

3583 Ultrium Scalable Tape Library



# Setup and Operator Guide



3583 Ultrium Scalable Tape Library



# Setup and Operator Guide

**Note!**

Before using this information and the product it supports, read the information in "Safety and Environmental Notices" on page xv and "Notices" on page 209.

To ensure that you have the latest publications, visit the web at <http://www.ibm.com/storage/1to>.

**Fourth Edition (March 2002)**

This edition of the *IBM® 3583 Ultrium Scalable Tape Library Setup and Operator Guide*, GA32-0411-03, obsoletes and replaces GA32-0411-02.

© **Copyright International Business Machines Corporation 2000, 2002. All rights reserved.**

US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

---

# Contents

<b>Figures</b> . . . . .	vii
<b>Tables</b> . . . . .	xiii
<b>Safety and Environmental Notices</b> . . . . .	xv
Danger Notice . . . . .	xv
Caution Notice . . . . .	xv
Attention Notice . . . . .	xvii
Possible Safety Hazards . . . . .	xvii
Laser Safety and Compliance . . . . .	xvii
Class I Laser Product . . . . .	xvii
Protective Devices . . . . .	xviii
Monitored Access to the Library . . . . .	xviii
Main Power Switch . . . . .	xviii
End of Life (EOL) Plan . . . . .	xix
<b>About This Book</b> . . . . .	xxi
Related Publications . . . . .	xxii
<b>Summary of Changes</b> . . . . .	xxiii
Fifth Edition (March 2002) . . . . .	xxiii
Fourth Edition (January 2002) . . . . .	xxiii
Third Edition (August 2001) . . . . .	xxiii
Second Edition (June 2001) . . . . .	xxiii
<b>Chapter 1. Introduction</b> . . . . .	1
Supported Servers and Operating Systems . . . . .	3
Supported Software . . . . .	4
Supported Device Drivers . . . . .	5
Optional Features . . . . .	6
Library Control Hardware . . . . .	6
Server Attachment . . . . .	6
SCSI Attachment . . . . .	6
Fibre Channel Attachment . . . . .	7
Library Components . . . . .	8
Door. . . . .	10
I/O Station . . . . .	11
Library Columns . . . . .	12
Tape Drives and Drive Sleds . . . . .	14
Robotic System. . . . .	15
RMU with StorWatch Specialist . . . . .	15
Power . . . . .	15
SAN Data Gateway Module with StorWatch Specialist . . . . .	16
Specifications . . . . .	17
Product Environment. . . . .	18
Tape Drive Performance . . . . .	19
Using Data Compression . . . . .	19
Operating Multiple Tape Drives Concurrently . . . . .	19
Types of Interfaces and Quantity of Tape Drives. . . . .	20
Other Special Considerations . . . . .	21
<b>Chapter 2. Installation</b> . . . . .	23
Installation Overview. . . . .	23

Step 1. Unpacking the Library . . . . .	23
Step 2. Deciding the Physical Configuration . . . . .	24
Installing a Stand-Alone Library . . . . .	24
Installing the Library into a Rack (optional). . . . .	28
Step 3. Installing Optional Features . . . . .	40
Installing a Drive Sled (optional FC8003 or FC8004) . . . . .	40
Installing a Redundant DC Power Supply (optional FC8008) . . . . .	42
Installing a SAN Data Gateway Module (optional FC8005 ) . . . . .	44
Installing a 12 Slot I/O Station (optional FC8012) . . . . .	45
Installing a Storage Column (optional FC8007) . . . . .	46
Step 4. Attaching the Cables . . . . .	47
Cabling the Library for a Server with a SCSI Interface . . . . .	48
Cabling the Library for a Fibre Channel Host Attach . . . . .	50
Step 5. Turning on the Power . . . . .	52
Step 6. Configuring the RMU. . . . .	56
Step 7. Configuring the SAN Data Gateway Module (optional) . . . . .	60
Step 8. Setting the SCSI IDs . . . . .	60
Setting the SCSI ID of the Library . . . . .	60
Setting the SCSI IDs of the Drives. . . . .	61
Step 9. Verifying Firmware Levels . . . . .	62
Step 10. Installing the SCSI Host Adapter Card (if required) . . . . .	62
Step 11. Installing the Device Drivers and Backup Software . . . . .	62
Step 12. Configuring the Tape Library to the Server . . . . .	62
Post-Installation Considerations . . . . .	63
<b>Chapter 3. Operation . . . . .</b>	<b>65</b>
Operator Panel . . . . .	65
I/O Station Status Area . . . . .	66
Library Status Area . . . . .	66
Drive Status Area . . . . .	68
Message Area . . . . .	68
RMU with StorWatch Specialist . . . . .	70
StorWatch Specialist Menu Description . . . . .	70
SAN Data Gateway Module . . . . .	75
Turning on the Power to the Tape Library . . . . .	76
Shutting Down the Tape Library. . . . .	77
Performing a Normal Shutdown. . . . .	77
Performing an Emergency Shutdown. . . . .	77
Restarting the Tape Library . . . . .	77
Inserting Media . . . . .	78
I/O Station . . . . .	78
Direct Insertion into the Tape Library . . . . .	78
Ejecting Media . . . . .	79
I/O Station . . . . .	79
Direct Removal from the Tape Library . . . . .	79
Updating Firmware . . . . .	80
Updating Firmware by Using the RMU . . . . .	82
Updating Firmware by Using the SCSI Bus . . . . .	83
Updating Drive Firmware by Using an FMR Tape . . . . .	83
Updating Library Firmware by Using the Library's Serial Port . . . . .	85
Retrieving Inquiry Data . . . . .	86
Cleaning Drives . . . . .	86
<b>Chapter 4. Menus and Commands . . . . .</b>	<b>87</b>
Using the Operator Panel Menu . . . . .	88
Main Menu . . . . .	89

Online/Offline Selection . . . . .	90
Status Menu . . . . .	92
Library Submenu . . . . .	92
Drives Dialog . . . . .	99
Logs Submenu . . . . .	99
Command Menu . . . . .	105
Move Submenu . . . . .	105
I/O Station Submenu . . . . .	114
Drives Submenu . . . . .	118
Setup Menu . . . . .	121
Library Submenu. . . . .	122
RMU Dialog . . . . .	124
Drives Submenu . . . . .	124
Utils Submenu . . . . .	126
Service Menu . . . . .	132
Start Dialog. . . . .	133
Library Submenu. . . . .	134
Drives Dialog . . . . .	148
About Menu . . . . .	151
Details Dialog . . . . .	152
<b>Chapter 5. Using the Media . . . . .</b>	<b>155</b>
Data Cartridge . . . . .	156
Cleaning Cartridge . . . . .	156
Bar Code Label . . . . .	157
Guidelines for Using Bar Code Labels . . . . .	158
Setting the Write-Protect Switch . . . . .	159
Handling the Cartridges . . . . .	160
Environmental and Shipping Specifications for Tape Cartridges. . . . .	161
Cleaning the Bar Code Scanner . . . . .	162
Repositioning or Reattaching a Leader Pin . . . . .	163
Repositioning a Leader Pin . . . . .	163
Reattaching a Leader Pin . . . . .	165
Disposing of Tape Cartridges . . . . .	170
Ordering Media Supplies . . . . .	170
Ordering Bar Code Labels . . . . .	171
<b>Appendix A. Removing a Tape Cartridge . . . . .</b>	<b>173</b>
Resetting a Drive and Ejecting a Cartridge . . . . .	173
Manually Removing the Cartridge . . . . .	174
<b>Appendix B. Element Addressing . . . . .</b>	<b>177</b>
All Operating Systems and Windows 2000 with RSM Disabled . . . . .	177
Windows 2000 with RSM Enabled . . . . .	180
<b>Appendix C. SCSI Commands . . . . .</b>	<b>183</b>
Library SCSI Commands. . . . .	183
Tape Drive SCSI Commands . . . . .	183
<b>Appendix D. TapeAlert Flags. . . . .</b>	<b>185</b>
TapeAlert Flags Supported by the Drive . . . . .	185
TapeAlert Flags Supported by the Library. . . . .	187
<b>Appendix E. Parts List . . . . .</b>	<b>189</b>
<b>Appendix F. Power Cords . . . . .</b>	<b>191</b>

Power Cable Information . . . . .	191
Types of Receptacles . . . . .	193
<b>Appendix G. Error Messages . . . . .</b>	<b>195</b>
Service Action Codes . . . . .	195
Operator Intervention Messages . . . . .	202
Operator Information Messages . . . . .	204
Drive Error Codes . . . . .	205
<b>Notices . . . . .</b>	<b>209</b>
Do You Have Comments or Suggestions . . . . .	210
Trademarks. . . . .	210
Electronic Emission Notices. . . . .	211
Federal Communications Commission (FCC) Class A Statement . . . . .	211
Industry Canada Class A Emission Compliance Statement . . . . .	211
Avis de conformité à la réglementation d'Industrie Canada . . . . .	211
European Union (EU) Electromagnetic Compatibility Directive . . . . .	211
Germany Electromagnetic Compatibility Directive . . . . .	212
Japan VCCI Class A ITE Electronic Emission Statement . . . . .	212
<b>Glossary . . . . .</b>	<b>213</b>
<b>Index . . . . .</b>	<b>221</b>



# Figures

1. Main power switch on the 3583 Ultrium Scalable Tape Library . . . . .	xviii
2. The 3583 Ultrium Scalable Tape Library (stand-alone configuration) . . . . .	1
3. Gigabit interface converter (GBIC) module with dust protector . . . . .	7
4. The 3583 Ultrium Scalable Tape Library and its components . . . . .	9
5. Door of the 3583 Tape Library . . . . .	10
6. Types of I/O stations in the 3583 Tape Library . . . . .	11
7. Storage columns in the 3583 Tape Library . . . . .	12
8. Tape drive in the 3583 Tape Library . . . . .	14
9. The sling for lifting the 3583 Tape Library . . . . .	25
10. Locking front casters . . . . .	26
11. Installing a stand-alone library . . . . .	27
12. The sling for lifting the 3583 Tape Library . . . . .	29
13. Components of the rackmount kit . . . . .	30
14. Example of standard racks . . . . .	31
15. Installing the front mounting brackets . . . . .	32
16. Installing the rear mounting brackets . . . . .	33
17. Installing the rear stop bracket . . . . .	34
18. Removing the band that secures the picker . . . . .	35
19. Removing cartridges and magazines . . . . .	36
20. Removing the drive sleds and the DC power supplies . . . . .	36
21. Removing the casters . . . . .	37
22. Removing the side covers . . . . .	37
23. Placing the library into a rack . . . . .	38
24. Installing a drive sled . . . . .	38
25. Proper orientation of the dc power supply . . . . .	39
26. Correct order for installing drive sleds . . . . .	40
27. Installing a drive sled . . . . .	41
28. Installing a redundant dc power supply . . . . .	42
29. Installing a redundant dc power supply . . . . .	43
30. Installing a SAN Data Gateway Module . . . . .	44
31. Installing the 12-slot I/O station . . . . .	45
32. Installing a storage column . . . . .	46
33. SCSI host interface board . . . . .	47
34. Examples of SCSI cable connections . . . . .	49
35. Cable connectors. . . . .	50
36. Examples of fiber and SCSI cable connections . . . . .	51
37. Main power switch . . . . .	52
38. Inserting a data cartridge . . . . .	52
39. Operator panel . . . . .	53
40. Select Drive Dialog . . . . .	54
41. Drive Diagnostics screen . . . . .	54
42. FAST Read/Write screen . . . . .	55
43. Command Complete screen. . . . .	55
44. RMU Dialog. . . . .	56
45. Connecting the RMU to a computer . . . . .	57
46. Status page. . . . .	58
47. Login page . . . . .	58
48. Configuration page . . . . .	59
49. Library SCSI dialog screen . . . . .	60
50. Drive SCSI Dialog . . . . .	61
51. Drive SCSI ID Dialog . . . . .	61
52. Operator panel . . . . .	65
53. I/O station status area . . . . .	66

