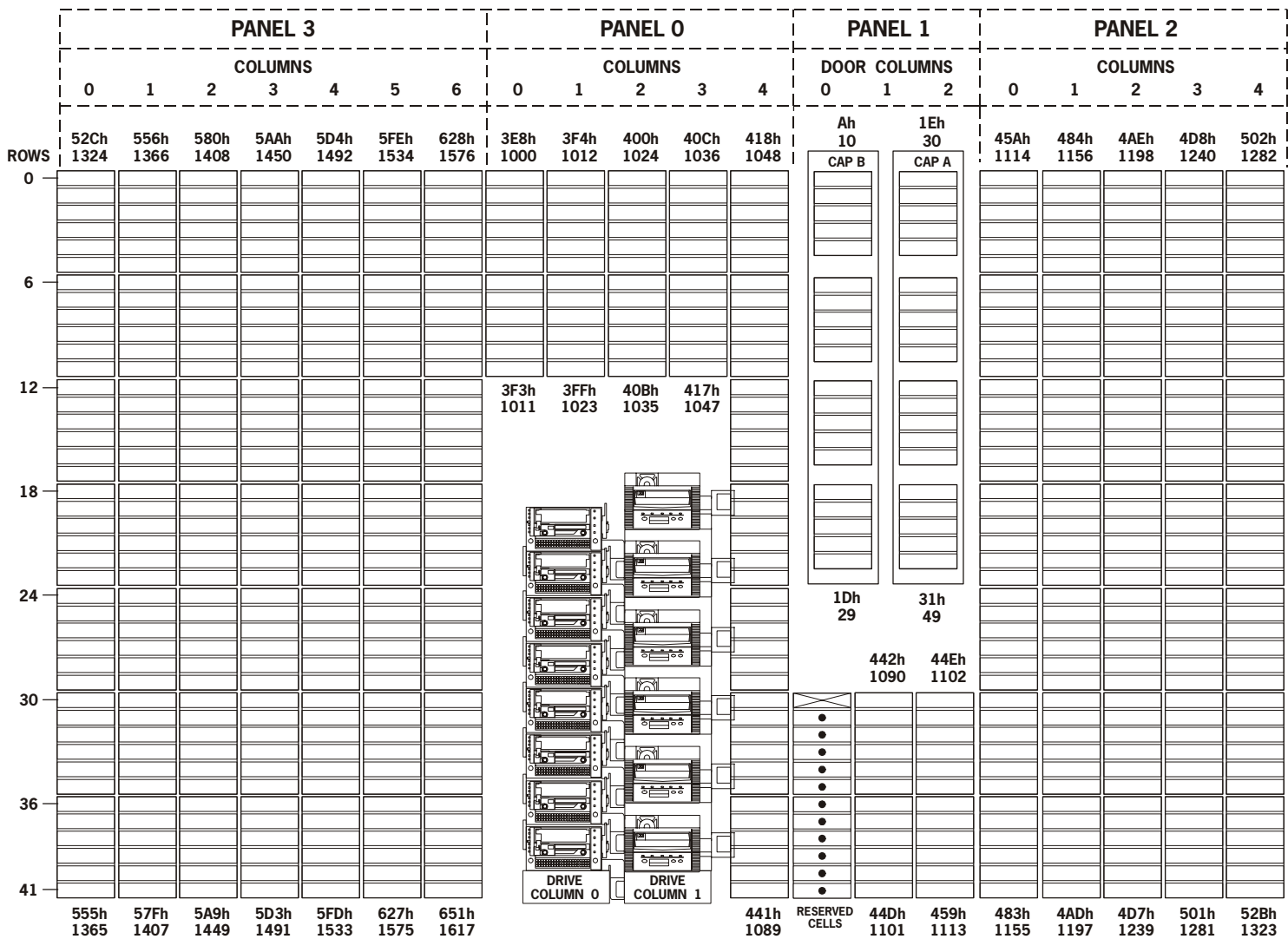
Figure A-11. Standalone Library Elements—One CAP, Two Drive Columns (C65044)



C65044



Figure A-13. Standalone Library Elements—Two CAPs Two Drive Columns (C65046)



C65046

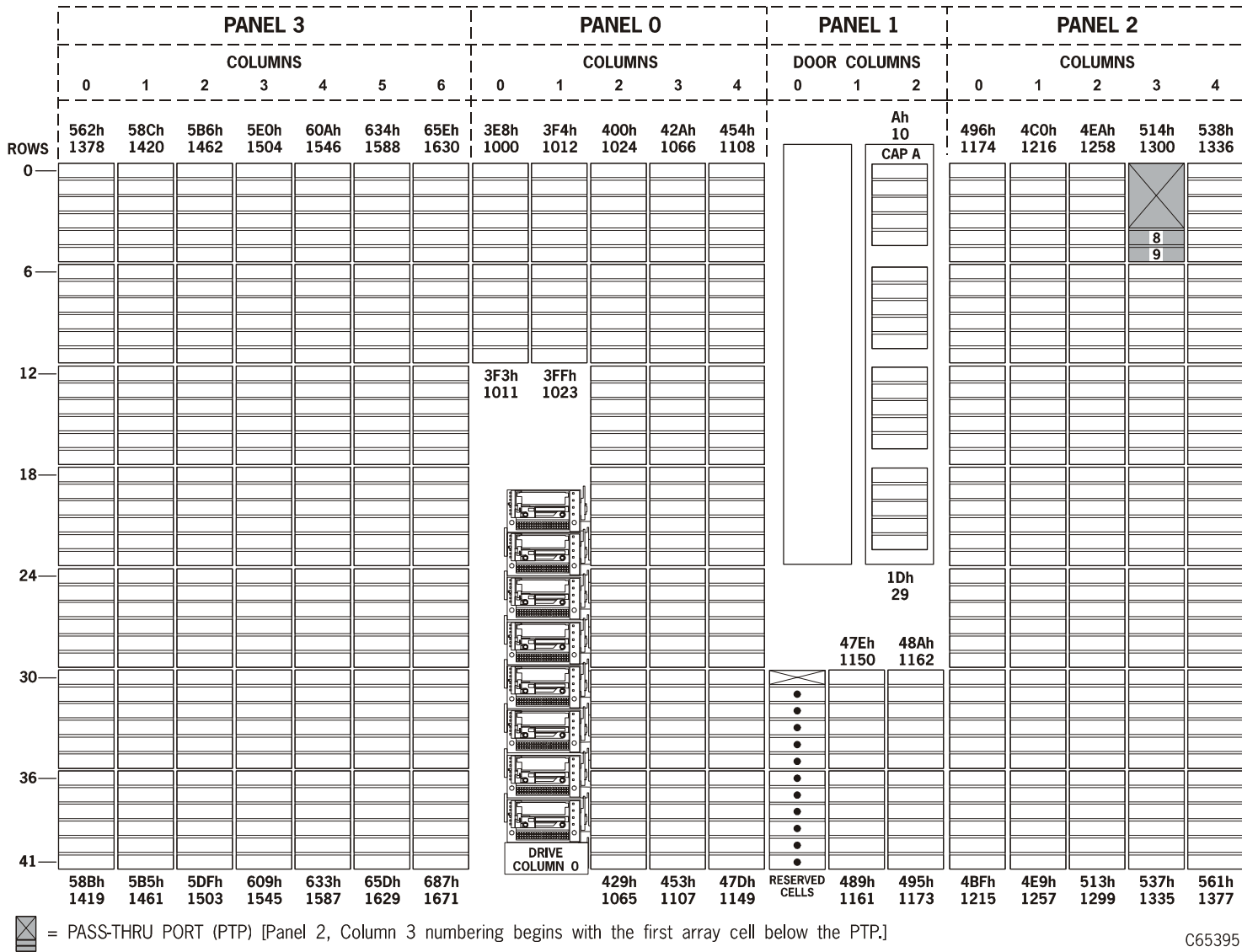
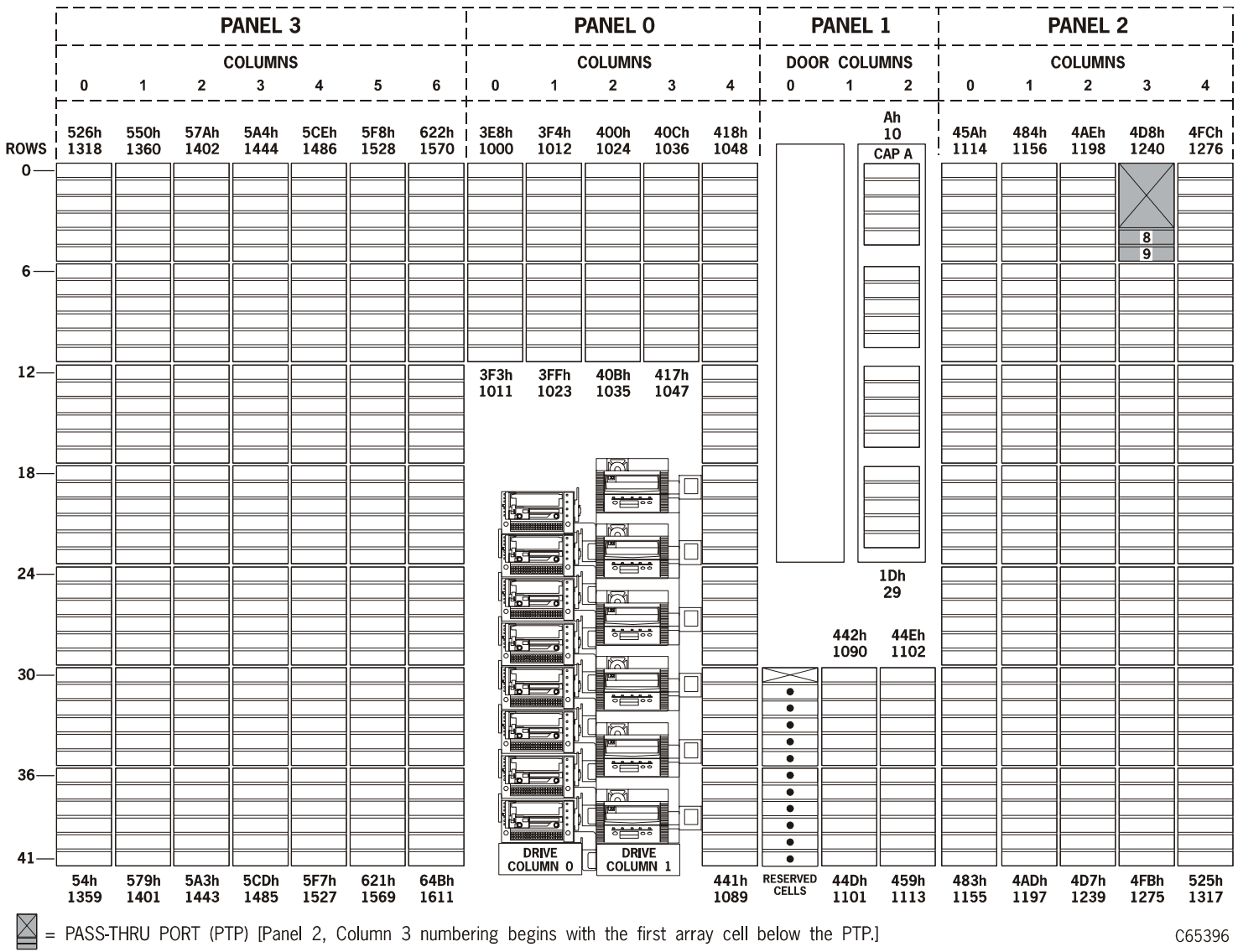