54. Library Status Area . . . . .	66
55. Drive status area . . . . .	68
56. Message area . . . . .	68
57. StorWatch Specialist home page . . . . .	70
58. Status page. . . . .	71
59. Login Page . . . . .	72
60. Configuration page . . . . .	72
61. Firmware page . . . . .	73
62. Diagnostics file page . . . . .	74
63. Operator panel page . . . . .	74
64. Logs page . . . . .	75
65. Main power switch . . . . .	76
66. Splash screen . . . . .	76
67. Drives Dialog . . . . .	80
68. About Menu. . . . .	81
69. Status page. . . . .	81
70. RMU firmware page. . . . .	82
71. FMR Tape Dialog. . . . .	83
72. Firmware Update Dialog . . . . .	84
73. Select Drives Dialog . . . . .	84
74. Firmware Update Dialog . . . . .	84
75. Menu Tree . . . . .	88
76. Main Menu (initial screen) . . . . .	89
77. Main Menu (alternate screen) . . . . .	89
78. Change Dialog . . . . .	90
79. Offline Confirmation Dialog . . . . .	90
80. Completed Verification Dialog . . . . .	91
81. Status Menu . . . . .	92
82. Library Submenu . . . . .	92
83. System Dialog . . . . .	93
84. Statistics Dialog . . . . .	93
85. Slot Dialog . . . . .	94
86. Change Drive Dialog . . . . .	94
87. Change Magazine Dialog. . . . .	95
88. Change Slot Dialog . . . . .	95
89. Slot Information Dialog. . . . .	96
90. Put/Get Information . . . . .	96
91. Position Dialog . . . . .	96
92. Media Dialog . . . . .	97
93. Select Media Dialog. . . . .	97
94. Media Information Dialog . . . . .	98
95. Drives Dialog . . . . .	99
96. Logs Submenu . . . . .	99
97. Command Log Dialog . . . . .	100
98. Print Dialog . . . . .	100
99. Error Log Dialog . . . . .	101
100. Print Dialog . . . . .	101
101. Select Drive Dialog . . . . .	102
102. Drive Log Dialog . . . . .	102
103. Drive Error Log Options Dialog . . . . .	103
104. Clear Log Dialog . . . . .	103
105. Force Dump Dialog . . . . .	104
106. Copy Dump Dialog. . . . .	104
107. Command Menu . . . . .	105
108. Move Submenu . . . . .	105
109. Source Move Media Dialog . . . . .	106

110. Change Drive Dialog . . . . .	107
111. Change Magazine Dialog . . . . .	107
112. Change Slot Dialog . . . . .	108
113. Target Move Media Dialog . . . . .	108
114. Position Picker Dialog . . . . .	109
115. Change Drive Dialog . . . . .	109
116. Change Magazine Dialog . . . . .	110
117. Change Slot Dialog . . . . .	110
118. Scan Barcode Dialog . . . . .	111
119. Change Drive Dialog . . . . .	111
120. Change Magazine Dialog . . . . .	112
121. Change Slot Dialog . . . . .	112
122. Select Slots Dialog . . . . .	113
123. Confirm Dialog . . . . .	113
124. Progress Dialog . . . . .	114
125. Completion Dialog . . . . .	114
126. I/O Station Submenu . . . . .	114
127. Import Dialog . . . . .	115
128. Command Completed screen . . . . .	115
129. Export Dialog . . . . .	116
130. Export List Dialog . . . . .	117
131. Export Select Dialog . . . . .	117
132. Drives Submenu . . . . .	118
133. Unload Dialog . . . . .	118
134. Reset Dialog . . . . .	119
135. Reset Type Dialog . . . . .	119
136. Firmware Update Dialog . . . . .	120
137. Select Drives Dialog . . . . .	120
138. Firmware Update Dialog . . . . .	121
139. Setup Menu . . . . .	121
140. Library Submenu . . . . .	122
141. SCSI Dialog . . . . .	122
142. Parity Dialog . . . . .	123
143. Library Dialog . . . . .	123
144. RMU Dialog . . . . .	124
145. Drives Submenu . . . . .	124
146. Drive SCSI Dialog . . . . .	125
147. Drive SCSI ID Dialog . . . . .	125
148. Utils Submenu . . . . .	126
149. Date/Time Dialog . . . . .	127
150. Sync Dialog . . . . .	127
151. Config Dialog . . . . .	128
152. Secure Dialog . . . . .	129
153. Security On Dialog . . . . .	129
154. Security Enabled Dialog . . . . .	130
155. Enter Password Dialog . . . . .	130
156. Security Off Dialog . . . . .	131
157. Set/Change Password Dialog . . . . .	131
158. Password Changed Dialog . . . . .	132
159. Service Menu . . . . .	132
160. Start Dialog . . . . .	133
161. Normal Service Dialog . . . . .	133
162. Enter Password Dialog . . . . .	134
163. Library Submenu . . . . .	134
164. Firmware Update Dialog . . . . .	135
165. Diags Submenu . . . . .	135

166. Sensor Dialog . . . . .	136
167. Fingers Submenu . . . . .	136
168. Get/Put Dialog . . . . .	137
169. New Start Slot Dialog. . . . .	137
170. Step Dialog . . . . .	138
171. Picker Finger Dialog . . . . .	138
172. Scanner Dialog . . . . .	139
173. Bar Code Label Dialog . . . . .	140
174. Picker Submenu . . . . .	140
175. Move Dialog . . . . .	141
176. Use Axes Dialog . . . . .	141
177. Step Dialog . . . . .	142
178. Axes Dialog . . . . .	142
179. Home Dialog . . . . .	143
180. Exercise Submenu. . . . .	143
181. Demo Dialog . . . . .	144
182. Include Drives Dialog. . . . .	144
183. Demo Execution screen. . . . .	145
184. Self Test Dialog . . . . .	145
185. Include Drives Dialog. . . . .	146
186. Self Test Execution Dialog . . . . .	146
187. Teach Dialog . . . . .	147
188. Teach in Progress Dialog . . . . .	147
189. Teach Completed Dialog . . . . .	147
190. Drives Dialog. . . . .	148
191. Drive Service Dialog . . . . .	148
192. Diagnostics Dialog . . . . .	149
193. FMR Tape Dialog . . . . .	149
194. Scratch Tape Dialog . . . . .	150
195. Repair Dialog . . . . .	150
196. Repair Dialog (Replace). . . . .	151
197. About Menu . . . . .	151
198. Detail Dialog (initial screen) . . . . .	152
199. Detail Dialog (secondary screen) . . . . .	152
200. Detail Dialog (tertiary screen). . . . .	153
201. The IBM LTO Ultrium Data Cartridge . . . . .	155
202. Sample bar code label on the LTO Ultrium Tape Cartridge . . . . .	157
203. Setting the write-protect switch . . . . .	159
204. Cleaning the bar code scanner . . . . .	162
205. Leader pin in the incorrect and correct positions . . . . .	163
206. Placing the dislodged leader pin into the correct position. . . . .	164
207. Rewinding the tape into the cartridge . . . . .	164
208. Attaching the leader pin attach tool to the cartridge. . . . .	166
209. Winding the tape out of the cartridge . . . . .	167
210. Removing the C-clip from the leader pin. . . . .	168
211. Attaching the leader pin to the tape . . . . .	169
212. Resetting the tape drive. . . . .	173
213. Removing the drive sled. . . . .	174
214. Determining whether the tape is broken . . . . .	175
215. Unloading the tape cartridge . . . . .	176
216. Element addresses for a 3583 Tape Library with a single-slot I/O station . . . . .	177
217. Element addresses for a 3583 Tape Library with a multiple-slot I/O station . . . . .	178
218. Element addresses for a 3583 Tape Library with a multiple-slot I/O station configured as storage slots . . . . .	179
219. Element addresses for a 3583 Tape Library with a single-slot I/O station . . . . .	180
220. Element addresses for a 3583 Tape Library with a multiple-slot I/O station . . . . .	181

221. Element addresses for a 3583 Tape Library with a multiple-slot I/O station configured as storage	
slots . . . . .	182
222. Types of receptacles . . . . .	193



---

## Tables

1.	Optional features and codes for the 3583 Tape Library . . . . .	6
2.	Tape library configurations . . . . .	13
3.	Specifications for the 3583 Tape Library . . . . .	17
4.	Particulate limits for the 3583 Tape Library . . . . .	18
5.	Corrosive gas limits for the 3583 Tape Library . . . . .	18
6.	Overview of the installation procedure . . . . .	23
7.	Components of Rackmount Kit. . . . .	30
8.	Library status area . . . . .	66
9.	Icons in the I/O station status area . . . . .	67
10.	Icons in the drive status area . . . . .	69
11.	Environment for operating, storing, and shipping the LTO Ultrium Tape Cartridge . . . . .	161
12.	Ordering media supplies for the 3583 Tape Library . . . . .	170
13.	Parts list for the 3583 Ultrium Scalable Tape Library . . . . .	189
14.	Power cable information. . . . .	191
15.	Service Action Codes (SAC) . . . . .	195
16.	Operator intervention messages . . . . .	202
17.	Operator information messages . . . . .	204
18.	Drive error codes . . . . .	205





# Safety and Environmental Notices

When using this product, observe the danger, caution, and attention notices that are contained in this guide. The notices are accompanied by symbols that represent the severity of the safety condition.

Most danger or caution notices contain a reference number (RSFTDxxx or RSFTCxxx). Use the reference number to check the translation in the *IBM Externally Attached Devices Safety Information, SA26-2004*.

The sections that follow define each type of safety notice and give examples.

## Danger Notice

A danger notice calls attention to a situation that is potentially lethal or extremely hazardous to people. A lightning bolt symbol always accompanies a danger notice to represent a dangerous electrical condition. A sample danger notice follows:




### DANGER

**An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (RSFTD201)**

## Caution Notice

A caution notice calls attention to a situation that is potentially hazardous to people because of some existing condition. A caution notice can be accompanied by one of several symbols:

If the symbol is...	It means....
	A hazardous electrical condition with less severity than electrical danger.
	A generally hazardous condition not represented by other safety symbols.
 Class II	A hazardous condition due to the use of a laser in the product. Laser symbols are always accompanied by the classification of the laser as defined by the U. S. Department of Health and Human Services (for example, Class I, Class II, and so forth).
	A hazardous condition due to mechanical movement in or around the product.

If the symbol is...	It means....
 <p data-bbox="558 346 636 401">&gt; 18 kg (40 lb)</p>	<p data-bbox="773 222 1412 306">A hazardous condition due to the weight of the unit. Weight symbols are accompanied by an approximation of the product's weight.</p>

Sample caution notices follow:



**CAUTION:**

This product contains a lithium battery. To avoid possible explosion, do not burn, exchange, or charge the battery. Discard the controller card as instructed by local regulations for lithium batteries.

*(RSFTC232)*



**CAUTION:**

Ensure that all rack-mounted units are fastened in the rack frame. Do not extend or exchange any rack-mounted units when the stabilizer is not installed. *(RSFTC222)*



Class II

**CAUTION:**

This product complies with the performance standards set by the U.S. Food and Drug Administration for a Class II and IEC825 Laser Product. Avoid prolonged staring into the laser beam.



> 18 kg  
(40 lb)

**CAUTION:**

The weight of this part or unit is between 18 and 32 kilograms (39.7 and 70.5 pounds). It takes two persons to safely lift this part or unit. *(RSFTC204)*



**CAUTION:**

This assembly contains mechanical moving parts. Use care when servicing this assembly.

---

## Attention Notice

An attention notice indicates the possibility of damage to a program, device, or server, or to data. An exclamation point symbol may accompany an attention notice but is not required. Sample attention notices follow:



**Attention:** If you use a power screwdriver to perform this procedure it could destroy the tape.

**Attention:** Do not operate the 3583 Ultrium Scalable Tape Library in a poor air-quality environment.

---

## Possible Safety Hazards

Possible safety hazards to the operation of this product are:

- Electrical** An electrically charged frame can cause serious electrical shock.
- Mechanical** Hazards, such as a safety cover missing, are potentially harmful to people.
- Chemical** Do not use solvents, cleaners, or other chemicals not approved for use on this product.

Repair any of the preceding problems before you use the 3583 Ultrium Scalable Tape Library.

---

## Laser Safety and Compliance

Before using the 3583 Ultrium Scalable Tape Library, review the following laser safety information.

### Class I Laser Product

The 3583 Ultrium Scalable Tape Library may contain a laser assembly that complies with the performance standards set by the U.S. Food and Drug Administration for a Class I laser product. Class I laser products do not emit hazardous laser radiation. The library has the necessary protective housing and scanning safeguards to ensure that laser radiation is inaccessible during operation or is within Class I limits. External safety agencies have reviewed the library and have obtained approvals to the latest standards as they apply.

---

## Protective Devices

The 3583 Ultrium Scalable Tape Library has the following protective devices:

- Monitored access to the library
- Main power switch

The sections that follow describe each type of protection.

## Monitored Access to the Library

The 3583 Ultrium Scalable Tape Library is completely surrounded by an enclosure. The library can be accessed only through monitored access areas.

The enclosure around the library separates the danger area of the library from the normal working area. The danger area is the area in which personnel can be injured by component movements.



### CAUTION:

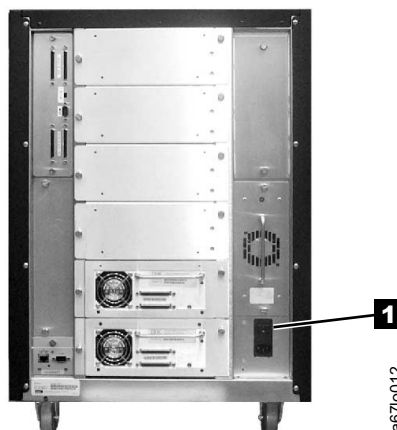
**Movements of mechanical components in the library can cause serious injury. Access to the library should be restricted to authorized personnel only.**

## Mechanical Lock

The library's front door can be opened only with a key from the outside. Authorized personnel are responsible for the security of the key.

## Main Power Switch

To turn on the power to the 3583 Ultrium Scalable Tape Library, press | on the main power switch (see **1** in Figure 1). To turn off the power, press 0 on the switch. In case of danger to personnel or property, immediately turn off the main power switch.



*Figure 1. Main power switch on the 3583 Ultrium Scalable Tape Library. The switch is located at the rear of the library.*



**CAUTION:**  
To completely remove all power, disconnect the line cord from the electrical outlet.

**Attention:** Except in emergencies, stop the library with the normal shutdown procedure before you switch off the main power switch. IBM is not responsible for damage caused by improper use of the main power switch. Such risk lies entirely with the user.



**CAUTION:**  
Movements of mechanical components in the tape library can cause serious injury. Before turning the main power switch on and restarting the tape library, confirm that no danger exists to personnel or property.

## End of Life (EOL) Plan

This box is a purchased unit. Therefore, it is the sole responsibility of the purchaser to dispose of it in accordance with local laws and regulations at the time of disposal.

This unit contains recyclable materials. The materials should be recycled where facilities are available and according to local regulations. In some areas IBM may provide a product take-back program that ensures proper handling of the product. For more information, contact your IBM representative.



---

## About This Book

This guide contains information and instructions necessary for the installation and operation of the 3583 Ultrium Scalable Tape Library. It is intended for operators, trained customer specialists, and any service partner's maintenance personnel.

This guide includes the following chapters:

Chapter 1, "Introduction" on page 1 describes general information about the 3583 Tape Library components.

Chapter 2, "Installation" on page 23 provides instructions for installing the 3583 Tape Library in stand-alone and rackmounted configurations.

Chapter 3, "Operation" on page 65 describes the functional startup and shutdown operations of the 3583 Tape Library.

Chapter 4, "Menus and Commands" on page 87 describes the visual menus and commands that the 3583 Tape Library executes.

Chapter 5, "Using the Media" on page 155 describes how to handle tape cartridges, and the types of media the 3583 Tape Library uses.

Appendix A, "Removing a Tape Cartridge" on page 173 provides information for manually removing a tape cartridge from the 3583 Tape Library.

Appendix B, "Element Addressing" on page 177 provides element addressing information for the 3583 Tape Library.

Appendix C, "SCSI Commands" on page 183 provides a list of Small Computer Systems Interface (SCSI) commands that the 3583 Tape Library supports.

Appendix D, "TapeAlert Flags" on page 185 lists TapeAlert flags that the Ultrium Tape Drive and the 3583 Tape Library support.

Appendix E, "Parts List" on page 189 lists the codes that you need when ordering features for the 3583 Tape Library.

Appendix F, "Power Cords" on page 191 provides power cord information for different countries or regions.

Appendix G, "Error Messages" on page 195 includes a list of service action codes (SACs), operator intervention messages, and drive error codes.

---

## Related Publications

Refer to the following publications for additional information. To ensure that you have the latest publications, visit the web at <http://www.ibm.com/storage/1to>.

- The *IBM 3583 Ultrium Scalable Tape Library Maintenance Information*, SA37-0425, provides service and maintenance information for the tape library.
- The *IBM 3583 Ultrium Scalable Tape Library SCSI Reference*, WB1106, provides the supported SCSI commands and protocol that govern the behavior of the SCSI interface for the tape library.
- The *IBM 3583 Ultrium Scalable Tape Library Quick Reference*, GX35-5057, illustrates how to install and operate the tape library.
- *IBM Storage Area Network Data Gateway Module Setup, Operator, and Service Guide*, GA32-0436, provides installation, operation, and service information for the SAN Data Gateway Module.
- *IBM Externally Attached Devices Safety Information*, SA26-2004, provides translations of danger and caution notices.
- *IBM Ultrium Device Drivers Installation and User's Guide*, GA32-0430, provides instructions for attaching IBM-supported hardware to open-systems operating systems. It indicates what devices and levels of operating systems are supported, gives requirements for adapter cards, and tells how to configure servers to use the device driver with the Ultrium family of devices.
- *IBM Ultrium Device Drivers Programming Reference*, GC35-0483, supplies information to application owners who want to integrate their open-systems applications with IBM-supported Ultrium hardware. The reference contains information about the application programming interfaces (APIs) for each of the various supported operating-system environments.
- *SCSI-3 Stream Commands (SSC)*, made available by the American National Standards Institute on the web at <http://www.t10.org>.
- *SCSI Primary Commands-2 (SPC-2)*, made available by the American National Standards Institute on the web at <http://www.t10.org>.



---

## Summary of Changes

This section summarizes changes to this publication. A vertical line in the left margin indicates each change.

---

### **Fifth Edition (March 2002)**

This edition includes miscellaneous changes.

---

### **Fourth Edition (January 2002)**

This edition includes the following:

- Enhanced guidelines for handling tape cartridges.
- New procedure for repositioning a misaligned leader pin in a tape cartridge.
- Reclassification of the IBM 3583 Ultrium Scalable Tape Library from a Class B electromagnetic device to a Class A electromagnetic device.

---

### **Third Edition (August 2001)**

This edition corrects country-sensitive language.

---

### **Second Edition (June 2001)**

This edition includes new information about the following:

- Addition of Fibre Channel attachment features
- Addition of the Remote Management Unit (RMU)
- Addition of Class I laser product information



---

## Chapter 1. Introduction

The IBM 3583 Ultrium Scalable Tape Library is a stand-alone or rack-mounted device that provides reliable, automated tape handling and storage for unattended mid-range systems and network servers. The library handles a wide range of data storage needs, including backup, archiving, software program distribution, automatic data migration between disk storage and tape, and disaster recovery. It includes the following features:

- Maximum capacity of 7.2 TB (14.4 TB at 2:1 compression)
- Sustained native data rate of up to 15 MB per second (up to 30 MB per second at 2:1 compression)
- Aggregate sustained data transfer rate of 648 GB per hour
- Optional remote management capability through a web browser
- Optional Fibre Channel connectivity through dual 2-Gigabit ports

The 3583 Tape Library comes equipped with a minimum of one IBM Ultrium Tape Drive and a robotic system that moves tape cartridges to and from the drive and cartridge storage slots. The drive uses the Small Computer Systems Interface (SCSI) to communicate with the server. It supports the Low Voltage Differential/Single Ended (LVD/SE) Ultra2 SCSI interface and the High Voltage Differential (HVD/DIFF) Ultra SCSI interface.

Figure 2 shows the IBM 3583 Ultrium Scalable Tape Library.