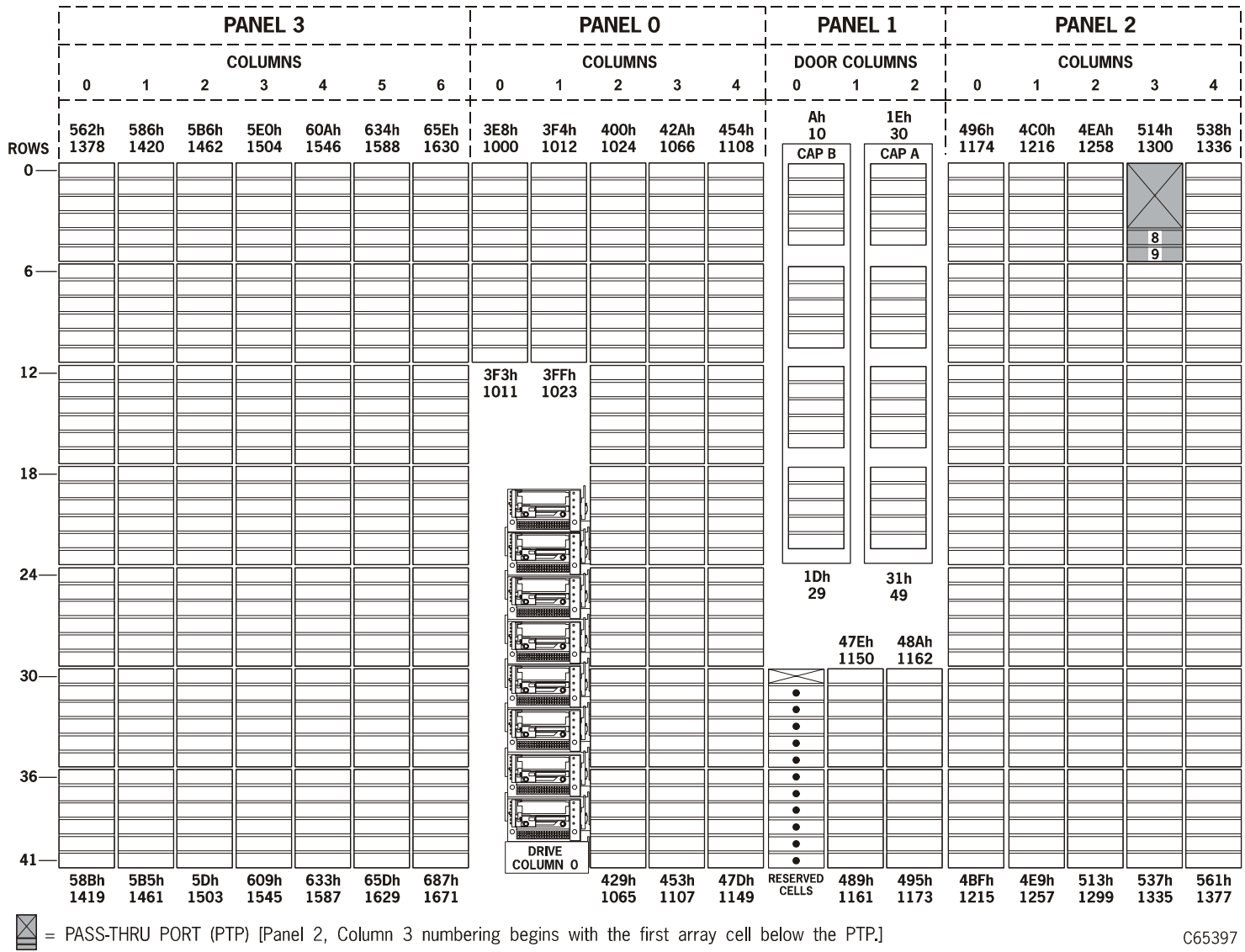
Figure A-14. PTP Library Elements—One Cap, One Drive Column (C65395)

Figure A-15. PTP Library Elements—One CAP, Two Drive Columns (C65396)



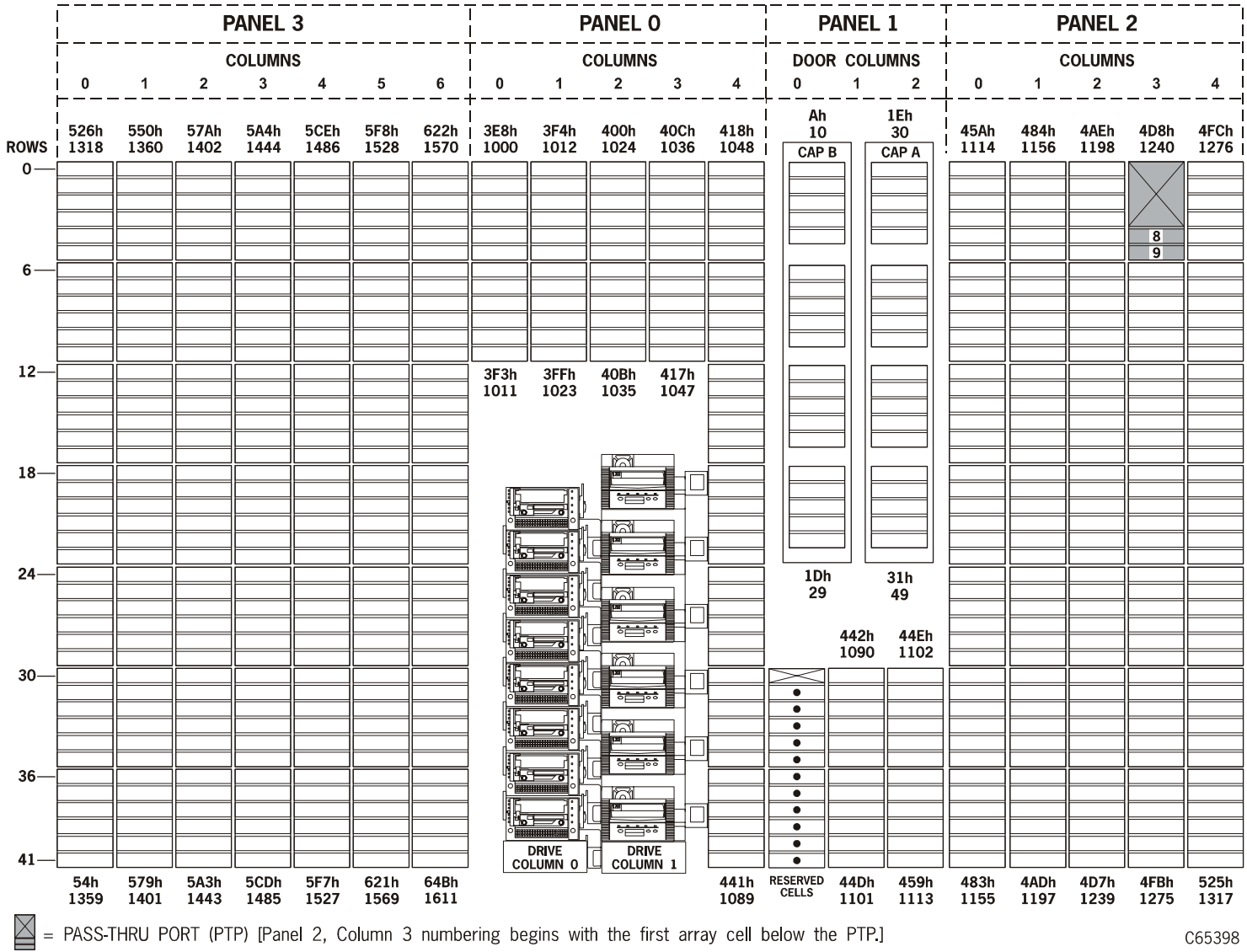
C65396

Figure A-16. PTP Library Elements—Two CAPs, One Drive Column (C65397)



C65397

Figure A-17. PTP Library Elements—Two CAPs Two Drive Columns (C65398)





---

This appendix provides the implementation of the Simple Network Management Protocol (SNMP) for the L700e library.

## ■ Overview

StorageTek's L-series libraries supports Version 1 of the simple network management protocol (SNMPv1). SNMP is an application layer protocol that performs network management operations over an Ethernet connection using a User Datagram Protocol (UDP/IP).

SNMP allows systems administrators to query the library for configuration, operation, and statistical information, SNMP also allows the library to inform the systems administrator of potential problems.

Systems administrators and network managers use SNMP to monitor and receive status from the library, such as:

- Operational state of the library (such as microcode level, serial number, online)
- Status of the cartridge access port (such as open, closed, number of cells)
- Library elements (number of hands, columns, panels, cells, CAPs)
- Number of storage cells and media types stored in the library
- Number and types of tape drives installed in the library
- Plus many other variables defined in the database

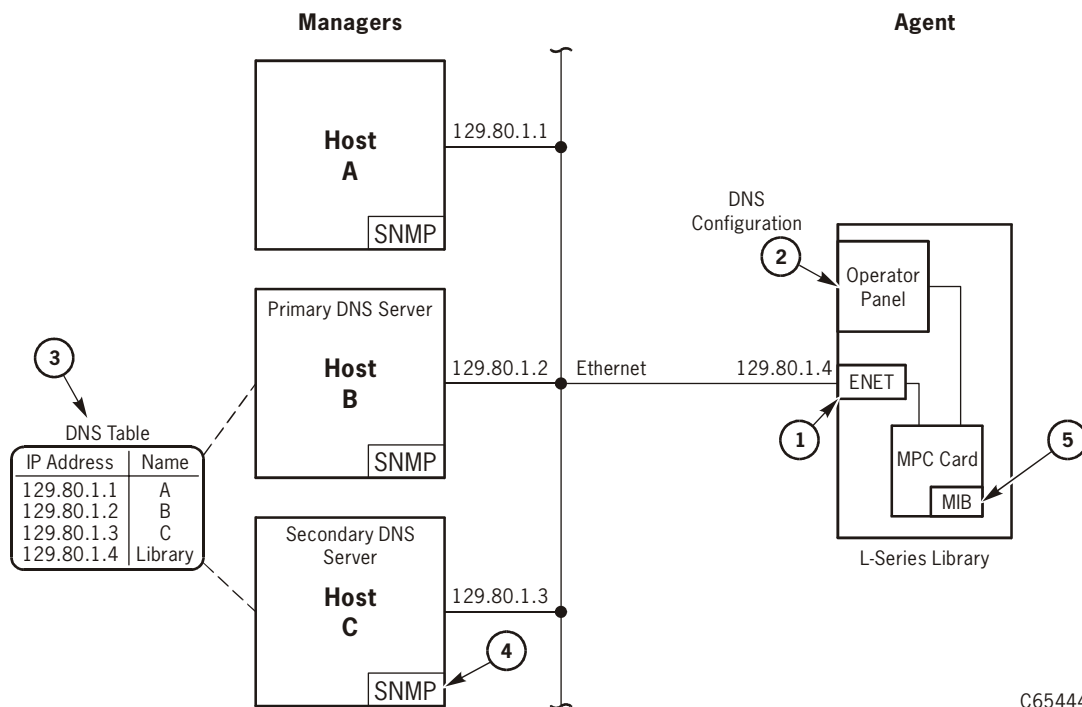
[Figure B-1 on page B-2](#) illustrates a simple network block diagram that identifies the locations of the SNMP software application, DNS servers, and Library Admin. This figure also identifies the IP addresses, shows a map of DNS names, and other components involved in that configuration (such as operator panel, Ethernet connections, location of the Management Information Base (MIB), and the MPC/MPCL processor card.

## ■ SNMP Terms

SNMP uses a manager/agent structure, a database, and a small set of commands to exchange information. SNMP terms include:

- **Agent** - A module that resides in a managed device. The agent is responsible for responding to requests from the manager and for sending *traps* to a recipient that inform the systems administrator of potential problems.

**Figure B-1. SNMP and DNS Network Block Diagram Example (C65444)**



C65444

1. Ethernet connection (ENET) for the library.
2. To configure the library to support DNS, see [“DNS Configuration” on page 2-35](#).  
Note: You must enter the Domain Name Service (DNS) configuration *only* if your Simplified Network Management Protocol (SNMP) agent is set to trap *named* recipients; if SNMP is set for *numbered* recipients (by using IP addresses), no entries are required.
3. An example of a table that matches IP addresses to selected DNS names.
4. SNMP software application that implements the role of manager. Some applications include:  
HP Open View  
IBM NetView  
Sun Microsystems SunNet Manager
5. The MIB is stored on the MPC/MPCL card. To view the contents of the MIB database, enter:  
`http://IP.Address/Lseries.mib` or `http://library_name/Lseries.mib`
6. Library Admin is an *optional* feature for the library. It provides the GUI-based monitoring system and is *separate* from the SNMP application. Library Admin provides an easy and convenient way to configure the library SNMP agent using a network configuration panel or screen. Library Admin also provides other beneficial functions and display screens for the library.

- **Community String** - Applications use community strings for access control. The manager includes the community string in its SNMP messages to an agent. The agent consequently can accept or reject the operation.
- **Managed device** - A device that hosts the services of an SNMP agent that provides monitored information and controlled operations using SNMP. L-Series libraries are managed devices.
- **Management Information Base (MIB)** - A collection of information stored in a database that contains configuration and statistical information for a managed device. For L-Series libraries, a copy of the MIB is loaded with microcode and stored on the processor card. See “[Management Information Base](#)” on page B-4 for more information about the MIB.
- **Manager** - Provides the communication link between the systems administrator and the managed devices on the network. A manager station or server allows the systems administrator to get information about the device through the MIB and to receive traps from an agent.
- **Recipient** - A location on a manager where the SNMP agent sends traps. This location is defined by the combination of either the IP address or DNS name and the port number. The default recipient port number is 162.
- **Trap** - A message that reports a problem, error, or a significant event that occurred within the device.

## ■ SNMP Commands

SNMPv1 offers a limited number of commands that follow a simple request/response exchange to communicate between the manager and the agent.

The **manager** issues request such as:

- **Get:** A request for information of a specific variable.
- **GetNext:** A requests for the *next* specific variable.
- **Set:** A request to change the value of a specific variable.

The **agent** responds with:

- **Get-Response:** A response to the manager’s **Get** and **GetNext** commands.
- **Trap:** An asynchronous message to the recipient about an error or event.

Refer to the SNMP software documentation for additional information.

## ■ Access Control

Because community strings provide a weak form of access control in SNMPv1, StorageTek's embedded agent will not rely on the so called "private" community string in order to accept changes to the library's configuration. Access control and authorization for **Set** operations is preformed by using an administrative password. Consequently StorageTek's embedded agent uses only one community string for both **Get** and **Set** operations.

**Important:**

You must first **Set** the MIB variable `lserLibConfigPassword` (1.3.6.1.4.1.1211.1.12.3.2) to the same value as the library password (see "[Setting the Web Password](#)" on page 2-28 for more information). Then subsequent **Set** operations are authorized for a specific period of time called the grace period.