Figure 2. The 3583 Ultrium Scalable Tape Library (stand-alone configuration)

The 3583 Tape Library uses the single-reel IBM Linear Tape-Open™ (LTO™) Ultrium Tape Cartridge. The data cartridge contains 1/2-inch, metal-particle tape with a highly dense recording area that enables 100 GB of native storage and 200 GB of compressed storage (assuming 2:1 compression).

The library can accommodate up to six tape drives and up to four storage columns that contain slots for tape cartridges. Three models are available and vary according to their capacity for cartridge storage slots:

**Model L18**

Contains 18 cartridge storage slots and offers native data capacity of 1.8 TB (3.6 TB at 2:1 compression)

**Model L36**

Contains 36 cartridge storage slots and offers native data capacity of 3.6 TB (7.2 TB at 2:1 compression)

**Model L72**

Contains 72 cartridge storage slots and offers native data capacity of 7.2 TB (14.4 TB at 2:1 compression)

The 3583 Tape Library is designed for easy expansion. You can upgrade any starting configuration to the maximum configuration of 6 Ultrium Tape Drives and 72 tape cartridges. Additional tape drives are modular units that are easy to install and offer enhanced function, such as faster transfer of data, simultaneous backup, concurrent read and write operations, and fault tolerance.

Located at the front of the library, an input/output (I/O) station lets you insert and remove cartridges without disrupting operation. Two I/O station options are available: a single-slot unit and a 12-slot unit. The 12-slot I/O station is required to achieve the 72-cartridge maximum library configuration. With the 12-slot I/O station, you can configure the library as 72 storage slots or as 60 storage slots and 12 I/O slots. By using supported software on a server, the library can load and unload the cartridges from the I/O station into tape drives without operator intervention.

Each 3583 Tape Library comes equipped with one modular dc power supply. A second redundant power supply feature is available.

You can access the 3583 Tape Library from a remote location by using the StorWatch Specialist software application on a web browser. The library features a removable circuit board called the Remote Management Unit (RMU) that facilitates access to the web and the StorWatch Specialist. Located at the rear of the library, the RMU comes standard in every unit. After you configure the RMU (set the Internet protocol (IP) and gateway addresses, as well as the RMU's subnet mask and name), you can perform all of the library's operator panel operations (including firmware updates) from a remote site. The RMU also gives access to library error logs and displays the current status for the library and the drives.

You can also connect the library to Fibre Channel devices (such as a server) or to a storage area network (SAN) by installing an optional hardware component called the SAN Data Gateway Module. Accessed through the StorWatch Specialist software application, the gateway functions as an interface between the SCSI devices in the library and the Fibre Channel devices on the SAN. It makes possible the following connectivity options:

- Expands the scope of attachment by making the library available to all devices that are attached to the SAN.

- Enables data to be transferred up to 500 m (1640 ft). By contrast, SCSI architecture restricts interconnection distances to a maximum of 25 m (82 ft.)
- Enhances resource sharing by making it easier for many servers to share the library.
- Improves efficiency by making all of the library's drives available over a single, high-speed Fibre Channel port (rather than a port dedicated to each drive).

With its 2-Gigabit (Gbit) port speeds, the gateway is compatible with 2-Gbit Fibre Channel components. It is also backward compatible with 1-Gbit Fibre Channel hardware. The gateway's two Fibre Channel ports make multiple attachments easy and ensure that the library will continue to operate if one of the paths fails.

With an optional rackmount kit, you can install the library into an Electronic Industries Association (EIA) standard EIA-310-D 19-inch rack.

---

## Supported Servers and Operating Systems

The 3583 Tape Library is supported by a wide variety of servers (hosts) and operating systems, as well as adapters. These attachments can change throughout the product's life cycle. To determine the latest supported attachments, visit the web at <http://www.ibm.com/storage/1to>.

Attachments to the library include (but are not limited to) the following:

Server	Operating System
IBM @server iSeries™ and AS/400®	IBM OS/400®
IBM @server pSeries™, RS/6000®, and RS/6000 SP™	IBM AIX®
IBM @server xSeries™ and Netfinity®	Microsoft® Windows NT® and Windows® 2000
HP	Hewlett-Packard HP-UX
Intel-compatible servers	Microsoft Windows NT and Windows 2000, and Red Hat Linux 7.1 kernel 2.4.2-2
Sun	Sun Solaris

---

## Supported Software

The following software products provide backup support for the 3583 Tape Library. To get a comprehensive list of compatible software, visit the web at <http://www.ibm.com/storage/1to>.

**Note:** IBM does not provide backup application software with the 3583 Tape Library. To order software, contact your IBM marketing representative, IBM Business Partner, or an independent software provider.

- Backup Recovery and Media Services/400 (BRMS/400), IBM Corporation
- Tivoli® Storage Manager, IBM Corporation
- Arkeia, Knox-Software
- Backup Express, Syncsort Inc.
- BrightStor Enterprise Backup, ARCserve, and ARCserve2000, Computer Associates International, Inc.
- CommVault Galaxy, CommVault Systems, Inc.
- Cray/REELlibrarian, Cray Inc.
- NetBackup and Backup Exec, VERITAS Software Corporation
- NetVault, BakBone Software Inc.
- NetWorker, Legato Systems, Inc.
- Omniback II, Hewlett-Packard Company
- REELbackup, Storage Technology Corporation
- Retrospect, Dantz Development Corporation
- Robot/SAVE, Help/Systems
- TapeWare, Yosemite Technologies, Inc.

---

## Supported Device Drivers

Device drivers are included in the ship group for the 3583 Tape Library. IBM maintains the latest levels of device drivers and driver documentation for the library on the Internet. You can access this material from your browser or through the IBM File Transfer Protocol (FTP) site by doing the following:

- Using a browser, type one of the following:  
`http://www.ibm.com/storage/1to` and click on Technical Support  
`ftp://ftp.software.ibm.com/storage/devdvr`  
`ftp://207.25.253.26/storage/devdvr`
- From an IBM FTP site, enter the following specifications:  
FTP site: `ftp.software.ibm.com`  
IP Addr: `207.25.253.26`  
Userid: `anonymous`  
Password: (use your current e-mail address)  
Directory: `/storage/devdvr`

IBM provides Portable Document Format (PDF) and Postscript versions of its device driver documentation in the `/storage/devdvr` directory:

- `IBM_ultrium_tape_IUG.pdf` and `IBM_ultrium_tape_IUG.ps` contain the current version of the *IBM Ultrium Device Drivers Installation and User's Guide*.
- `IBM_ultrium_tape_PROGREF.pdf` and `IBM_ultrium_tape_PROGREF.ps` contain the current version of the *IBM Ultrium Device Drivers Programming Reference*.

A list of device drivers for each supported server appears at `/storage/devdvr/` in the following directories (the device driver for the AS/400 server and iSeries server is included in the OS/400 operating system).

- `AIX/`
- `HPUX/`
- `Linux/`
- `Solaris/`
- `WinNT/`
- `Win2000/`

For more information about device drivers, refer to any of the preceding directories.

---

## Optional Features

Table 1 lists the optional features for the 3583 Tape Library.

Table 1. Optional features and codes for the 3583 Tape Library

Optional Feature	Feature Code
Ultrium Tape Drive with LVD/SE Ultra2 SCSI	8003
Ultrium Tape Drive with HVD/DIFF Ultra SCSI	8004
SAN Data Gateway Module, LVD	8005
Rackmount kit	8006
18-slot tape storage column	8007
Redundant DC power supply	8008
12-slot I/O station	8012
6-cartridge magazine with cover	8013

---

## Library Control Hardware

The library's control hardware controls all operations in the library, including the interaction between the library and operators. The library's firmware creates and maintains the library configuration, the logical location of the robotic system, and the inventory of cartridges. The database is kept in the flash memory of the library's control hardware.

---

## Server Attachment

You can attach the 3583 Tape Library to servers that use a SCSI or Fibre Channel interface. Both High Voltage Differential (HVD) and Low Voltage Differential/Single-Ended (LVD/SE) SCSI interfaces are supported. The Fibre Channel interface is available when you install the optional SAN Data Gateway Module.

## SCSI Attachment

The minimum configuration of the 3583 Tape Library consists of two SCSI target devices: a tape drive and the medium changer (the medium changer is also known as the robotics system or the library). The maximum configuration consists of seven SCSI target devices (six tape drives and the medium changer), although if you are using an IBM AS/400 or IBM @server iSeries, you can attach only one HVD Ultrium Tape Drive to the SCSI bus.

The medium changer and each drive have separate SCSI IDs and SCSI connections. The connections for the medium changer are on the SCSI host interface board located at the rear of the library. The connections for each drive are also located at the rear of the library.

The SCSI host interface board has both LVD/SE and HVD/DIFF connectors and a configuration switch. To select the type of interface that you want to use (LVD/SE or HVD/DIFF), you must set the configuration switch to the appropriate setting (see "Step 4. Attaching the Cables" on page 47). Only one set of connectors can be used at a time. Because the SCSI host interface board is a narrow device, it can only



transmit 8 bits of data per data cycle on the SCSI bus. To support wide data transfer (16 bits per cycle), both sets of SCSI host interface board connectors are high-density, 68-pin connectors.

**Note:** Although communication between the server and the medium changer on the library's SCSI host interface board is limited to narrow data transfer, all communication between the server and drives can be wide.

The range of SCSI IDs for the SCSI host interface board is from 0 to 7. Any initiator (such as a server) on the bus that communicates with the SCSI host interface board must also have its SCSI ID set from 0 to 7.

**Important:** The AS/400 and iSeries adapters are HVD SCSI and support only one initiator per bus. In addition, the medium changer and tape drives must be attached on the same SCSI bus. For these reasons and for other drive performance reasons, a SCSI-configured library must use a single-drive, single-server configuration when attached to the AS/400 or the iSeries server.

For a list of the supported adapters that you can use when connecting the SCSI interface, visit the web at <http://ssddom02.storage.ibm.com/tape/1to/>.

## Fibre Channel Attachment

You can connect the library to a Fibre Channel server by using the optional SAN Data Gateway Module. The gateway is the interface between the tape library and the SAN or Fibre Channel server. It provides Fibre Channel connectivity to the SCSI tape drives and SCSI medium changer in the library.

Two Fibre Channel ports are available on the gateway. Each port is equipped with a gigabit interface converter (GBIC) module that lets you connect a fiber cable. The GBIC can transmit data at up to 2 Gbits per second by using a short-wave, multimode, subscriber connector (SC). Figure 3 shows the GBIC module. The gateway also has four LVD Ultra2 SCSI ports to which you can attach tape

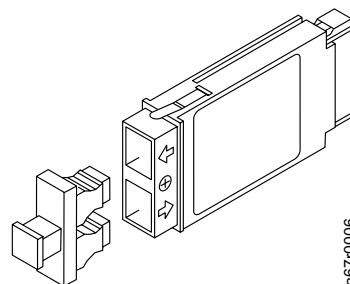


Figure 3. Gigabit interface converter (GBIC) module with dust protector

drives and the medium changer. To make the LVD/SE connectors active, you must attach the gateway to the LVD/SE connectors of the medium changer and you must set the configuration switch.

**Note:** The SAN Data Gateway Module supports only tape drives that use an LVD/SE (SCSI) interface.

For a list of the supported adapters that you can use when connecting the Fibre Channel interface, visit the web at <http://ssddom02.storage.ibm.com/tape/1to/>.

---

# Library Components

The 3583 Tape Library consists of the functional components shown in Figure 4 on page 9.

## **1 I/O station**

A cartridge compartment that allow you to insert or remove tape cartridges without the library performing a reinventory of its columns. When you order the library, you can specify a single-slot or 12-slot I/O station.

## **2 Operator panel**

The set of controls that lets you perform operations and determine the status of the library. The panel consists of a liquid crystal display (LCD) and push button.

## **3 IBM Ultrium Tape Drive**

Contained in a storage column within the library, up to six units that read and write data that is stored on tape cartridges. The IBM Ultrium Tape Drive uses the IBM LTO Ultrium Tape Cartridge.

## **4 Library columns**

Mounted within the library, stationery units that can contain drives and tape cartridges. One column is dedicated to drives; four columns contain I/O or storage slots for cartridges.

## **5 Magazines**

Removable containers that can contain up to six tape cartridges. Each cartridge storage column can contain three magazines.

## **6 Cartridge storage slots**

Containers that are mounted in cartridge magazines to store tape cartridges.

## **7 Robotic system**

The assembly that moves tape cartridges between storage slots, tape drives, and the I/O station.

## **8 Host interface board (SCSI)**

A circuit card that houses the SCSI connectors for the medium changer. The SCSI host interface board features both LVD/SE and HVD/DIFF connectors and a configuration switch to change from one interface to another.

## **9 SAN Data Gateway Module (optional)**

A hardware component that enables the library to connect to Fibre Channel servers or switches.

## **10 Remote Management Unit (RMU)**

A removable circuit board that facilitates access to the library from a remote location. The RMU lets you use a web browser and the library's StorWatch Specialist software application to perform library functions.

## **11 Tape drive sled**

The container that houses an IBM Ultrium Tape Drive within the library. The sled allows the drive to easily slide into or from the library. The library can hold six sleds.

## **12 ac power supply**

The electrical component that converts standard ac current to the lower-voltage dc current that is used by the library.

## **13 dc power supply**

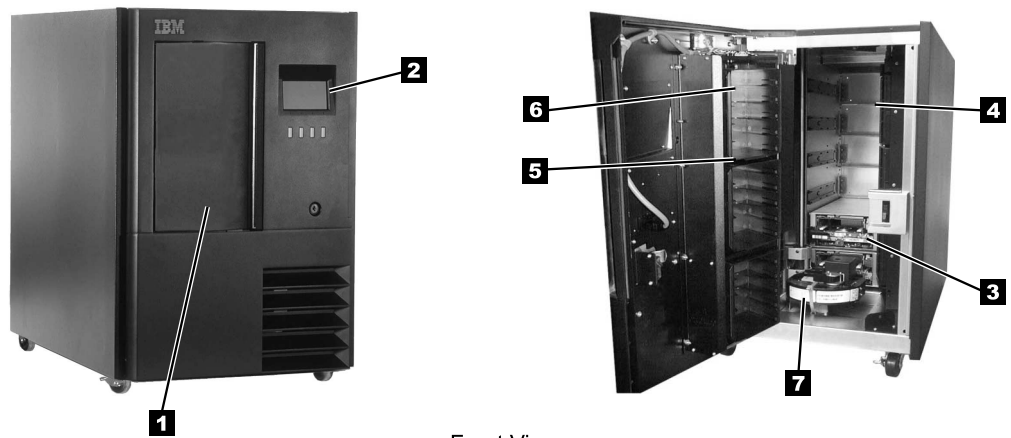
The electrical component that provides dc power to library components.

## **14 Redundant dc power supply (optional)**

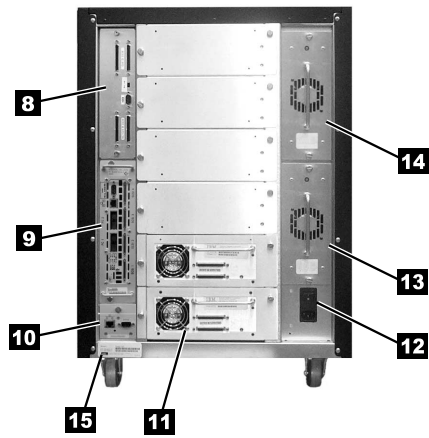
An electrical component that provides auxiliary power if the main power supply fails.

## **15 Serial number**

Located on a label, the serial number of the 3583 Tape Library. The serial number also appears on a label inside the front door.



Front View



Rear View

Figure 4. The 3583 Ultrium Scalable Tape Library and its components

a67nc209

## Door

The front door of the 3583 Tape Library (see **1** in Figure 5) lets you access the magazines and cartridge storage slots that are mounted within. The operator panel **2**, I/O station **3**, door handle **4** and keylock (with key) **5** are all mounted on the door. To unlock and open the door, insert the key into the keylock and turn it counterclockwise approximately 180°.

If you open the door of the 3583 Tape Library during operation, the library fails the active operation and rejects new requests for operations until the door is closed. After approximately 15 seconds, the library performs an inventory update (a process that determines whether cartridges have been added to or removed from the library, or moved within the library). Following the inventory, the library accepts new requests for operations.



Figure 5. Door of the 3583 Tape Library

## I/O Station

The I/O station lets you insert and remove cartridges without interrupting the normal operation of the 3583 Tape Library. Two types of the I/O station are available:

- **Single-slot I/O station** Holds one IBM LTO Ultrium Tape Cartridge.
- **12-slot I/O station** Holds twelve IBM LTO Ultrium Tape Cartridges. The cartridges are contained in two removable magazines. A fixed magazine that contains six storage slots is housed inside the front door (below the door of the I/O station).

Figure 6 shows the two types of I/O stations.



*Figure 6. Types of I/O stations in the 3583 Tape Library. The single-slot I/O station is on the left; the 12-slot I/O station is on the right.*

To open the door of the I/O station, grasp the handle on the right and pull the door toward you. To close it, push the door until it is properly seated. After you close the door, it automatically locks while the library performs an inventory of the I/O station. The door unlocks after the inventory is complete.

You can configure the 12-slot I/O station as twelve additional storage slots. For information about the quantity of storage slots, see “Library Columns” on page 12. To configure additional storage slots, see the Config Dialog portion of the “Utils Submenu” on page 126.

# Library Columns

The 3583 Tape Library can have up to five storage columns. Column 1 contains a single-slot or 12-slot I/O station. Column 2 contains cartridge storage slots and is standard in all libraries. Column 3 contains drives. Columns 4 and 5 may be optionally installed and contain cartridge storage slots. Beginning with Column 1 (the I/O station column), the columns are ordered clockwise. Figure 7 shows the arrangements of the columns within the library.

Each cartridge column contains three magazines, each of which holds six storage slots. The magazines within each column are designated A to C from top to bottom. The slots within each magazine are numbered 1 to 6 from top to bottom. The drives within the drive column are designated 1 to 6 from bottom to top (see Figure 7).

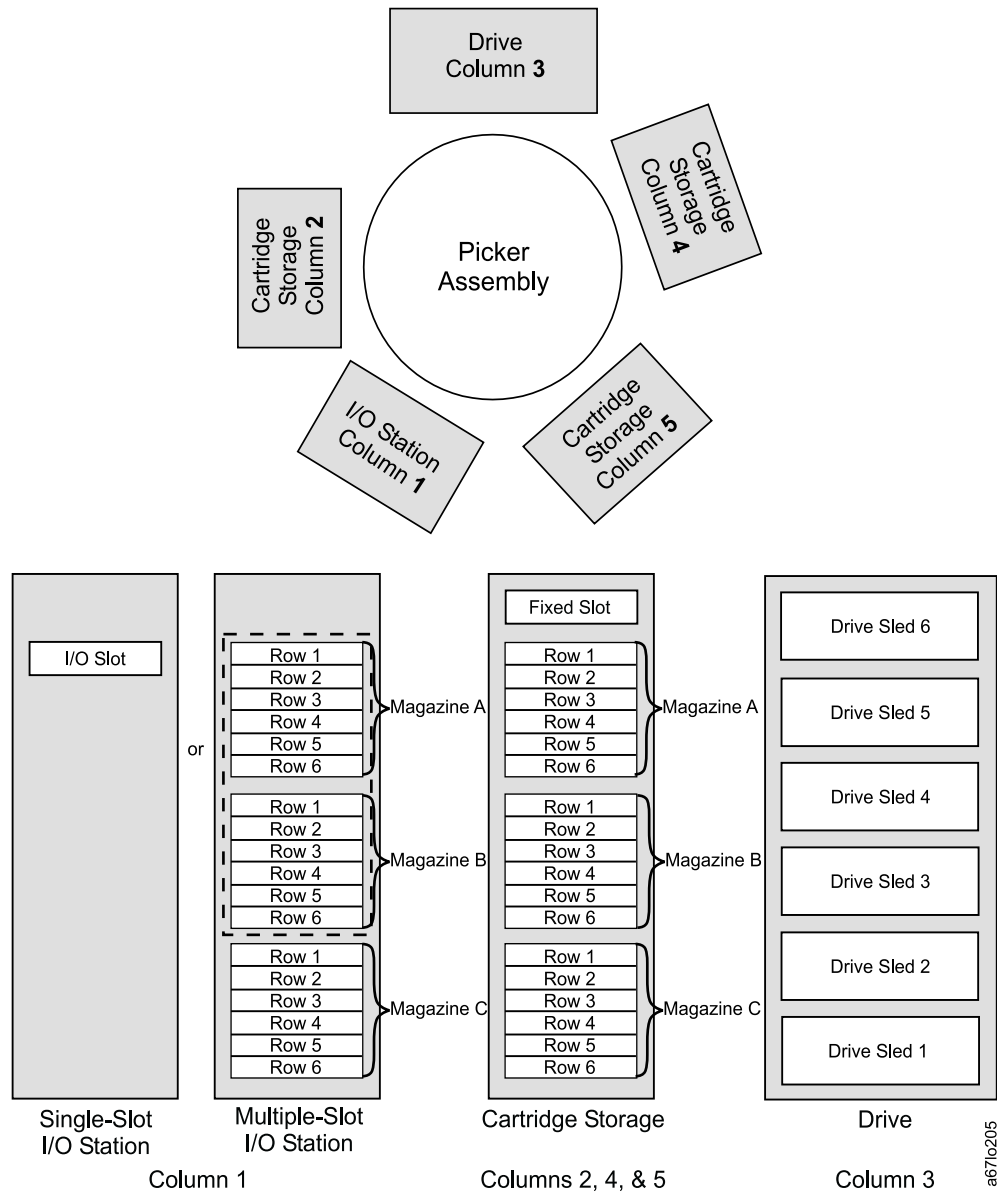


Figure 7. Storage columns in the 3583 Tape Library

To move the media in the library, the server references each movement with source and target designations. The server does this by using element addressing, which specifies which slots to use. For information about element addressing, see Appendix B, “Element Addressing” on page 177.