Traps however, can be sent to recipients using alternate community strings. Different community strings can be specified while adding entries to the Trap Recipient List (see "[Configuration](#)" on page B-6).

## ■ Management Information Base

The MIB is a viewable document that contains descriptions about the characteristics for a managed device. These characteristics are the functional elements for that device which can be monitored using SNMP software.

To access and view the contents of the MIB using a Web browser, enter the IP Address or DNS library name and Lseries.mib. For example: `http://IP.Address/Lseries.mib` or `http://library_name/Lseries.mib`.

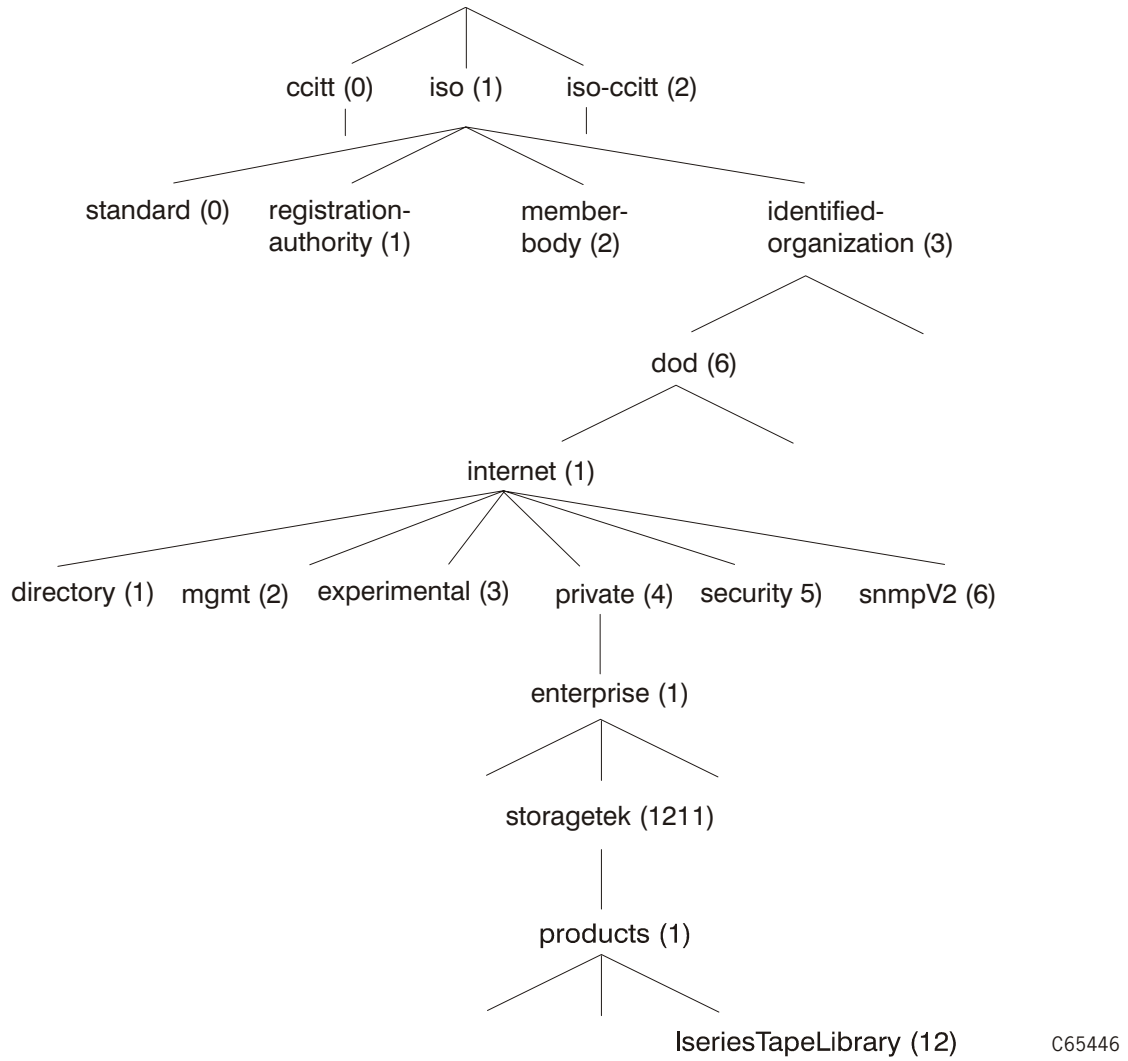
**Note:** StorageTek's L-series libraries implement only MIB extensions defined in the LSERIES-TAPE-LIBRARY-MIB under the **private (4)** section as shown in [Figure B-2 on page B-5](#).

**Figure B-2. Management Information Base Hierarchy (C65446)**

**MIB Title** = LSERIES-TAPE-LIBRARY-MIB

**Object Name** = iso.identified-organization.dod.internet.private.enterprise.storagetek.products.lseries

**Equivalent Object Descriptor** = 1.3.6.1.4.1.1211.1.12



## ■ Configuration

There are three ways to configure the library to support SNMP:

1. Library Admin, an *optional* feature for the library, but it is not required to support SNMP.
2. The CLI port (command line interface)  
See [Figure B-3](#) for examples of the `help` and `help snmp` commands
3. The SNMP software application—you can also use any SNMP application to change *some* of the agent's settings. You must be MIB-aware and refer to the L-series.mib for specific information.

**Figure B-3. CLI Help and Help SNMP Commands**

```
cli> help
help [command]          help on a specific command
diag                   execute diagnostics
download              download new image to prom
fsc                   manipulate fault symptom codes
network              manipulate network information
snmp                manipulate SNMP configuration
time                 view/modify library date & time
password             reset/modify library admin password

cli> help snmp
snmp view             display SNMP Agent settings
snmp community [string] set Community String/IP address
snmp [enable|disable] enable of disable SNMP Agent
snmp port [port number] set Agent Listening Port Number
                    (Valid: 161, 1024-65535)
snmp grace [number]  set Write Grace Period Number
                    ( 1-5 minutes )
snmp reset           set SNMP Agent configuration parameters
                    to default values
snmp list            display SNMP Trap Recipient List
snmp add             add a member to the SNMP Trap Recipient List by
                    answering individual prompts for values.
snmp add [ipaddr|name] add a member to the SNMP Trap Recipient List using
                    some default values
snmp add [ipaddr|name] [host port number] add a member to the SNMP Trap Recipient List
                    using some default values
snmp delete [[ipaddr|name] [host port number]] | all
                    delete all or a selected member of the SNMP
                    Trap Recipient List
                    Where valid [host port number] values: (162, 1024-65535)

cli> _
```

The library comes configured with some default settings, listed in [Table B-1](#):

**Table B-1. SNMP Default Settings**

Setting	Default	Description
Port ID	161	Valid port IDs are 161, and 1024 to 65535
Community String	public	Agent community string. When set to <i>public</i> , requests coming from <i>any</i> community string will be accepted.
Grace Period	5 minutes	1 to 5 minutes Once you enter the password, you have 1-5 minutes to <b>Set</b> any values for the agent.
Trap Recipient List	Empty	This list supports up to 12 recipients with no duplicate entries.
SNMP (agent)	Disabled	Enabled or Disabled

## ■ Starting SNMP

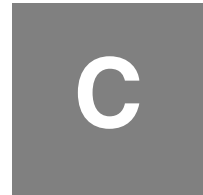
To start SNMP for the library, you need to:

1. Configure the library:
  - a. *Enable* the agent
  - b. Add recipients to the trap list (if needed)
  - c. Make any optional changes to the default settings
2. *Re-IPL* the library for the changes to take effect.

This page intentionally left blank.



# StorageTek L-Series Library Admin



---

StorageTek's L-Series Library Admin is an optional software product that resides internally in the library and is activated by using a Web browser. This product provides a Web-based, graphical user interface (GUI) that enables customers to monitor and perform library operations remotely.

Some of the features of Library Admin include the ability to:

- Get a virtual view of the library's cells
- Load microcode
- Generate useful reports on the library, drives, FSCs, and media
- Obtain valuable statistics on the library, drive, cells, and cleaning cartridge
- View and modify the configuration of the library, drives, and network
- Set the cleaning cartridge threshold
- Enable SNMP and add trap recipients (see [Appendix B](#) for more information)

For more information about StorageTek's L-Series Library Admin, visit:

<http://stagesupport.storagetek.com/LibraryAdminHelp/LSA.HTM>

## ■ Requirements

Before installing the L-Series Library Admin, verify that the following requirements are met:

- Minimum system requirements:
  - 200MHz processor
  - 64 MB RAM (96 MB preferred).
- Microcode level 2.20.00 and later contains the L-Series Library Admin software.
- Library Personality Module.
- Java™ Plug-in Software 1.4 or later.

You can download the Java plug-in from:

<http://java.sun.com/products/plugin>

- Netscape Navigator 4.5 and later *or* Internet Explorer 5.0 and later

**Note:** After Library Admin is installed, the Web-based GUI with the Java plug-in is intuitive, easy to use, and requires minimal training.

## ■ Installation Instructions

**Note:** When the operator panel displays “Web Enabled,” the Personality Module is installed and Library Admin is enabled.

To install the L-Series Library Admin:

1. Make sure the library is powered-on and initialized.
2. Make sure the library network configurations have been completed. See “[Network Entries](#)” on page 2-31 for more information.

Referring to [Figure C-1 on page C-4](#):

3. Make sure the Ethernet (**Enet**) cable is connected.
4. Connect the Personality Module to the DB9 connector.

**Note:** The Library Admin software is *disabled* if the Personality Module is not installed.

5. Reset the library (cycle power or open and close the front door).
6. Start the L-Series Library Admin by accessing Netscape or Internet Explorer and entering your library name or IP address at the Address Bar.

See [Figure C-1 on page C-4](#) for an example of the Library Admin for the L180 and L700 Tape Libraries.

[Table C-1](#) outlines the functionality of the Library Admin:

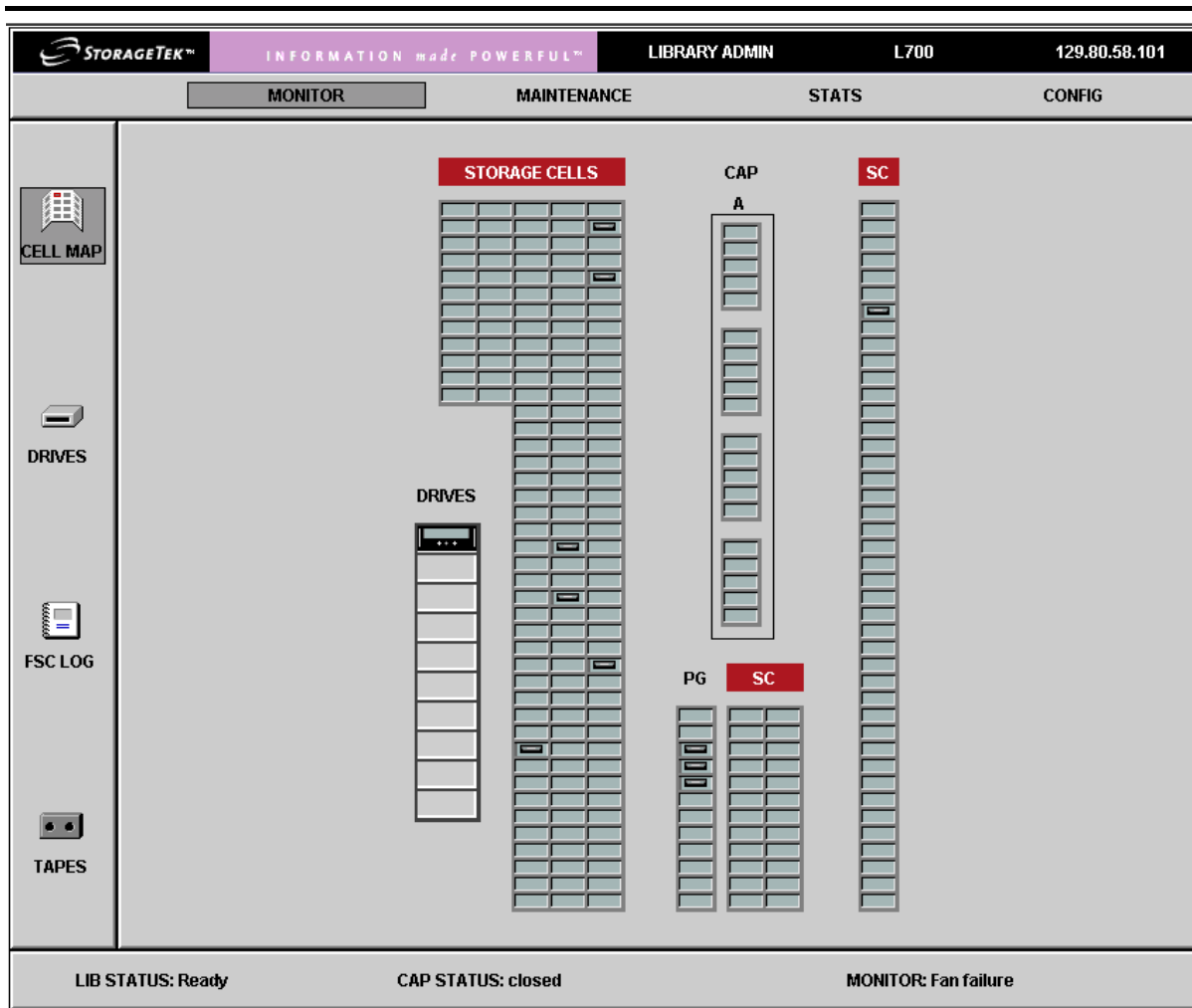
**Table C-1. Library Admin Functions**

Select Tab...	For Information About...
Monitor	<ul style="list-style-type: none"> <li>• Cell map</li> <li>• Drive status</li> <li>• FSC log</li> <li>• Tape inventory</li> </ul>
Maintenance	<ul style="list-style-type: none"> <li>• Diagnosing a problem</li> <li>• Performing a code load</li> <li>• Generating reports</li> <li>• Rebooting the library</li> </ul>
Statistics	<ul style="list-style-type: none"> <li>• Library</li> <li>• Drives</li> <li>• Cells</li> <li>• Cleaning cartridge</li> </ul>
Configuration	<ul style="list-style-type: none"> <li>• Library</li> <li>• Drives</li> <li>• Network</li> <li>• Cleaning count threshold</li> </ul>

[Figure C-1](#) shows an example of the initial Library Admin Monitor Screen that shows the cell maps for the library.