The total number of slots available per storage column is 19. However, the server can only access 18 slots because the fixed, nonaddressable slot at the top of columns 2, 4, and 5 is reserved for future use and is not available. The bar code reader cannot read the label of a cartridge that is stored in the fixed slot.

Table 2 gives I/O and storage slot configurations for each model of the 3583 Tape Library.

*Table 2. Tape library configurations*

Model	Cartridge Storage Columns Installed	Single-Slot I/O Station Installed	12-Slot I/O Station Installed	
			Configured as I/O Station	Configured as Storage Slots
L18	2	Storage Slots: 18 I/O Slots: 1	Storage Slots: 24 I/O Slots: 12	Storage Slots: 36 I/O Slots: 0
L36	2, 4	Storage Slots: 36 I/O Slots: 1	Storage Slots: 42 I/O Slots: 12	Storage Slots: 54 I/O Slots: 0
L72	2, 4, 5	Storage Slots: 54 I/O Slots: 1	Storage Slots: 60 I/O Slots: 12	Storage Slots: 72 I/O Slots: 0

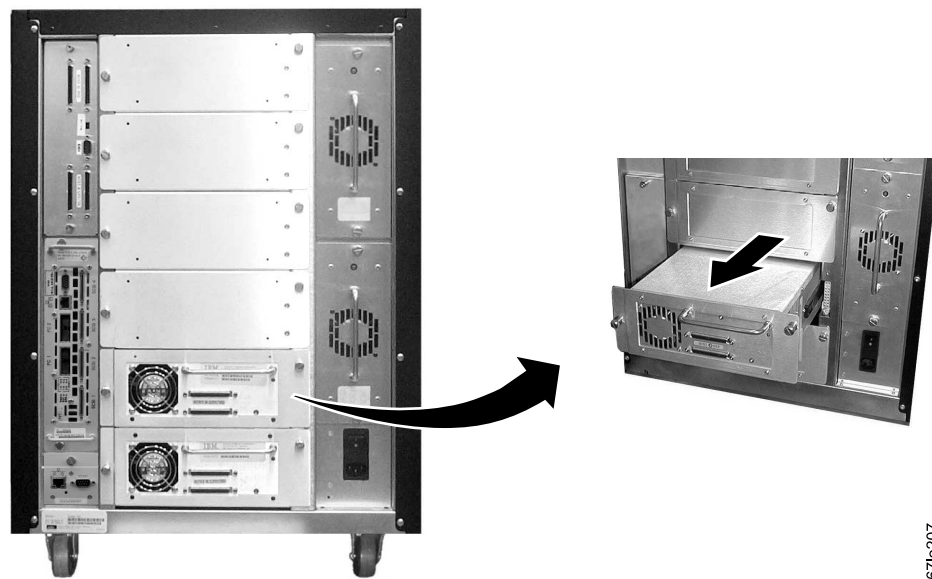
## Tape Drives and Drive Sleds

The 3583 Tape Library supports the IBM Ultrium Tape Drive and uses one of the following SCSI interfaces:

- LVD/SE, Ultra2 SCSI interface
- HVD/DIFF, Ultra SCSI interface

Although the library can contain both LVD and HVD drives, both types of drives cannot reside on the same SCSI bus.

Each tape drive in the 3583 Tape Library is packaged in a container called drive sled. The drive sled is a field replaceable unit (FRU), and is designed for quick removal and replacement in the library. Figure 8 shows the drive and drive sled in the library.



a671b207

*Figure 8. Tape drive in the 3583 Tape Library. The tape drive is contained in a removable drive sled. The view is from the rear of the library.*



## Robotic System

The robotic system identifies and moves cartridges between the storage slots, tape drives, and the I/O station. The system includes the following components:

- A picker assembly for mounting a cartridge picker and the bar code scanner.
- A cartridge picker for picking and placing cartridges in storage slots, tape drives, or the I/O station.
- A bar code scanner for reading the external labels on the cartridges. The library uses the bar code scanner during the inventory process to locate and categorize all cartridges. The bar code scanner is also used during the teaching process where it reads the fiducial labels (the bar code labels on the columns and the magazines) to identify the types of storage and tape drives installed in the library.
- A vertical (Y) axis drive for moving the picker assembly vertically in the library.
- A rotary (X) axis drive for moving the picker assembly between storage and drive columns.
- A reach (Z) axis drive for moving the picker assembly's gripper in a forward and backward motion.

## RMU with StorWatch Specialist

When used with a supported web browser, the Remote Management Unit (RMU) provides remote access to the library over a network. The RMU supports Microsoft Internet Explorer version 4.0 and above, as well as Netscape Navigator versions 4.01, 4.5, and 4.7X. By attaching the library to the network (through a 10/100 Ethernet port on the RMU) and by using a supported web browser, you can access the library through any server on the network. The RMU lets you access all available functions without a dedicated server or separate software. In addition, when you use the RMU with the StorWatch Specialist you can perform the following functions remotely:

- Check system status, library and drive conditions, and firmware levels
- Perform all library operator panel functions
- Update firmware in the RMU, the library controller, and the tape drives
- Retrieve the library command and error logs and the RMU error log
- Configure changes, such as network, users, date, and time
- Access online documentation about the library

The RMU supports the Simple Network Management Protocol (SNMP) version 2.0 and can act as an SNMP server by responding to SNMP requests and generating SNMP traps. An internal library serial interface enables the RMU to acquire TapeAlert 3.0 compatibility information from the drives and to send this information to an SNMP server. In the event of a power loss, the RMU will detect the loss and generate an SNMP trap for notification.

## Power

For the 3583 Tape Library, the initial connection to a power source is through the ac power supply. The library's dc power is provided by its dc power supply. In the event of power failure, an optional redundant dc power supply is available to continue the library's operation.

Each drive sled in the 3583 Tape Library has its own dc power supply. Thus, if one drive fails other drives are not affected.

## SAN Data Gateway Module with StorWatch Specialist

The Storage Area Network (SAN) Data Gateway Module is a hardware component that, when installed in the 3583 Tape Library, serves as an interface between the library and a SAN or Fibre Channel server. When you install the gateway into the library, the gateway connects the SCSI devices in the library to the SAN or to a Fibre Channel server.

Fibre Channel connectivity provides the library with important advantages:

- **Enhanced library sharing.** Sharing the library between multiple servers is easier in a SAN environment.
- **Increased distances.** Distances allowed between the server and the library are greatly extended.
- **Efficiency of interconnection.** With a capability of up to 200 MB per second, each Fibre Channel port of the gateway can support multiple devices, thereby saving the cost of using a switch port for every device.
- **Redundancy.** With two Fibre Channel ports, the gateway provides redundant paths into the library.

The gateway includes two Fibre Channel interfaces and four SCSI interfaces (interfaces are also known as ports). The Fibre Channel ports of the gateway connect to the SAN or to a Fibre Channel server. They provide two independent paths to the SCSI devices in the library. The SCSI ports of the gateway connect to the library's medium changer and tape drives.

A tape library that is attached to a SAN is available to all servers on the SAN. The gateway and all attached devices appear on the SAN or Fibre Channel server as a single Fibre Channel loop ID (LID), with each device addressable at a unique logical unit number (LUN) of that ID. The gateway's address assignments are persistent. They will survive the power-up cycles of the library, power-up cycles, and server.

The gateway supports any of three available Fibre Channel topologies: point-to-point, arbitrated loop, or switched fabric. It also can function in a public or private loop environment.

By using its StorWatch Specialist application, the gateway supports remote management, configuration, and event notification over an Ethernet connection. It can log and analyze events, and runs periodic health checks for predictive failure analysis. These management, configuration, and remote notification capabilities are accessible by using the industry-standard SNMP protocol.

The gateway also includes a data mover option that enables server-free backup. This option will be implemented in a later release. The data mover will let you move data from disk to tape (backup) or from tape to disk (restore) without tying up valuable system resources.

## Specifications

Table 3 lists the specifications for the 3583 Tape Library. Specifications for tape cartridges are given in “Environmental and Shipping Specifications for Tape Cartridges” on page 161.

Table 3. Specifications for the 3583 Tape Library

Physical Specifications			
Specification	Dimension		
Width	48.1 cm (18.9 in.)		
Depth	73.5 cm (28.9 in.)		
Height	68.5 cm (27.0 in.) (with casters)		
Weight	65.8 kg (145 lb) (minimum configuration, no cartridges)		
	101.6 kg (224 lb) (maximum configuration, no cartridges)		
	118.4 kg (261 lb) (maximum configuration, with cartridges)		
Height of library in rack	14 EIA units		
Power Specifications			
Voltage	100 to 240 Vac, 50 to 60 Hz		
Current for 100 Vac	7.0 A		
Current for 240 Vac	3.5 A		
Maximum Electrical Power	0.840 kVA		
Inrush Current	45 A at 120 Vac, 90 A at 208 Vac		
Environment Specifications			
Environmental Factor	Operating (see Note)	Storage	Shipping
Temperature	10 to 38°C* (50 to 100°F)	-40 to 60°C (-40 to 140°F)	-40 to 60°C (-40 to 140°F)
Heat Output	542 W (483 Cal/Hr)	Not applicable	Not applicable
Relative Humidity	20 to 80%	10 to 90%	10 to 90%
Maximum Wet Bulb Temperature	26°C (79°F)	Noncondensing	Noncondensing
Maximum Noise Level (operating/idle)	69/69 dB	Not applicable	Not applicable
Maximum Altitude	2500 m (8202 ft)	Not applicable	Not applicable
<p><b>Note:</b> The operating environment of the library must not conflict with the media storage requirements (see “Environmental and Shipping Specifications for Tape Cartridges” on page 161). While the library may be capable of operating at elevated temperatures for an extended period of time, the temperature could shorten the useful life of media that is stored in the library. If media is stored in the library for more than 10 hours, the storage temperature requirements for media should be met. It should be assumed that media stored in the library will be 2 degrees above ambient room temperature when the library is powered on.</p>			

## Product Environment

The 3583 Tape Library meets the acoustical requirements for a data processing center.

To allow for service access, install the library a minimum of 0.9 m (3 ft) from all obstacles.

The library is a precision computer peripheral. To ensure its maximum longevity, use the following guidelines:

- Place the library away from dust, dirt, and airborne particulates.
- Keep the library away from high-traffic areas, especially if the floor is carpeted. Carpeting harbors dust, and people walking on the carpet can cause the carpet fibers and dust to become airborne.
- To avoid toner residue and paper dust, keep the library out of printer rooms. Do not store paper supplies next to the library.
- Keep the library away from moving air that is caused by doorways, open windows, fans, and air conditioners.
- Keep the library's doors closed to minimize any contamination from airborne particles.