The top and the left navigation bars allow you to select various functions as described in [Table C-1 on page C-3](#).

Figure C-1. Library Admin Screen Example



## Library Statistics

Library statistics are divided into two major categories: counters and composite information. Both categories are explained in the following sections.

### Counters

Counters are composed of 8-bit, 16-bit, and 32-bit elements. Each type is explained below.

#### 8-bit Counters

8-bit counters have values from 0 to  $2^8$  minus 1 (or 255).

### ***Drive Statistics***

Drive statistics are composed of the following information, based upon the absolute element location of the drive:

1. PUT Retries: the number of times a PUT operation was retried for the specified location. Generally, two retries will be logged for one failed motion.
2. GET Retries: the number of times a GET operation was retried for the specified location. Generally, two retries will be logged for one failed motion.
3. Mount Count: the number of mount operations to a specified location

### ***Cell Statistics***

Cell statistics are composed of the following information, based upon the absolute element location of the cell:

1. PUT Retries: the number of times a PUT operation was retried for the specified location. Generally, two retries will be logged for one failed motion.
2. GET Retries: the number of times a GET operation was retried for the specified location. Generally, two retries will be logged for one failed motion.

## **16-Bit Counters**

16-bit counters have values from 0 to  $2^{16}$  minus 1 (or 65,535).

**Table C-2. 16-Bit Counters**

<b>Bin</b>	<b>Description</b>
IPL	Number of times the machine was booted. No distinction is made between powering-on or pressing the RESET button
Door Open	Number of times the left access door (L700/700e) or access door (L180) has been opened
GET Retries	Number of times a GET operation required a retry operation. A single move will have two retries before failing
GET Failures	Number of times a GET operation failed. For every failed GET operation, there will be two GET retries logged.
PUT Retries	Same as GET retries, but for PUT operations
PUT Failures	Same as GET failures, but for PUT operations
Label Retries	Same as GET retries, but for label reading operations
Label Failures	Same as GET failures, but for label reading operations

**Table C-2. 16-Bit Counters (Continued)**

<b>Bin</b>	<b>Description</b>
Target Retries	Same as GET retries, but for targeting operations
Target Failures	Same as GET retries, but for targeting operations

### 32-Bit Counters

32-bit counters have values from 0 to  $2^{32}$  minus 1 (or 4,294,967,295).

**Table C-3. 32-Bit Counters**

<b>Bin</b>	<b>Description</b>
Move Count	Number of successful sets of GET/PUT operations (a single move consists of one GET and one PUT operation)
Mount Count	Same as move count, except that the move here involves mounting/dismounting a tape to/from a drive
Uptime Second Count	Number of time (in seconds) that the machine has been running
Empty Read	Number of times an empty cell was detected
Target Read	Number of successful targeting operations
Label Read	Number of time a cartridge label was read
Label Read 1*	Number of times algorithm 1 read a label
Label Read 2*	Number of times algorithm 2 read a label
Label Read 3*	Number of times algorithm 3 read a label
Label Unread 1*	Number of times algorithm 1 could not read a label
Label Unread 2*	Number of times algorithm 2 could not read a label
Label Unread 3*	Number of times algorithm 3 could not read a label

\* Added for the purpose of tracking new vision algorithms supplied with firmware Versions 2.21.00 and later.

## Composite Information

Composite information contains statistics that keep track of *groups of data*, using units of time or some other discrete measurement. Composite information is supplied for Cartridge Access Port (CAP) usage, library-wide drive performance, and individual drive performance.

### Cartridge Access Port (CAP) Usage

CAP usage counters are 16-bit. The definitions are supplied below.

#### ***PUT Count***

The CAP PUT count is the number of times a PUT was executed to a CAP, with bins incrementing when a CAP is opened. This provides an indication of how a CAP is being used. For example, if five PUTs were executed to a CAP, the “5” bin (see bin list below) would increment by one. Counts in the 21+ bin would indicate that the CAP is being used for normal operations, not just export operations.

**Table C-4. CAP PUT Count**

<b>Bin</b>	<b>PUTs executed between CAP opens</b>
Idle	0
1	1
2	2
3	3
4	4
5	5
6–10	6–10
11–15	11–15
16–20	16–20
21+	21 or more

#### ***GET Counts***

The CAP GET count is the number of times a GET was executed from a CAP, with bins incrementing when a CAP is opened. This provides an indication of how a CAP is being used. For example, if 10 GETs were executed from a CAP, the “6–10” bin (see bin list below) would increment by one. Counts in the 21+ bin would indicate that the CAP is being used for normal operations, not just import operations.

CAP GET counts are listed in [Table C-5 on page C-8](#).

**Table C-5. CAP GET Count**

<b>Bin</b>	<b>GETs executed between CAP opens</b>
Idle	0
1	1
2	2
3	3
4	4
5	5
6–10	6–10
11–15	11–15
16–20	16–20
21+	21 or more

## Library–Wide Drive Performance

Job rate intervals are set to five and 15 minutes to best understand peak machine usage. These intervals were chosen because such data can generally be applied to thermal behavior of electromechanical components.

As examples, one customer may only require peak machine performance for a time less than five minutes. If so, some electromechanical components may not heat sufficiently to cause short- or long-term reliability issues. On the other hand, another customer may require peak performance for a full 15 minutes or longer. In this case, peak performance indicates that components will reach higher operating temperatures and, therefore, require more costly components.

**Note:** Drive mount times are included in this statistics; these times vary widely, depending on the drive type. As a result, these statistics cannot be used to determine if a library is meeting its published Exchanges Per Hour (EPH) specification.

Library-wide drive performance counters are 32-bit.

### ***Five Minute Job Rate***

This pool of statistics defines the hourly drive job rate the library was given during continuous five minute intervals. For example, if 13 mounts were executed during one five minute interval, the “151–175” usage bin (see below) would increment by one (13 mounts/5 minutes x 60 minutes/hour = 156 mounts per hour). If no mount activity takes place during a five minute interval, the “idle” bin will increment by one.

The five minute job rate statistics are listed in [Table C-6 on page C-9](#).



**Table C-6. Library-Wide Performance—Five Minute Job Rate**

<b>Bin</b>	<b>Number of mounts within a five minute interval</b>
Idle	0
1–25	1–2
26–50	3–4
51–75	5–6
76–100	7–8
101–125	9–10
126–150	11–12
151–175	13–14
176–200	15–16
201–225	17–18
226–250	19–20
251–300	21–25
301–350	26–29
351–400	30–33
401–450	34–37
451–500	38–41
501–550	42–45
551–600	46–50
611–650	51–54
651–700	55–58
701+	58+

***Fifteen Minute Job Rate***

This pool of statistics defines the hourly drive job rate the library was given during continuous fifteen minute intervals. For example, if 31 mounts were executed during one fifteen minute interval, the “101–125” usage bin (see below) would increment by one ( $31 \text{ mounts}/15 \text{ minutes} \times 60 \text{ minutes}/\text{hour} = 124 \text{ mounts per hour}$ ). If no mount activity takes place during a five minute interval, the “idle” bin will increment by one.

The fifteen minute job rate statistics are listed in [Table C-7 on page C-10](#).

**Table C-7. Fifteen Minute Job Rate**

<b>Bin</b>	<b>Number of mounts within a fifteen minute interval</b>
Idle	0
1–25	1
26–50	2–3
51–75	4–5
76–100	6
101–125	7–8
126–150	9–10
151–175	11
176–200	12–13
201–225	14–15
226–250	16
251–300	17–20
301–350	21–23
351–400	24–26
401–450	27–30
451–500	31–33
501–550	34–36
551–600	37–40
601–650	41–43
651–700	44–46
701+	47+

## Individual Drive Performance

Performance statistics for individual drives is the third component of composite information. The counters for these statistics are mixed; a listing and an explanation are provided in [Table C-8 on page C-11](#).

**Table C-8. Individual Drive Performance**

<b>General – No Data Transfer*</b>		
<b>Bin</b>	<b>Counter</b>	<b>Explanation</b>
Serial Number		Tracking is done by serial number rather than location. This allows for drive positional changes with no loss or inaccurate information.  In addition, two extra information slots are allocated above the maximum drive count to allow for temporary swapping of drives.
PUT Retries	8-bit	Number of times a PUT was retried on this drive
GET Retries	8-bit	Number of times a GET was retried on this drive
Mount Count	16-bit	Number of times a mount was executed on this drive
Idle Time	32-bit	How long (in seconds) the drive has not been able to transfer data across the host interface (for example, no cartridge loaded, loading, unloading); this is counting occurrences of time available for data transfer.
<b>Specific – Data Transfer Possible*</b>		
Minimum	16-bit	Cartridge spent less than 30 seconds in a drive (probably a 9840-style drive)
30 sec to 5 minutes	16-bit	Cartridge spent from 30 seconds to 5 minutes in a drive
5 minutes to 10 minutes	16-bit	Cartridge spent from 5 minutes to 10 minutes in a drive
10 minutes to 30 minutes	16-bit	Cartridge spent from 10 minutes to 30 minutes in a drive
30 minutes to 60 minutes	16-bit	Cartridge spent from 30 minutes to 60 minutes in a drive
More than 60 minutes	16-bit	Cartridge spent more than 60 minutes in a drive
* “General” refers to statistics that relate to non-data transfer drive activities; “Specific” excludes loading/unloading activities and counts only the time that data may be transferred to/from the drive.		

This page intentionally left blank.

# Glossary

---

A - B - C - D - E - F - G - H - I - J - K - L - M -  
N - O - P - Q - R - S - T - U - V - W - X - Y - Z

This glossary defines abbreviations and new or special terms in this publication.

Some of the definitions are taken from other glossaries. The letters in the parentheses that follow some definitions indicate the source of the definition:

**(A)** *The American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI).

**(E)** The ANSI/Electronic Industries Association (EIA) Standard-440-A, *Fiber Optic Terminology*.

**(I)** *The Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and International Electrotechnical Commission (ISO/IEC/JTC1/SC1).

**(IBM)** *The IBM Dictionary of Computing*, copyright 1994 by IBM.

**(T)** Draft international standards committee drafts, and working papers being developed by the ISO/IEC/JTC1/SC1.

## A

**acknowledgement (ack)** A message sent by the receiver of a communication, acknowledging its receipt.

**Advanced Interactive Executive (AIX)** IBM's implementation of the UNIX (trademark of AT&T Bell Laboratories) operating system. The RISC System/6000 system, among others, runs the AIX operating system. (IBM).

**American Power Conversion (APC)** The supplier for the L700 uninterruptible power source (UPS).

**audit** 1) 1) An operation to catalog or record the physical location of a cartridge tape in an automated library (2) A process by which a specified volume serial number location in the tape inventory is physically verified.

**Automated Cartridge System Library Software (ACSLs)** The software within a UNIX-based server that interfaces the server and hosts; it also maintains a list of all tapes within a library storage module.

**automatic mode** (1) A relationship between a library and all attached hosts. A library operating in automatic mode handles cartridges without operator intervention. This is the normal operating mode of a library that has been placed online to all host central processing units. (2) A relationship between a library and the client. In automated mode, the robot moves the cartridges among the storage cells, CAP, and drives in response to client commands. This is the normal operating mode of a library that is communicating with the client.

## B

**backward read compatible (BRC)** The ability of an SDLT 220 tape drive to read recorded data from an earlier version of DLT tape drive. *Contrast with* "NBRC" (below).

## C

**camera** A system that reads volume serial number labels on cartridges, instead of scanning the labels with a laser. A camera performs faster and more accurately than a laser scanner.

**CAP** *See* cartridge access port.

**cartridge** (1) A storage device that consists of magnetic tape on supply and take-up reels, in a protective housing. (IBM) (2) A container that holds magnetic tape on a supply reel and is inserted into a drive for read and write operations.

In the 9840/T9840, the cartridge has both the supply and take-up reels. In the T9940, the cartridge has only a single supply reel with the take-up mechanism residing in the drive.

**cartridge access port (CAP)** (1) In a StorageTek library, a mail slot through which an operator feeds tape cartridges into and retrieves tape cartridges from a library. (2) A device in the library that allows an operator to insert or remove cartridges during library operations. (3) A storage device that allows an operator to insert or remove cartridges during automated library operations.

**cartridge drive** The unit that houses the magnetic-tape transports and controllers that store and retrieve data for the host system in a cartridge subsystem.

**cartridge tape** A composite of the plastic housing and the magnetic tape.

**catalog** (1) The inventory of all cartridge tape storage locations in a library; this inventory is by library number, panel, row, column. (2) A stored list of backed up files and directories and the locations of the backup copies.

**CCITT** Consultative Committee for International Telephone and Telegraph.

**cell** (1) A slot in the library in which a cartridge is stored. (2) The location in which a cartridge is stored in a library. (3) A place in which a cartridge resides in a library. (4) The location in the library in which a cartridge is stored.

**command line interface (CLI)** For firmware 2.20 and lower—the SER1 port on

the MPC card. For firmware 3.00 or later, the CSE port on the MPC/MPCL card. For MPB firmware only, the CSE port on the Master library's door frame.

**configuration (config)** (1) The manner in which the hardware and software of an information processing system is organized and interconnected. (I) (2) The physical description of a library listing the panel types, cartridge capacity, type of host connection, and number of drives.

**customer services engineer (CSE)** A service representative who supports and services customer's products.

**CSE port** A port on the MPC card for loading 3.00 or later firmware.

## D

**daisy chain** (1) A method of device interconnection for determining interrupt priority by connecting the interrupt sources serially. (2) A device interconnection cable.

**diagnostic programs** Automated offline tests that a service representative uses to evaluate and troubleshoot equipment.

**diagnostic tests** *See* diagnostic programs.

**Direct Memory Access (DMA)** An operation in which the electronics bypass the microprocessor and directly access the memory.

**domain** (1) A shared user authorization database which contains users, groups, and their security policies. (2) A set of interconnected network elements and addresses that are administered together and that may communicate.

**Domain Name Service (DNS)** A service that translates domain names into IP addresses. Because domain names are alphabetic, they are easier to remember than IP addresses.

**drive** (1) A device for moving magnetic tape and controlling its movement. (IBM) (2) A device for moving tape and controlling its movement. (I) (3) A device that moves magnetic tape and includes the mechanisms for reading and writing data on the tape. (3) An electromechanical device that moves magnetic tape and includes the mechanisms for writing and reading data to and from the tape. *See also* tape drive.

**Dynamic Host Configuration Protocol**

**(DHCP)** (1) Server software that automatically sets the library IP address, subnet mask, and name. (2) Server software that automatically sets IP address, net mask, and gateway. (IBM)

**Dynamic Worldwide Name (dWWN)** A feature that applies dynamic names to network devices rather than fixed names. When a dWWN-named device is replaced, it is assigned the same WWN as the one it replaced, preventing re-configuration of the network.

## E

**electronically erasable programmable read-only memory (EEPROM)** A nonvolatile sequential access memory device that can be written onto when a change of contents is required.

**electrostatic discharge (ESD)** An undesirable discharge of an accumulated electrical charge (static) that can severely damage delicate components and degrade electrical circuitry.

**Enterprise Systems Connection**

**(ESCON)** (1) An IBM-patented set of products and services that provide a dynamically connected environment, over fiber-optic cable, within a mainframe or client server enterprise. (2) A set of IBM products and services that provide a dynamically-connected environment within an enterprise. (IBM).

**Ethernet** (1) A local area network (LAN) architecture developed by Xerox Corporation. The Ethernet specification served as the basis for the IEEE 802.3 standard, which is one of the most widely implemented LAN standards. (2) A 10 Mb/s baseband local area network that allows multiple stations to access the transmission medium at will without prior coordination, avoids contention by using carrier sense and deference, and resolves contention by using collision detection and transmission. Ethernet uses carrier sense multiple access with collision detection. (IBM) (3) A trademark for a local area network (LAN) protocol. (4) A type of networking technology for local area networks that uses coaxial cable to carry signals between computers at a rate of 10 Mb/s.

**Ethernet address** A six-byte address that makes a library accessible to a network. *See also* Ethernet, Internet Protocol (IP) address, library name, and subnet mask.

**event examination** A file, accessible through the operator panel, that contains events that occurred during the functional operation of the tape library.

## F

**Fabric** (1) The Fibre Channel topology similar to a telephone switch in that the initiator of a call to the receiving port simply provides the receiver with the port address, and the fabric routes the transmission to the correct port. A fabric differs from a point-to-point or arbitrated loop topology in that it provides for interconnections between ports without having a point-to-point connection. The fabric also serves as a media-type converter. (2) The hardware that connects workstations and servers to storage devices in a SAN. A fabric enables any-server-to-any-storage device connectivity using a Fibre Channel switch.

**Fabric login** The process by which a Fibre

Channel node establishes a logical connection to a fabric switch.

**fault symptom code (FSC)** A four-character hexadecimal code generated in response to an error to help isolate failures within the device.

**fiber** Any filament made of dielectric material that guides light, regardless of its ability to send signals.

**fiber-optic cable** (1) A jacketed cable of thin strands of glass that carries pulses of light that transmit data for high-speed transmissions over medium to long distances. The cable can be single mode, which carries a single signal from a laser or light-emitting diode light source, or multimode, which carries multiple signals from either light source. (2) A technology that uses glass (or plastic) threads (fibers) to transmit data. A fiber optic cable consists of a bundle of glass threads, each of which is capable of transmitting messages modulated onto light waves. Fiber-optic cables have several advantages over traditional metal cables, such as: greater bandwidth, less susceptible to interference, thinner and lighter than metal cables, and they can transmit data digitally rather than analogically. (3) A jacketed cable of thin strands of glass that carries pulses of light; these pulses transmit data for high-speed transmissions over medium to long distances. The cable can be single mode, which carries a single signal from a laser or light-emitting diode light source, or multimode, which carries multiple signals from either light source.

**Fibre Channel (FC)** (1) The National Committee for Information Technology Standards standard that defines an ultra high-speed, content-independent, multilevel data transmission interface that supports multiple protocols simultaneously. Fibre Channel supports connectivity to millions of devices over copper and/or fiber-optic physical media and provides the best characteristics of both networks and channels over diverse

topologies. (2) The standard from the National Committee for Information Technology Standards that defines an ultra high-speed, content-independent, multilevel data transmission interface that supports multiple protocols simultaneously. Fibre Channel supports connectivity to millions of devices over copper and/or fiber-optic physical media and provides the best characteristics of both networks and channels over diverse topologies.

**Fibre Channel Arbitrated Loop (FC\_AL)** (1) An arrangement of Fibre Channel stations such that messages pass from one to the next in a ring. (2) One of three Fibre Channel topologies where 2 to 126 devices interconnect serially in a single-loop circuit.

**Fibre Channel protocol** The mapping of SCSI-3 commands over a Fibre Channel interface.

**firmware** An ordered set of instructions and data stored in a way that is functionally independent of main storage; for example, microprograms stored in a ROM. (1) *See also* microcode. (2) *See* microcode.

**field replaceable unit (FRU)** An assembly that is replaced in its entirety when any one of its components fails. (IBM)

## G

**Gateway** A 32-bit, or 4-byte number, in dotted decimal format (typically written as four numbers separated by periods, such as 107.4.1.3 or 84.2.1.111) that is applied to an IP Address to identify router interface.

## H

**hand-camera assembly** (1) A part of the library robot whose function is grasping cartridge tapes and moving them between storage cells and tape drives. The camera reads cartridge volume serial numbers during library audits and normal operation. (2) A



part of the library robot whose function is grasping cartridges and moving them among the cartridge access port, the storage cells, and the drives. The camera reads the volume serial number labels during library audits.

**Hardware Support Services (HSS).** The remote diagnostic center at StorageTek. Hardware support services engineers (HSSEs) can access and test StorageTek equipment and software, through telecommunications lines, from certain remote customer installations. Previously referred to as the remote diagnostic center (RDC) or the Customer Support Remote Center (CSRC).

**HBA** *See* host bus adapter.

**host bus adapter (HBA)** (1) A circuit installed in a multi-platform host or device that interfaces between the device and the bus. (2) An I/O adapter that sits between the host and the interface that manages the transfer of information between the host and the device. To minimize the impact on host processor performance, the host bus adapter performs many low-level interface functions automatically or with minimal processor involvement.

**hub** A Fibre Channel Arbitrated Loop switching device that allows multiple servers and targets, such as storage systems, to connect at a central point. A single hub configuration appears as a single loop.

## I

**initial program load (IPL)** (1) A process that activates a machine reset and loads system programs to prepare a computer system for operation. Processors having diagnostic programs activate these programs at initial program load execution. Devices running firmware usually reload the functional firmware from a diskette or disk drive at initial program load execution. (2) The initialization procedure that causes an operating system to commence operation.

**initialization** (1) The startup and initial configuration of a device, system, piece of software, or network. (2) The operations required for setting a device to a starting state, before the use of a data medium, or before implementation of a process. (I)

**Internet Protocol (IP)** A stacked set of protocols, developed by the United States Department of Defense, to facilitate communication between dissimilar computers over networks.

**Internet Protocol (IP) address** (1) A four-byte value that identifies a device and makes it accessible through a network. The format of an IP address is a 32-bit numeric address written as four numbers separated by periods. Each number can be from zero to 255. For example, 129.80.145.23 could be an IP address. *See also* Ethernet address, library name, subnet mask.

(2) A four-byte value that identifies a library and makes it accessible through a network. IP addresses are logically divided into two parts: the network (similar to a telephone area code), and the system on the network (similar to a phone number). *See also* Ethernet address, library name, subnet mask.

**in-transit cartridges** Cartridges left in the robot hand. The Data Management Software must recover these cartridges to a known location to clear out the software in-transit record.

**in-transit record** A temporary record written by the host software, noting that a cartridge has been moved from its home cell. After this cartridge returns to its home cell, the record erases.

## K

**kernel** (1) A section of code that handles the multitasking within the library storage module (LSM). It is responsible for intertask communication and is the heart of the

operating system for the LSM. (2) The central module of an operating system. It is the part of the operating system that loads first, and it remains in main memory. (3) The essential part of UNIX or other operating systems, responsible for resource allocation, low-level hardware interfaces, and security (4) An essential subset of a programming language, in terms of which other constructs are (or could be) defined. Also known as a core language.

## L

**lb** An abbreviation for pound.

**library name** An assigned name that maps to the Internet Protocol (IP) address for a library. *See also* Ethernet address, Internet Protocol (IP) address, subnet mask.

**Linear Tape-Open (LTO)** (1) A technology developed jointly by HP, IBM, and Seagate for new tape storage options. LTO technology is an open format, which means that users have multiple sources of products and media. The open nature of LTO technology also provides a means of enabling compatibility between different vendors' offerings. (2) An open specification for tape storage devices.

## M

**magazine** (1) A container that holds cartridges in the cells provided and is inserted into the CAP. (2) A removable container that holds cartridges and is placed into the cartridge access port (CAP).

**machine activated routing switch (MARS)** An electronic switching mechanism built by Giltronix that either the Customer Service Remote Center or the machine can activate to select a port for communications.

**manual mode** (1) A relationship between a library and all attached hosts. Libraries operating in manual mode are placed offline

to and do not communicate with all host central processing units and require human assistance to perform cartridge operations. (2) A relationship between a library and the client. A library operating in manual mode does not communicate with the client and requires human assistance to perform cartridge operations. Manual mode occurs when the robot is unavailable to the client. (3) A library operating mode in which all clients are placed offline and requires human intervention to perform cartridge load and unload operations. (4) A relationship between a library and all attached clients. Tape libraries operating in manual mode have been placed offline to all client CPUs and require human assistance to perform cartridge operations.

**master (PTP)** The library that powers the pass-thru port.

**media format** Format of data written on tape (36-track, compressed, and so on).

**micro ( $\mu$ )** A prefix that means one one-millionth ( $10^{-6}$ ).

**microcode** (1) A code, representing the instruction of an instruction set, that is implemented in a part of storage that is not program-addressable. (IBM) (2) The lowest-level of instruction that directly controls a microprocessor. *See also* firmware.

**Mode Select command** The command used in Fibre Channel that specifies operational parameters and options for a logical unit. The Mode Select command shows the fields to be changed and the default values for these fields.

**Mode Sense command** The command used in Fibre Channel that returns the current operating modes and parameters of a device to the host. The Mode Sense command also returns the default parameters or information in which fields and bits can be changed using the Mode Select command.

**modulator/demodulator (modem)** An electronic device that converts computer digital data to analog data for transmission over a telecommunications line (telephone line). At the receiving end, the modem performs the reverse function.

**MPC card** (1) The central processing unit card for the tape library. (2) The main logic card in the library.

**MPCL card** Replaces the MPC card in new machines manufactured after 9/02. The MPCL card function is identical to the MPC except that it can be jumpered to operate on a native LVD/SE interface; there is no need to install the MPV and MPW cards for LVD operation.

**MPF card** The DC power supply card for the tape library.

**MPK card** An EEPROM-based module that holds upgraded library feature data. *See also* personality module.

**MPU card** The Fibre expansion card for the tape library.

**MPV card** Acts as the backplane on the CPCI assembly for either the fibre (MPU) interface card (both MPC and MPCL cards) or the LVD (MPW) interface card (MPC only).