Table 4 shows particulate limits and Table 5 shows corrosive gas limits for the 3583 Tape Library.

*Table 4. Particulate limits for the 3583 Tape Library*

Particulate Limits	Suspended Particulates ( $\mu\text{g}/\text{m}^3$ )	Settleable Particulates ( $\mu\text{g}/\text{cm}^2$ )
	Base Sampling Period 24 hours	Sample Collection Time 30 days
Annual average	150	500
50% of values are less than:	138	460
84% of values are less than:	207	690

*Table 5. Corrosive gas limits for the 3583 Tape Library*

Typical Environment Pollutant	Concentration Limits—Annual Arithmetic Mean ( $\mu\text{g}/\text{m}^3$ )
Total Reduced Sulfur ( $\text{S}_x$ )	3.2
Acidic Chlorine Gases ( $\text{Cl}_x$ )	1.5
Sulfur Dioxide ( $\text{SO}_2$ )	100.0
Nitrogen Dioxide ( $\text{NO}_2$ )	140.0
Total Oxidant ( $\text{O}_3$ )	98.0

---

## Tape Drive Performance

The Ultrium Tape Drive is capable of a maximum sustained native data rate of up to 15 MB per second. With careful planning, and an optimized library and server configuration, you can achieve maximum tape drive performance. Variables that affect performance include:

- Use of data compression on tape cartridges
- Simultaneous communication of multiple drives on the same data pathway
- Type of interface (HVD/DIFF or LVD/SE) that is used by the tape drive that is attached to the SCSI bus
- Quantity of tape drives that are on the SCSI or Fibre Channel pathways
- Type and speed of Fibre Channel elements (a hub or a fabric; a 1-Gbit or 2-Gbit speed)
- Block size and other parameter settings of the backup application
- Capability of the server that is dedicated to the backup application
- Capability of internal host bus
- Performance of a disk drive and disk drive adapter
- Average file size
- Tape and disk drives that use the same host bus adapter (not recommended)

The sections that follow describe some of the variables.

### Using Data Compression

If you use data compression (hardware data compression in the tape drive), data rates may increase. An improved data rate depends on whether the data to be processed can be compressed. Some data can be compressed; other data cannot. Exact compression ratios are difficult to predict and may vary greatly from file to file during a backup operation. Compression does not guarantee a multiplication factor above the maximum sustained data rate; it only provides an additional boost over the real, uncompressed data rate. That is, compression refers to the density of data on the tape and may not mean an increased data rate.

For example, due to other performance variables a drive may operate at a sustained uncompressed data rate of 8 MB per second (which is about half of the maximum). If the data is capable of 2:1 compression, an increase in the data rate may be possible. The actual data rate may not double to 16 MB per second if some other factor (like those previously listed) restricts the data rate.

**Important:** Running compression on the tape drive does not guarantee a 2:1 compression ratio, nor does it guarantee a doubling of the maximum sustained data rate.

### Operating Multiple Tape Drives Concurrently

Under certain circumstances, your library will operate more efficiently if it is installed with multiple drives that do not run concurrently.

If your library is installed with multiple tape drives and their backup windows overlap (meaning the drives operate simultaneously), the drives will contend for the bandwidth of the same data pathway. However, if the library is installed with multiple tape drives and the backup window for each does not overlap, the drives will not contend for the bandwidth of the same data pathway.

For example, if two drives operate at maximum sustained data rates and 2:1 compression ratios and their backup windows do not overlap, they may only use 30 MB per second of available bandwidth. If they both operate simultaneously, they may use 60 MB per second of available bandwidth.

Because many variables can affect drive performance, predicting the performance quality can be difficult. If performance is a key consideration and you expect to use the drives in your library concurrently and with compression on, the following configuration guidelines will help to maximize drive data rates.

- Attach no more than one HVD/DIFF tape drive to an HVD SCSI bus.
- Attach no more than two LVD/SE tape drives to an LVD SCSI bus.
- Zone no more than three tape drives to a Fibre Channel gateway port if it is operating at a speed of 1 Gbit (100 MB per second).

**Note:** If concurrent tape drive performance is not a key consideration, fewer restrictions are necessary and enable more flexibility in the configuration. For example, you could add more tape drives to your SCSI bus.

## Types of Interfaces and Quantity of Tape Drives

Ultra SCSI HVD buses have a bandwidth of 40 MB per second and Ultra2 LVD SCSI buses have a bandwidth of 80 MB per second. If the combined data rate of the tape drives on a SCSI bus exceeds the bandwidth of the bus, the tape drive performance may be limited. For example, if two tape drives are performing at maximum sustained data rates with 2:1 compression ratios, each may operate at 30 MB per second. If both drives run simultaneously, their combined data rate may be 60 MB per second. This exceeds the bandwidth of the HVD bus, but is within the bandwidth of the LVD bus. Performance may be limited on the HVD bus with two drives running simultaneously.

In the Fibre Channel environment, 1-Gbit Fibre Channel devices have a bandwidth of 100 MB per second and 2-Gbit Fibre Channel devices have a bandwidth of 200 MB per second. The SAN Data Gateway Module attaches to either 1- or 2-Gbit Fibre Channel devices and runs at the respective bandwidths. However, although all six of the library's drives can be accessed through one Fibre Channel port, a performance limitation could be introduced by aggregating too many tape drives on one data pathway. If performance is a key consideration, always distribute the drives evenly over the two available Fibre Channel ports.

The iSeries servers support Fibre Channel arbitrated loop protocol. They support multiple iSeries servers with a single-device target per loop. The single device target ID may have multiple LUNs. Because each port of the library's gateway appears as a single-device target ID with multiple LUNs (the drives and medium changer), the library can be shared by multiple iSeries servers on the same loop. Because each port of the library's gateway is its own target ID, both ports may not be attached to the same loop. Each port can be attached to different loops, and in this configuration all iSeries servers attached to both loops may share the library. In a one-port arrangement, the number of drives on the loop should match the bandwidth of the port. With two ports used, twice the number of drives could be installed in the library.

## Other Special Considerations

For the purposes of planning for performance, the bandwidth that is consumed by the medium changer is considered negligible compared to a tape drive. The medium changer can be attached to any Fibre Channel gateway or any convenient SCSI bus with no performance implications.

Some of the variables that affect tape drive performance cannot be controlled by library configuration. The parameter settings of the backup application, the host bus structure, disk drive and disk drive adapter performance, the average file size, and the bandwidth of the server that is dedicated to the backup application can all affect maximum achievable tape drive data rates. To understand more about these variables, consult backup application, disk drive, adapter, or server documentation.





---

## Chapter 2. Installation

**Attention:** The 3583 Tape Library is a customer setup unit. It is the customer's responsibility to install this product.

To ensure optimum performance, obtain the latest level of firmware from the web by visiting <http://www.storage.ibm.com/hardsoft/tape/1to/index.html>. After you access the web site, select Technical Support to locate and download the firmware. Be sure to verify that you have the latest firmware installed on your machine before you contact IBM for any necessary technical support.

If you choose not to install this product yourself, IBM will install it for a fee. You can purchase installation services by contacting your local IBM Service office or your IBM Business Partner.

---

### Installation Overview

Table 6 gives an overview of the steps that are required to install the 3583 Tape Library. The installation is complete after you perform all of the steps.

Table 6. Overview of the installation procedure

Step	Description	Page Location
1	Unpack the library	23
2	Install a rackmount library	24
	Install a stand-alone library	28
3	Install any of the optional features listed in Table 1 on page 6.	
4	Attach the SCSI or Fibre Channel cables	47
5	Power-on and run the FAST Read/Write tests	52
6	Configure the RMU	56
7	If installed, configure the SAN Data Gateway Module. Refer to the <i>IBM Storage Area Network Data Gateway Module Setup, Operator, and Service Guide</i> .	Not applicable
8	If necessary, set the SCSI IDs	60
9	If necessary, update the firmware for the drive and the library	62
10	If necessary, install the host bus adapter	62
11	If necessary, install IBM device drivers and commercial backup application software	62
12	Configure the library to the server	62

---

### Step 1. Unpacking the Library

To unpack the 3583 Tape Library, read the printed instructions located on the shipping container.

Inspect the library for shipping damage. If there is damage, do not install the it. Report the damage immediately by contacting your place of purchase.

---

## Step 2. Deciding the Physical Configuration

You can install the 3583 Tape Library as a stand-alone model or in a standard 19-inch rack (14 U of space is required):

- To install the library as a stand-alone unit, go to “Installing a Stand-Alone Library”.
- To install the library in a rack, go to “Installing the Library into a Rack (optional)” on page 28.

### Installing a Stand-Alone Library

Before you begin the installation, complete the following tasks.

- Familiarize yourself with the installation instructions and understand the requirements for connecting cables between the server, the library, and the tape drives.
- Use the inventory checklist to verify that you have received the items that are required for installation.

#### Reviewing the Inventory Checklist

- \_\_\_ 1. Front door key (taped to the back of the library)
- \_\_\_ 2. Power cord (for the appropriate cord for your country or region, see Appendix F, “Power Cords” on page 191)
- \_\_\_ 3. Up to six optional Ultrium Tape Drives with drive-to-drive SCSI cable (0.4 m) and terminator
- \_\_\_ 4. Host-to-device SCSI bus (signal) cable, 4.5 m or 5 m (as specified or ordered)
- \_\_\_ 5. Device-to-device SCSI bus (signal) cable (0.7 m) for connection between the SCSI host interface board and the first drive
- \_\_\_ 6. LVD/SE single-connector SCSI wrap tool or HVD/DIFF single-connector SCSI wrap tool, or both
- \_\_\_ 7. Serial cable (straight through; that is, the cable’s wires connect to identical connector pins on each end)
- \_\_\_ 8. Optional SAN Data Gateway Module (if ordered)
  - \_\_\_ a. Four VHDCI-to-HD68 SCSI bus (signal) cables (0.6 m)
  - \_\_\_ b. Two 2-Gbit GBICs (installed in gateway)
  - \_\_\_ c. *IBM Storage Area Network Data Gateway Module Setup, Operator, and Service Guide*
  - \_\_\_ d. Service accessory kit:
    - VHDCI-to-VHDCI SCSI wrap cable (0.5 m)
    - SC-to-SC Fibre Channel coupler block
    - Gateway service tools:
      - Null modem cable
      - Ethernet wrap tool
      - Fibre Channel wrap tool
- \_\_\_ 9. IBM LTO Ultrium Data Cartridge
- \_\_\_ 10. IBM LTO Ultrium Cleaning Cartridge
- \_\_\_ 11. Device driver kit that includes:
  - CD that contains the Open Systems Device Drivers
  - Copy of the *IBM Ultrium Device Drivers Installation and User’s Guide*

**Note:** Device driver support is subject to change. For information about the latest supported device drivers (and to download them), see “Supported Device Drivers” on page 5.