**MPW card** The LVD/SE card (attached to the MPV card) that enables LVD/SE operation for an MPC card only.

**Multiple Virtual Storage (MVS)** IBM's Multiple Virtual Storage, consisting of MVS/System Product Version 1 and the MVS/370 Data Facility Product operating on a System/370 processor. (IBM)

## N

**negative acknowledgement (NACK)** Used by the recipient of a communication to tell

the sender that the data was not accurately received.

**network gateway** A four-byte notation that makes the library accessible to a large network, which consists of two or more subnets, through a gateway connection.

**network file system (NFS)** A distributed file system and its associated network protocol.

**non-backward read compatibility (NBRC)** The inability of an SDLT 220N tape drive to read recorded data from an earlier version of DLT tape drive. *Contrast with* "BRC" (above).

**non-maskable interrupt (NMI)** An interrupt which cannot be shut off by executing a disable interrupt instruction on the microprocessor. These interrupts are principally reserved for fatal conditions (for example, parity errors, watchdog timer faults).

**non-volatile random access memory (NVRAM)** A section of memory that will retain its information even when power is removed from the equipment.

## O

**offline** Not available for functional use by the host CPU.

**online** State of being controlled directly by or in direct communication with a computer. Available for functional use.

**open fiber control (OFC)** Open Fiber Control (OFC) cables incorporate a safety mechanism that prevents damage to the human eye when the connection (link) is disconnected.

**oz** An abbreviation for ounce. A unit of weight equal to 28.35 grams.

**P**

**pass-thru port (PTP)** an automatic mechanism that transfers cartridge tapes from one library to another.

**personality** Synonymous with the MPK card, which holds library upgrade feature data.

**personality module** (1) A small piece of hardware, which connects to the library through a DB9 connector. The hardware can contain a small amount of data. StorageTek uses this device to enable features on the library and/or to store “personality” information like the vendor name. (2) A connector key, which connects to the library through a DB9 connector. The personality module stores the library cell capacity information. A module or flash file that causes the operator panel to display a vendor’s identification.

**power distribution unit (PDU)** A device for the distribution of AC line power from one inlet to multiple outlets. Multiple PDUs, in a rack-mount cabinet or deskside storage system, provide higher availability because the power continues if one PDU (or its alternating current [AC] source if the PDUs use separate AC sources) loses power.

**PRX card** The interconnecting card between the MPC card and the Z motor/hand logic. Z motor power and tachometer lines connect to this card, along with signal lines to/from the hand.

**PRY card** The interconnecting card between the MPC card and the theta motor/hand logic. Theta motor power and tachometer lines connect to this card, along with signal lines to/from the hand.

**Q**

**quiesce** (1) Allowing all activity to complete before any new activity is allowed to start. (2) To bring a device or an application to a state

where all processing has been suspended and there are no tasks in progress.

**R**

**recoverable error** Error condition that can be automatically corrected (for example, by initiating a retry operation) and, when corrected, allows continual processing of a job, program, or hardware function.

**reinitialize the library** To cause the library to rerun its start-up diagnostic routine and audit. During the start-up diagnostic routine, the library calibrates its motors and vision. The audit loads into the MPC card the location and volume serial number of every cartridge in the library. To reinitialize the library, the operator may power it off and power it back on or open and close the main library door.

**remote center** *See* Hardware Support Services.

**request geometry** (1) A host software request for the physical configuration of a library storage module. (2) A client software request for the physical configuration of the tape library.

**RESET button** Pressing this button starts an initial program load (IPL) of the library.

**reserved cells** The cells in the library in which only cleaning cartridges, diagnostic cartridges, or “swapped” data cartridges may reside. Only one of these cells is a swap cell.

**RISC** Reduced Instruction Set Controller technology.

**RISC System/6000** An IBM processor that can be used as a server through a network.

**robot** (1) An electromechanical device that moves cartridge tapes between storage cells and tape drives. (2) An electromechanical device that moves cartridges among the cartridge access ports, the storage cells, and

the drives. (3) Electromechanical device for locating and moving cartridges.

## S

**SCSI-3** The set of SCSI commands used specifically for Fibre Channel. SCSI-3 comes in a Generic Packetized Protocol (SCSI-3 GPP) and Fibre Channel Protocol (SCSI-3 FCP), chosen by SCSI as its primary implementation of SCSI on Fibre Channel. SCSI-3 FCP allows queuing of commands from the initiator at the target, retains the half-duplex nature of the parallel SCSI-2, and permits a single operation, such as a READ command, to operator over a single port pair between an initiator and a target.

**SCSI bus** (1) The interface connecting peripheral devices to a host operating system. (2) Any parallel, multi-signal, I/O bus that implements some version of the SCSI standard. A wide SCSI bus may connect up to 16 initiators and targets. A narrow SCSI bus may connect up to 8 initiators and targets.

**SCSI commands** The SCSI-3 Fibre Channel Protocol (FCP) commands issued by either the initiator or target in an arbitrated loop topology to perform a specific SCSI task. A direct correspondence exists between the SCSI task and the Fibre Channel exchange. A Fibre Channel exchange can correspond directly to either a single SCSI command or a group of linked SCSI commands.

**SCSI device** A host adapter or control unit attached to the SCSI bus. *Synonymous with target.*

**SCSI ID** The bit-significant representation of an address on the SCSI bus.

**SER1** For pre-3.00 firmware, the port on the MPC card used for command line interface—running diagnostic tests, clearing of FSC log—through a laptop at 38,400 baud rate. Unused for post-3.00 firmware.

**servo** Device that uses closed-loop feedback to govern physical positioning.

### **small computer systems interface (SCSI)**

A type of data or control interface between the tape library/ tape drives and a server or client.

**service required LED** When on steadily, the library is inoperative; when blinking, a fan is defective.

**servo power interrupt (SPI)** A signal that removes voltage to a motor if overtravel is detected in the motor or a safety condition exists (for example, the main access door to the library storage module is open). When the sensor or switch is made, the drive current to the motor disables and an error posts. The SPI prevents a servo runaway condition for an out-of-range motor; it also prevents motors from starting up while the access door is open.

### **Simplified Network Management**

**Protocol (SNMP)** (A protocol for monitoring and managing systems and devices in a network.

### **small computer systems interface (SCSI)**

(1) A local interface operating over a wide range of transfer rates using a common command set for all devices attached to the interface. It connects host computer systems to a variety of peripheral devices. (2) An intelligent input and output bus that provides a standard interface/protocol between operating systems and peripheral devices. (3) A collection of ANSI standards and proposed standards which define I/O buses for connecting storage subsystems or devices to hosts using host bus adapters. *See also* SCSI-2, SCSI-3.

**SNMP** *See* Simple Network Management Protocol.

**standby (PTP)** The library attached to a master PTP library and under the control of the master PTP.

**stoplock** A servo stopped condition, holding the motor in a fixed position by electronically locking onto a tachometer line. Synonyms: Locked-on-a-Line, Detent.

**storage cells** (1) The slots where cartridge tapes are kept in the library. (2) A location where data cartridges are kept in the library. (3) The locations where cartridges are kept in the library.

**StorageTek Framework Library Monitor** An optional interface that monitors several SCSI-attached libraries.

**StorageTek L-Series Library Admin** An optional interface that simulates internet browser operation for the library.

**StorageTek Library Monitor** Provides sharing and common robotics control for SCSI-attached libraries and PTP operation.

**Subnet mask** A four-byte notation that resolves routing within a network. (*See* IP address, Ethernet address, and library name.)

**swap cell** The cell among the reserved cells into which the robot might temporarily place a cartridge.

## T

**tape drive** (1) A device for moving magnetic tape and controlling its movement. (IBM) (2) A device for moving tape and controlling its movement. (T) (3) A device that moves magnetic tape and includes the mechanisms for reading and writing data on the tape. (3) An electromechanical device that moves magnetic tape and includes mechanisms for writing and reading data to and from the tape. *See also* drive.

**tape transport interface (TTI)** An interface to control/monitor tape movement.

**target** (1) A SCSI device that performs an input/output operation requested by the initiator. (2) A marker on components in the

library storage module used by the robot for calibration during audits.

**terminator power (TERMPWR)** A SCSI bus signal for device termination networks.

**TERMPWR** *See* terminator power.

**theta motor** The motor responsible for the lateral movement of the hand mechanism in the tape library.

**thumbscrew** The large, cylindrical, rough-edged handle on the rear of a drive tray that, when a person turn it, lets the person secure the drive to the drive column.

**Transmission Control Protocol/Internet Protocol** (1) This is the basic set of communication protocols used on the Internet. (2) A set of communication protocols that supports peer-to-peer connectivity functions for both local and wide area networks. (IBM)

## U

**Ultra SCSI** An enhancement of SCSI that results in doubling the throughput speeds to 20 MB/s for 8-bit SCSI and 40 MB/s for 16-bit SCSI.

**Ultra2 SCSI** An enhancement of SCSI that results in doubling the throughput speeds to 40 MB/s for 8-bit SCSI and 80 MB/s for 16-bit SCSI. The SCSI specification only recognizes LVD Ultra2 SCSI at this speed with a maximum allowable cable length of 12 m (39 ft).

**Ultra3 SCSI** A form of SCSI capable of transfers up to 160 MB/s. There is no single ended or high voltage differential Ultra3 SCSI specification. Specifications only define wide, 16-bit, SCSI buses.

**Ultrium** The single hub implementation of the LTO specification for tape storage devices.

**uninterruptible power supply** (1) A

power supply that includes a battery to maintain power in the event of a power outage. (2) A buffer between utility power and the load that maintains, uninterrupted or sustained, power during outages.

**unrecoverable error** Error condition that cannot be automatically corrected and which requires external intervention for possible correction. It causes termination of a job, program, or hardware function.

## V

**vectored interrupt (VI)** An interrupt which directly generates an ID of the cause of the interrupt and places it on the bidirectional bus for the microprocessor to read.

**VOLID** Volume identification. *See* volume serial number.

**volume** A data carrier that mounts and dismounts as a unit; for example, a reel of magnetic tape or a disk pack.

**volume serial number (VOLSER)** (1) An alphanumeric label that the host software uses to identify a volume. It attaches to the spine of a cartridge and is both human- and machine-readable. (2) A number in a volume label assigned when a volume is prepared for use in a system. (IBM) (3) A six-character alphanumeric label used to identify a volume.

**VOLSER** *See* volume serial number.

## W

**warning count** A user-determined limit that indicates the number of times a cleaning cartridge will be used before it must be exported from the library.

**watchdog timer** A timer which must be refreshed before it expires. If not refreshed, an NMI is generated, indicating that the functional firmware has failed to execute properly.

**write-protect (WP)** (1) To restrict the writing onto a data set, file, or storage area of a user or program not authorized to do so. (2) To set the switch on a cartridge tape to prevent data from being written on the tape. Reading data is still possible. (3) To set the switch on a cartridge to prevent data from being written on the tape. *See also* file-protect.

## Z

**Z carriage** (1) The assembly that moves the hand vertically up and down the Z-column to the storage cells, the drives, and the cartridge access port in a library storage module or library. (2) The portion of the robot on which the hand rests.

**Z column** The column which allows the hand mechanism in the tape library to move vertically.

**Z motor** (1) The mechanism that moves the hand assembly vertically in a library storage module or library. (2) The motor responsible for the vertical movement of the hand assembly in the library.

This page intentionally left blank.



# Index

---

## Numerics

- 16-bit counters, library statistics, C-5
- 32-bit counters, library statistics, C-6
- 3580. *See* IBM Ultrium
- 8-bit counters, library statistics, C-4, C-5
- 9840/9840B. *See* T9840
- 9940. *See* T9940

## A

- access control, SNMP, B-4
- ACSLs
  - addressing rules, 2-23
  - ESCON operation requirement, 1-15
  - version requirement
    - ESCON operation, 2-23, A-7
    - PTP operation, 2-23, A-7, A-18
    - standalone operation, 2-23
- APC
  - described, A-2
  - runtimes, A-2
  - troubleshooting, 3-4
- arm safety, xxvii
- arrays
  - capacity variations, 2-17-, 2-18
  - illustrated, A-33-, A-40
- asterisk, on operator panel, 2-45
- audit
  - conditions, 2-3
  - definition, 2-3
  - reserved cells, 2-3
- Auto Clean
  - cleaning cartridge
    - expiration, 2-45
    - requirements, 2-40
    - warning count, 2-43
  - described, 2-40, 2-43
  - enabling, 2-40
  - warning count, 2-44
- Automated Cartridge System Library Software.  
*See* ACSLS

## B

- baud rate
  - CLI (CSE) port, 2-12
  - CSE port, 4-1, A-26
  - SER1 port, 4-1, A-32

## C

- cables
  - (OFC) open fiber control, A-12
  - drive column types, A-4, A-5
  - fiber, A-12
  - overall diagram, A-24, A-25
  - power requirements, A-1
  - PTP, 3-9, A-18, A-26
  - RJ45-to-DB9 adapter, 2-9, 4-1
  - SCSI length restrictions, 1-5, A-8
  - Z flex, 5-131
- CAP
  - elements, A-33-, A-40
  - magazine
    - numbering, 2-49, A-28
    - retention cover, 2-42, 2-53
  - motor removal & replacement, 5-4
  - operation, A-28
  - optional, 1-8
- CAP usage, library statistics, C-7
- capacity variations
  - described, 2-16
  - illustrated, 2-17-, 2-18
- cartridge
  - cleaning
    - asterisk on operator panel, 2-46
    - auto features, 2-40
    - expiration, 2-45
    - exporting cartridge, 2-52
    - importing cartridge, 2-42, 2-53
    - location, 2-5
    - requirements, 2-40
  - diagnostic
    - function, 2-54
    - locations, 2-5
- cartridge access port. *See* CAP

- caution
  - equipment damage, 2-10, 2-12
  - rack limitations, xxix
  - safety precautions, xxv
  - SCSI types on same bus, A-10
  - system degradation, 2-21
- cells
  - cleaning cartridge, 2-4
  - diagnostic cartridge, 2-4
  - drop-off, 2-4
  - in-transit, 2-4
  - reserved, 2-4
  - See also* elements
- clean
  - Auto clean feature
    - enabling/disabling, 2-41
  - drive diagnostic, 2-58
- cleaning cartridges
  - asterisk on operator panel, 2-46
  - expiration, 2-45
  - warning count, 2-44
- cleaning. *See* Auto Clean *and* cartridge, cleaning
- clearances, service, 1-20
- CLI (CSE) port
  - baud rate, 2-12
  - firmware loading, 2-11
  - SNMP commands, B-6
- Client Server Component (CSC), ESCON
  - requirement, 1-15
- columns (drive)
  - single power cable, A-4, A-24
  - two power cables, A-4, A-25
- command line interface. *See* CLI (CSE) port
- configuration
  - Auto Clean, 2-40
  - cleaning cartridge warning count, 2-43
  - conditions requiring new, 2-15
  - date, setting, 2-27
  - DNS entries, 2-35, 2-39
  - drive column power cables, A-5
  - drives
    - LTO Fibre Channel, 2-30
    - SCSI, 2-28
  - Ethernet address, 2-31
  - fast load option, 2-26
  - Fibre Channel port address, 2-24
  - IP address, 2-32
  - library Fibre Channel, 2-24
  - library name, 2-32
  - library SCSI ID, 2-23
  - library worldwide ID, 2-26
  - network gateway address, 2-33
  - Port 0 worldwide ID, 2-25
  - PTP, 2-21
  - screen characteristics, 2-39
  - SNMP, B-6
  - StorageTek L-Series Library Admin, 2-45
  - subnet mask address, 2-34
  - tables, 2-21
  - time, 2-27
  - viewing, 2-45
  - warning count, cleaning cartridge, 2-44
  - Web password, 2-28
- conventions in manual, xx
- conversion bills
  - rack cooling, 1-8
  - rack cooling option, 1-7
  - redundant AC power option, 1-7, 1-8
- cooling
  - conversion bill, 1-7
  - drive bay fans
    - described, A-6
    - removal & replacement, 5-11
  - electronics module fans
    - described, A-6
    - removal & replacement, 5-9
  - rack area conversion bill, 1-7
- CSC. *See* Client Server Component
- CSE
  - diagnostic tests, 2-54
  - interface, A-31
  - modem port, 4-4
  - SER1 interface, A-31
- CSE port
  - baud rate, 4-1, A-26
  - cable requirements, 2-9
  - communication set-up, 4-1
  - MPB firmware port, 2-6
  - MPC/MPCL connector, A-26
  - MPC/MPCL firmware port, 3-9
  - updating firmware, 4-1
- Customer Resource Center (CRC), xxiii
- customer services engineer. *See* CSE

**D**

demo mode test, 2-58

diagnostic tests

- clean drive, 2-58
- demo mode, 2-58
- described, 2-54
- dismount drive, 2-58
- mount drive, 2-58
- PTP, 2-56

diagnostics. *See* diagnostic tests

diagram

- MPC/MPCL card, A-26
- overall operation, A-24, A-25
- wall elements, A-33-, A-40

dismount drive test, 2-58

DLT

- clean drive diagnostic, 2-58
- dismount drive test, 2-58
- drive combinations, 1-3
- feature numbers, 1-13
- load handle cycling, 2-4
- mount drive test, 2-58
- swap procedure, 3-15
- terminating power jumper, 5-73
- troubleshooting TIP, 3-15

Documents on CD, xxiv

domain name service (DNS)

- configuration, 2-35, 2-39

door, interlock, xxxii

DOS

- adapter cable for PC, 2-9, 4-1
- firmware transfer method, 2-10

drives

- configuration screen,
  - explained, 2-29, 2-31
- hot swap (ANSI spec.), A-20
- information on operator panel, 2-49
- LTO Fibre Channel addressing, 2-30
- numbering, internal, 2-29
- power cable configurations, A-3
- swap procedure, 3-15

drives. *See also* specific type (for example DLT,T9840)

drop-off cell

- described, 2-4
- illustrated, 2-5

dWWN. *See* dynamic Worldwide Name

dynamic Worldwide Name

- explained/enabling, 2-36
- Fibre Channel, 2-36

dynamic worldwide name

- library-to-drives interface, A-29

**E**

elbow safety, xxvi

elements

- CAP, A-33-, A-40
- illustrated, A-33-, A-40

emergency firmware loading

- instructions, 2-13

environmental, specifications, 1-25

e-Partners Web site, xxiv

ESCON

- ACSLs requirement, 1-15
- client server requirement, 1-15
- library firmware requirement, 1-14
- software requirements, 1-15

ESD

- grounding kit, contents, xxx
- precautions and practices, xxx
- procedures to follow when servicing, xxx

Ethernet

- address, viewing the, 2-31
- connector, A-27
- SNMP operation, B-1

expansion frame

- element numbers, A-33
- feature number, 1-8

expiration, cleaning cartridges, 2-45

export destination statement, -ii

**F**

fans

- drive bay
  - described, A-6
  - removal & replacement, 5-11
- electronics module
  - described, A-6
  - removal & replacement, 5-9

fast load, option, 2-26

fault symptom code. *See* FSC

features

- drives, 1-14

- library, 1-8
  - optional, 1-8
  - standard, 1-6
- fiber
  - library feature number, 1-8
  - See also* fiber-optic cables, Fibre Channel
  - T9X40 feature number, 1-14
- fiber-optic cables
  - (OFC) open fiber control, A-12
  - connector type, A-12
  - connectors, xxviii
  - handling, xxviii
  - installation, xxvii
  - MPU connection, 5-41, 5-49, 5-54
  - specifications, A-12
- Fibre Channel
  - dynamic Worldwide Name, 2-36
  - Gen2 Ultrium drive
    - described, 1-15
  - IBM Ultrium drive, 5-81
  - library address, 2-24
  - library theory of operation, A-30
  - LTO drive addressing, 2-30
  - MPU card, 5-40
  - MPV card, 5-44
  - port address, 2-24
  - T9840 address, 2-28
  - T9940 address, 2-28
  - worldwide IDs (library), 2-25
- firmware
  - Auto Clean, 2-40
  - cleaning cartridge warning count, 2-43
  - configuration, 2-15
  - description, 2-1
  - DOS transfer, 2-10
  - emergency loading instructions, 2-13
  - ESCON requirement, 1-14
  - hyperterminal transfer, 2-11
  - MPB download, 2-7
  - MPC/MPCL download, 2-7
  - required for Gen2 Ultrium Fibre Channel
    - operation, 1-14
  - required for Gen2 Ultrium SCSI
    - operation, 1-14
- FSC
  - dictionary, 2-11, 2-13
  - purging log, A-31, A-32

## G

- Gen2
  - Fibre Channel drives described, 1-15
  - SCSI drives described, 1-15
- Gen2 Ultrium
  - drive/tape specifics, 1-15
  - feature codes, 1-13
- get-put loop, described, 2-54
- Global Services Support Tools, xxiv
- grace period, SNMP, B-4, B-7
- grounding
  - for safety, xxv
  - kit, xxx
  - procedures, xxxi

## H

- hand safety, xxvi
- hand-camera assembly
  - logic cards, A-22
  - operation, A-17
  - removal & replacement, 5-14
  - testing, 2-2
- hardcopy publications, xxiv
- Hewlett Packard. *See* HP
- host bus adapter (HBA)
  - address ranges, 2-23
  - Unix-based workstation, 1-2
- hot swap
  - ANSI specification, A-20
  - DLT procedure, 3-15
- HP Gen1 Ultrium
  - feature number, 1-13
- HP Gen2 Ultrium
  - feature number, 1-13
- HP Ultrium
  - clean drive diagnostic, 2-58
  - dismount drive routine, 2-58
  - drive combinations, 1-3
  - Gen2 drives, 1-15
  - Gen2 feature code, 1-13
  - LVD-to-HVD logic card (Paralan)
    - discussed, A-20
  - mount drive test, 2-58
  - swap procedure, 3-15
  - troubleshooting TIP, 3-15

## HVD

- cable length restrictions, 1-5, A-8
- drive feature numbers, 1-13
- drive requirements, A-9
- to-LVD, library conversion, A-28
- hyperterminal
  - firmware transfer, 2-11
  - protocol setup, 2-12

## I

- IBM Gen2 Ultrium feature number, 1-13
- IBM Ultrium
  - clean drive diagnostic, 2-58
  - dismount drive test, 2-58
  - drive combinations, 1-3
  - Gen1 Fibre Channel feature number, 1-13
  - Gen2 Fibre Channel
    - described, 1-15
    - feature number, 1-13
  - LVD-to-HVD logic card (Rancho)
    - discussed, A-20
  - microswitch settings for library
    - operation, 5-85
  - mount drive test, 2-58
  - removal & replacement, 5-81
  - swap procedure, 3-15
  - terminator
    - Fibre Channel, 5-84
    - SCSI, 5-85
  - troubleshooting TIP, 3-15
- individual drive statistics, C-10, C-11
- initial program load. See IPL
- initialization
  - general, 2-1
  - robotic mechanisms, 2-1
- installation, fiber-optic cables, xxvii
- interface
  - CAP, A-28
  - CSE port, A-26
  - Horizon L-Series Library Monitor, A-12
  - library-to-client, A-28
  - library-to-CSE port, A-31
  - library-to-drives, A-29
  - library-to-operator panel, A-31
  - library-to-personality key (MPK), A-30
  - library-to-PTP, A-32
  - MPC/MPCL card, A-27
  - operator panel, A-31

- SER1 port, A-32
  - troubleshooting, 3-12
- interlock, door (described), xxxii
- IP address, setting the, 2-32
- IPL, sequence, 2-1

## J

- Java Plug-in
  - Library Admin, C-1
- jumper
  - DLT terminating power, 5-73
  - IBM Ultrium drive, 5-85
  - library
    - operation type, A-29
    - terminating power, A-29

## K

- kit, grounding, xxx

## L

- L700/700e. See library
- L700-PTP. *See* PTP
- labels
  - Gen2 media ID, 1-15
- laser product label, xxvii
- library
  - ACSLS version requirements, A-7
  - Auto Clean, 2-40
  - capacity
    - described, 2-16
    - illustrated, 2-17-, 2-18
  - cleaning cartridge warning count, 2-43
  - described, 1-16
  - Ethernet
    - address, 2-31
    - connector, A-27
  - features, 1-8
    - drive, 1-13
    - optional, 1-8
    - standard, 1-6
  - Fibre Channel address, 2-24
  - IP address, 2-32
  - LVD HBA requirement, 1-2
  - model numbers, 1-5

- models, 1-5
- name, 2-32
- network gateway address, 2-33
- overview, 1-1
- Port 0 address, 2-24
- Web password, 2-28
- Library Admin. *See* StorageTek L-Series
  - Library Admin
- library statistics
  - 16-bit counters, C-5
  - 32-bit counters, C-6
  - 8-bit counters, C-4, C-5
  - CAP usage, C-7
  - individual drive statistics, C-10, C-11
  - library-wide drive statistics, C-8
- library-wide drive statistics, C-8
- lifting
  - procedures, xxvi
  - safety, xxv
- limits, SCSI cable length, A-8
- linear tape-open (LTO). *See* specific drive type (IBM, HP, Seagate)
- logic cards
  - general description, A-22
  - MPB
    - firmware download option, 2-8
    - location, A-18
    - power connection, 3-9, A-26
    - removal & replacement, 5-23
    - serial communication
      - connection, A-26
  - MPC/MPCL, 1-1
    - card layout, A-26
    - firmware download option, 2-8
    - functional diagram, A-24, A-25
    - removal & replacement, 5-27
  - MPF (DC power supply)
    - described, A-1
    - removal & replacement, 5-64
  - MPM
    - described, A-29
    - removal & replacement, 5-32
  - MPU (fiber interface)
    - described, A-30
    - removal & replacement, 5-40
  - MPV
    - removal & replacement, 5-39, 5-52
    - with fiber interface (MPU),
      - described, A-30
      - with LVD (MPW) interface for MPC cards only, described, A-30
- MPW (LVD interface for MPC cards only)
  - described, A-30
  - removal & replacement, 5-52
- PRX
  - connectors, 5-126
  - described, A-16
- PRY
  - connectors, 5-117
  - described, A-16
- Low Voltage Differential. *See* LVD
- LTO (linear tape-open). *See* specific drive type (IBM, HP, Seagate)
- LVD
  - (MPC cards only)
    - library operation through MPW and MPV cards, A-30
  - (MPCL cards only)
    - library operation, 1-9, A-30
    - cable length restrictions, 1-5, A-8
    - cable/terminator requirements
      - host/drive, A-10
      - library, A-30
    - drive requirements, A-9
      - converter cards, A-20
    - library (MPW card) feature number, 1-9
    - library (w/MPCL card) feature number, 1-9
    - library operation feature for MPC card, 1-9
    - library operation feature for MPCL card, 1-9
    - required HBA for library operation, 1-2

## M

- magazine, retention cover, 2-42, 2-53
- Management Information Base. *See* MIB
- matrix switch, 1-8
- media
  - Gen2 ID labels, 1-15
- MIB
  - described, B-4
  - hierarchy, illustrated, B-5
- microcode. *See* firmware
- mini-boot, instructions, 2-13
- mode, demo, 2-58

- model number
    - DLT drive, 1-13
    - library, 1-5
    - optional features, 1-8
    - SDLT drive, 1-13
    - T9X40 drive, 1-13
    - Ultrium drive, 1-13
  - modem
    - configuration, 4-3
    - installation, 4-2
    - switch settings, 4-2
    - testing, 4-3
  - mount drive test, 2-58
  - mount-dismount test, described, 2-55
  - MPB card
    - firmware download, 2-7
    - firmware download port, 2-6
    - function & location, A-22
    - removal & replacement, 5-23
  - MPC/MPCL card
    - connectors, A-26
    - described, 1-1
    - emergency firmware loading
      - instructions, 2-13
    - firmware download, 2-7
    - PTP connections, A-26
    - removal & replacement, 5-27
    - servo power interrupt (SPI), A-6
  - MPCL card w/LVD, library feature number, 1-9
  - MPF card (DC power supply)
    - removal & replacement, 5-64
    - voltage outputs, A-6
  - MPM card
    - described, A-30
    - removal & replacement, 5-32
  - MPU card (fiber interface)
    - described, A-30
    - removal & replacement, 5-40
  - MPV card
    - described, A-30
    - removal & replacement, 5-39, 5-52
  - MPW (LVD for MPC cards only) card
    - connector, A-27
    - described, A-22
  - MPW (LVD) card, library feature number, 1-9
  - Multiple Virtual System, ESCON
    - requirement, 1-15
  - MVS. *See* Multiple Virtual System
- ## N
- network
    - configuration, 2-31
    - DNS configuration, 2-35, 2-39
    - dynamic Worldwide Name, 2-36
    - gateway address, 2-33
- ## O
- OFC. *See* fiber, cables, and Glossary
  - operation
    - ESCON feature, 1-15
  - operations, monitoring status
    - information, 2-46
  - operator panel
    - asterisk, 2-46
    - buttons illustrated, 2-20
    - navigation, 2-19
    - removal & replacement, 5-56
    - troubleshooting, 3-11
- ## P
- Paralan card, LVD-to-HVD location for HP
    - Ultrium, A-20
  - park command, Seagate Ultrium drives, 5-101
  - part number
    - CSE diagnostic cable, 2-9
    - RJ45 cable, 2-9
    - RJ45-to-DB9 adapter, 2-9
  - pass-thru port. *See* PTP
  - password
    - reset for StorageTek L-Series Library
      - Admin, 2-28
      - Web, 2-28
  - PDU
    - power specifications, 1-22
    - removal & replacement, 5-59
    - troubleshooting, 3-2
  - personality, viewing, 2-50
  - port address (Fibre Channel), 2-24
  - power
    - DC supply
      - removal & replacement, 5-64

- specifications, A-1
    - troubleshooting, 3-7
  - DLT supply, 5-76
  - drive column configurations, A-3
  - measuring line voltage, 3-3
  - PDU
    - removal & replacement, 5-59
    - specifications, 1-22
    - troubleshooting, 3-2
  - redundant AC power option, 1-7, 1-8
  - power distribution unit. See PDU
  - precautions
    - ESD, xxx
    - handling fiber-optic cables, xxviii
  - preventing ESD, xxx
  - proprietary information statement, -ii
  - PRX card
    - described, A-16
    - removing connectors, 5-126
  - PRY card
    - described, A-16
    - removing connectors, 5-117
  - PTP
    - cable connection, 5-138
    - components, A-18
    - configuration, 2-21
    - library interface, A-32
    - MPC/MPCL card connections, A-26
    - operation, A-19
    - removal & replacement, 5-137
    - software requirements, A-18
    - terms associated with, A-19
- R**
- rack area, cooling option conversion bill, 1-7
  - rack-mounting, safety, xxix
  - Rancho card, LVD-to-HVD location for IBM Ultrium, A-20
  - redundant AC power option, conversion bill, 1-7, 1-8
  - requirements
    - basic tools, 1-26
    - ladder for PTP, 5-137
  - reserved cells
    - audit, 2-3
    - illustrated, 2-5
  - reset
    - operator panel button, 2-20
    - password, StorageTek L-Series Library Admin, 2-28
    - Web password, 2-28
  - restrictions, SCSI
    - cable length, 1-5, A-8
    - connector type, 1-5, A-8
  - RISC System/6000, address ranges, 2-23
  - robot
    - described, A-14
    - illustrated, A-15
- S**
- safety
    - arm, xxvi
    - fiber optics, xxvi
    - grounding, xxv
    - laser product label, xxvii
    - lifting, xxv
    - rack-mounting, xxix
  - SCSI
    - cable length restrictions, 1-5, A-8
    - DLT Y cable, 5-112
    - Gen2 Ultrium drives described, 1-15
    - library operation, A-8
    - operation jumpers, A-29
    - setting drive IDs, 2-28
    - terminator types/part numbers, A-10
  - SDLT, removal & replacement, 5-106
  - Seagate Ultrium
    - clean drive diagnostic, 2-58
    - dismount drive routine, 2-58
    - drive combinations, 1-3
    - feature numbers, 1-13
    - mount drive test, 2-58
    - park command, 5-101
    - swap procedure, 3-15
    - troubleshooting TIP, 3-15
  - SER1 port
    - baud rate, 4-1, A-32
    - connector, 3-9, A-26, A-27
    - connector type, A-32
    - function, A-31
  - server, ESCON operation, 1-15
  - service required LED, defined, 2-20
  - service, clearances, 1-20
  - servo power interrupt. *See* SPI



- shoulder safety, xxvi
  - simplified network management protocol. *See* SNMP
  - single-ended, cable length restrictions, 1-5
  - SNMP, B-6
    - access control, B-4
    - commands, B-3
      - CLI (CSE) port, B-6
      - manager/agent, B-3
    - configuration (through CLI port), B-6
    - configuration (with Library Admin), B-6
    - configuration (with software application), B-6
    - for DNS entries, 2-35, 2-39
    - grace period, B-4, B-7
    - illustrated, B-2
  - software
    - ACSLs
      - PTP operation, A-7
      - versions, A-7
    - ESCON requirements, 1-15
    - fast load option, 2-26
    - server, A-7
    - SNMP operation, B-1
    - StorageTek Library Manager, for PTP operation, A-18
  - SPARC
    - address ranges, 2-23
    - version requirements
      - PTP operation, 2-23
      - standard operation, 2-23
      - T9840B ESCON operation, 2-23
  - specifications
    - library
      - environmental, 1-25
      - PDU voltage, A-1
    - SCSI
      - cable length, 1-5, A-8
      - connector type, 1-5, A-8
  - SPI
    - access door generated, A-6
    - door interlock generated, xxxii
    - MPC/MPCL card generated, xxxii, A-6
  - statistics, StorageTek L-Series Library Admin, C-4
  - StorageTek
    - Customer Resource Center (CRC), xxiii
    - Documents on CD, xxiv
    - e-Partners Web site, xxiv
    - ESCON operation, 1-15
    - Global Services Support Tools, xxiv
    - hardcopy publications, xxiv
    - L-Series Library Admin, C-1
    - model/feature codes, 1-14
    - Web site, xxiii
  - StorageTek Framework Library Monitor
    - comparison, 1-12
    - described, 1-11
    - See also* StorageTek Library Manager, StorageTek L-Series Library Admin
  - StorageTek Library Manager
    - comparison, 1-12
    - described, 1-11
    - PTP operation, A-18
    - See also* StorageTek L-Series Library Admin, StorageTek Framework Library Monitor
  - StorageTek L-Series Library Admin
    - and MPC/MPCL replacement, 5-31
    - and personality module comparison, 1-12
    - configuration, 2-28, 2-45
    - described, 1-10
    - functionality, C-3
    - installation, C-2
    - microcode level, C-1
    - model number, 1-10
    - overview, C-1
    - personality Module, C-1
    - requirements, C-1
    - screen example, C-3
    - See also* StorageTek Library Manager, StorageTek Framework Library Monitor
    - statistics, C-4
    - viewing configuration, 2-50
    - Web password, 2-28
  - subnet mask, 2-34
  - Sun. *See* SPARC
  - Super DLT. *See* SDLT
- ## T
- T9840
    - clean drive diagnostic, 2-58
    - dismount drive test, 2-58
    - drive combinations, 1-3

- feature number, 1-13
- Fibre Channel address, 2-28
- mount drive test, 2-58
- VOLID reporting, A-20

T9940

- clean drive diagnostic, 2-58
- dismount drive test, 2-58
- drive combinations, 1-3
- feature number, 1-13
- Fibre Channel address, 2-28
- mount drive test, 2-58
- VOLID reporting, A-20

terminating power, MPC/MPCL

- location, A-27, A-28, A-29

terminator

- MPW (LVD) card, 5-53
- SCSI type/part numbers, A-10
- Ultrium Fibre Channel drive, 5-84

theta motor

- calibration, 2-2
- illustrated, A-15
- removal & replacement, 5-116

tools

- library installation, 1-26
- PTP installation, 5-137

troubleshooting

- AC PDU, 3-2
- APC redundant power, 3-4
- DC power, 3-7
- operator panel, 3-11
- SCSI interface, 3-12
- tape drives, 3-15

**U**

Ultrium

- drives *See* specific drive type (IBM, HP, Seagate)
- feature numbers, 1-13
- Gen2 SCSI drives, 1-15

uninterruptible power source (UPS). *See* APC

Unix-based workstation

- host bus adapter, 1-2
- RISC System/6000, 2-23
- SPARC, 2-23

**V**

vendor identification *See* personality

vision system

- calibration, 2-2
- drive targeting, 2-3
- operation, 2-2

VOLID, reporting for StorageTek drives, A-20

voltage

- MPF (DC power supply), A-1-, A-6
- power system, A-1
- specifications, 1-22

**W**

wall panel elements

- CAP, A-33-, A-40
- map, A-33-, A-40

warning count, cleaning cartridges, 2-44

warnings

- DLT power supply, 5-76
- eye hazard from laser, xxvi
- measuring line voltage, 3-3
- MPF (DC power supply), 5-64
- PDU breaker, 5-59
- rack equipment in library, xxix

Web

- interface *See* StorageTek L-Series Library Admin, StorageTek Library Admin, StorageTek Framework Library Monitor
- password, 2-28

worldwide ID

- library, 2-25
- Port 0, 2-25

worldwide name. *See* dynamic Worldwide Name

wrist safety, xxvi

**Z**

Z flex cable, removal & replacement, 5-131

Z motor

- calibration, 2-2
- illustrated, A-15
- removal & replacement, 5-124

z-modem, firmware download, 2-12

# Reader's Comment Form

---

## Contact Us

Submit your questions, comments, and suggestions to StorageTek's Global Learning Solutions. We appreciate your correspondence and are committed to responding to you.

## Publication Information

Publication Name: **L700/700e Tape Library and L700-Pass-thru Port Service Manual**

Publication Part Number: **95846**

## Questions and Comments:

**Note:** Staples can cause problems with automated mail sorting equipment. Please use pressure sensitive or other gummed tape to seal this form. If you would like a reply, please supply your name and address on the reverse side of this form.

Thank you for your cooperation. No postage stamp is required if mailed in the U.S.A.

TO COMPLY WITH POSTAL REGULATIONS, FOLD EXACTLY ON DOTTED LINES AND TAPE (DO NOT STAPLE)



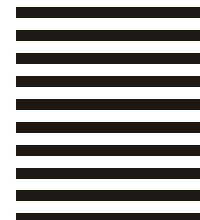
NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES

**BUSINESS REPLY CARD**

FIRST CLASS PERMIT NO. 2 LOUISVILLE, CO U.S.A.

POSTAGE WILL BE PAID BY ADDRESSEE

GLOBAL LEARNING SOLUTIONS MS 3256  
STORAGE TECHNOLOGY CORPORATION  
ONE STORAGETEK DRIVE  
LOUISVILLE CO 80028-9989  
USA



FOLD HERE AND TAPE

DO NOT STAPLE

FOLD HERE AND TAPE

If you would like a reply, please print:

Your Name: \_\_\_\_\_

Company Name: \_\_\_\_\_ Department: \_\_\_\_\_

Street Address: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

**Storage Technology Corporation**  
One StorageTek Drive  
Louisville, CO 80028-3256  
USA



## **World Headquarters**

Storage Technology Corporation  
One StorageTek Drive  
Louisville, Colorado 80028 USA  
Phone: 303.673.5151  
Fax: 719.536.4053



**STORAGETEK**

INFORMATION *made* POWERFUL™