- \_\_\_ 12. *IBM 3583 Ultrium Scalable Tape Library Quick Reference*
- \_\_\_ 13. *IBM 3583 Ultrium Scalable Tape Library Setup and Operator Guide* (this guide)
- \_\_\_ 14. *IBM 3583 Ultrium Scalable Tape Library Maintenance Information*
- \_\_\_ 15. *IBM Externally Attached Devices Safety Information* manual

**Note:** To ensure that you have the latest publications and the latest firmware, visit the web at <http://www.ibm.com/storage/1to>.

## Performing the Installation Procedure



> 55 kg  
(121.2 lb)



### CAUTION:

The weight of this part or unit is more than 55 kilograms (121.2 pounds). It takes four people with a lifting device to safely lift this part or unit.

There are no required tools for installing a stand-alone library

1. Use the sling (see **1** in Figure 9) that is shipped with the 3583 Tape Library to lift and move the library into place. It is recommended that four people use the handles **2** of the sling to lift the library. If you are installing the library on a raised floor, place the hole cutout under the rear of the frame.



a6710122

Figure 9. The sling for lifting the 3583 Tape Library

2. Lock the two front casters **1** in place by turning the latch **2** counterclockwise (see Figure 10).

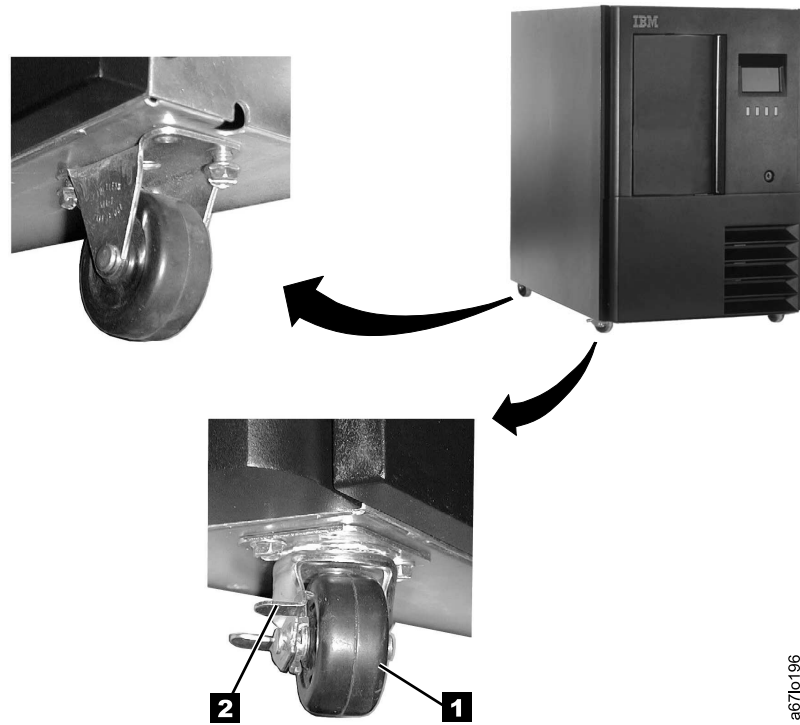


Figure 10. Locking front casters

3. Open the front door **1** by using the key **2** (see Figure 11).
4. Remove the band **3** that secures the picker assembly **4** to the frame.

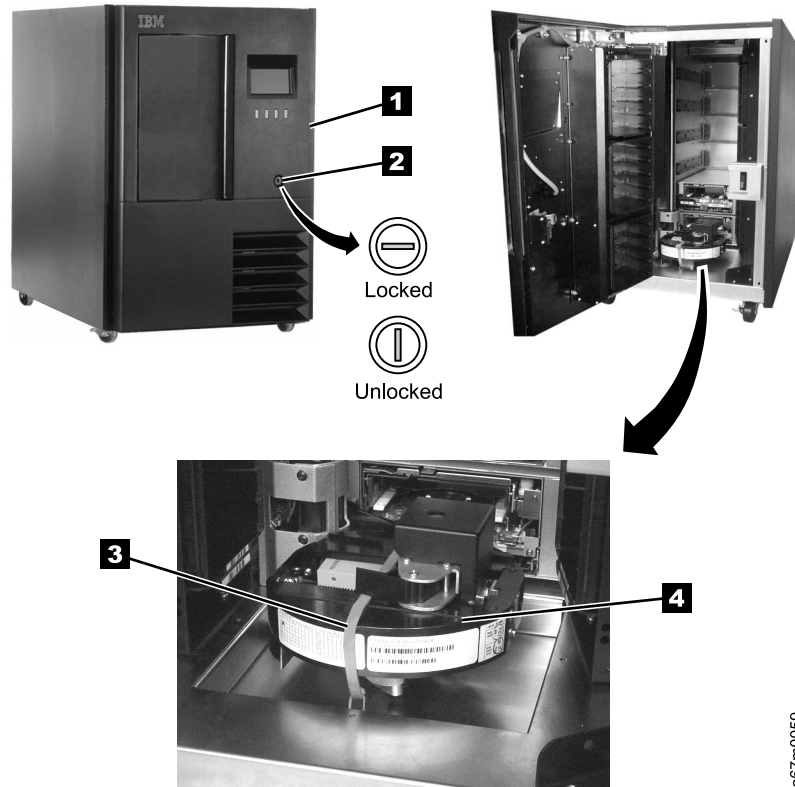


Figure 11. Installing a stand-alone library

5. Close the front door securely.
6. Perform one of the following:
  - If you intend to install one or more optional features, go to “Step 3. Installing Optional Features” on page 40.
  - If you do not intend to install an optional feature, go to “Step 4. Attaching the Cables” on page 47.

## Installing the Library into a Rack (optional)

To install the 3583 Tape Library into a rack, the Rackmount Kit (feature code 8006) is required.

Before you begin the installation, complete the following tasks.

- Familiarize yourself with the installation instructions and understand the requirements for connecting cables between the server, the library, and the tape drives.
- Use the inventory checklist to verify that you have received the items that are required for installation.

### Reviewing the Inventory Checklist

- \_\_\_ 1. Front door key (taped to the back of the library)
  - \_\_\_ 2. Power cord (for the appropriate cord for your country or region, see Appendix F, "Power Cords" on page 191)
  - \_\_\_ 3. Up to six optional Ultrium Tape Drives with drive-to-drive SCSI cable (0.4 m) and terminator
  - \_\_\_ 4. Host-to-device SCSI bus (signal) cable (4.5 m or 5 m as specified or ordered)
  - \_\_\_ 5. Device-to-device SCSI bus (signal) cable (0.7 m) for connection between the SCSI host interface board and the first drive
  - \_\_\_ 6. LVD/SE single-connector SCSI wrap tool or HVD/DIFF single-connector SCSI wrap tool, or both
  - \_\_\_ 7. Serial cable (straight through; that is, the cable's wires connect to identical connector pins on each end)
  - \_\_\_ 8. Optional SAN Data Gateway Module (if ordered)
    - \_\_\_ a. Four VHDCI-to-HD68 SCSI bus (signal) cables (0.6 m)
    - \_\_\_ b. Two 2-Gbit GBICs (installed in gateway)
    - \_\_\_ c. *IBM Storage Area Network Data Gateway Module Setup, Operator, and Service Guide*
    - \_\_\_ d. Service accessory kit:
      - VHDCI-to-VHDCI SCSI wrap cable (0.5 m)
      - SC-to-SC Fibre Channel coupler block
      - Gateway service tools:
        - Null modem cable
        - Ethernet wrap tool
        - Fibre Channel wrap tool
  - \_\_\_ 9. IBM LTO Ultrium Data Cartridge
  - \_\_\_ 10. IBM LTO Ultrium Cleaning Cartridge
  - \_\_\_ 11. Rackmount Kit (feature code 8006)
  - \_\_\_ 12. Device driver kit that includes:
    - CD that contains the Open Systems Device Drivers
    - Copy of the *IBM Ultrium Device Drivers Installation and User's Guide*
- Note:** Device driver support is subject to change. For information about the latest supported device drivers (and to download them), see "Supported Device Drivers" on page 5.
- \_\_\_ 13. *IBM 3583 Ultrium Scalable Tape Library Quick Reference*

- \_\_\_ 14. *IBM 3583 Ultrium Scalable Tape Library Setup and Operator Guide* (this guide)
- \_\_\_ 15. *IBM 3583 Ultrium Scalable Tape Library Maintenance Information*
- \_\_\_ 16. *IBM Externally Attached Devices Safety Information* manual

**Note:** To ensure that you have the latest publications and the latest firmware, visit the web at <http://www.ibm.com/storage/1to>

### Reviewing the Guidelines

For proper library operation and to meet safety requirements, review the following guidelines before performing the installation:

- Do not install the 3583 Tape Library in a rack where the maximum internal ambient temperature will exceed 38°C.
- Do not install the 3583 Tape Library in a rack where the airflow is compromised. Do not block or otherwise restrict airflow to the power supply front or rear vents.
- When installing the 3583 Tape Library into a rack, ensure that a hazardous condition is not created due to uneven mechanical loading. If the rack has a stabilizer, it must be firmly attached before you install or remove the library.
- The 3583 Tape Library requires 6 amps of power with an input of 100 Vac or 3 amps with an input of 240 Vac. Connect the library to the power supply circuit so that the overloading of circuits does not compromise the supply wiring or overcurrent protection.
- Ensure that the 3583 Tape Library is properly grounded when in the rack (see step 10 on page 38).
- Use the sling (see **1** in Figure 9 on page 25) that is shipped with the 3583 Tape Library to lift and move the library into place. It is recommended that four people use the handles **2** of the sling to lift the library.



Figure 12. The sling for lifting the 3583 Tape Library

### Unpacking the Rackmount Kit

1. Open the shipping carton and remove the components of the kit (see Figure 13 on page 30).
2. Verify that you received the parts listed in Table 7 on page 30.

Table 7. Components of Rackmount Kit

Component Number	Description	Quantity
<b>1</b>	Screw, pan head Phillips, M5 x 16 mm, .8 pitch, black zinc	10
<b>2</b>	Finishing washer, M5, black polyamide	10
<b>3</b>	Cage nut, M5 (for rack rails that have square mounting holes)	10
<b>4</b>	Clip nut, M5 x .8, steel (for rack rails that have round mounting holes)	10
<b>5</b>	Front mounting bracket	2
<b>6</b>	Rear mounting bracket	2
<b>7</b>	Screw, flat head, 8–32 x 3/8 in.	4
<b>8</b>	Screw, pan head Phillips, 8–32 x 3/8 in.	2
<b>9</b>	Rear stop bracket	1
<b>10</b>	Nut, with integral lock washer, 8–32	2
	Power cords (not shown)	2

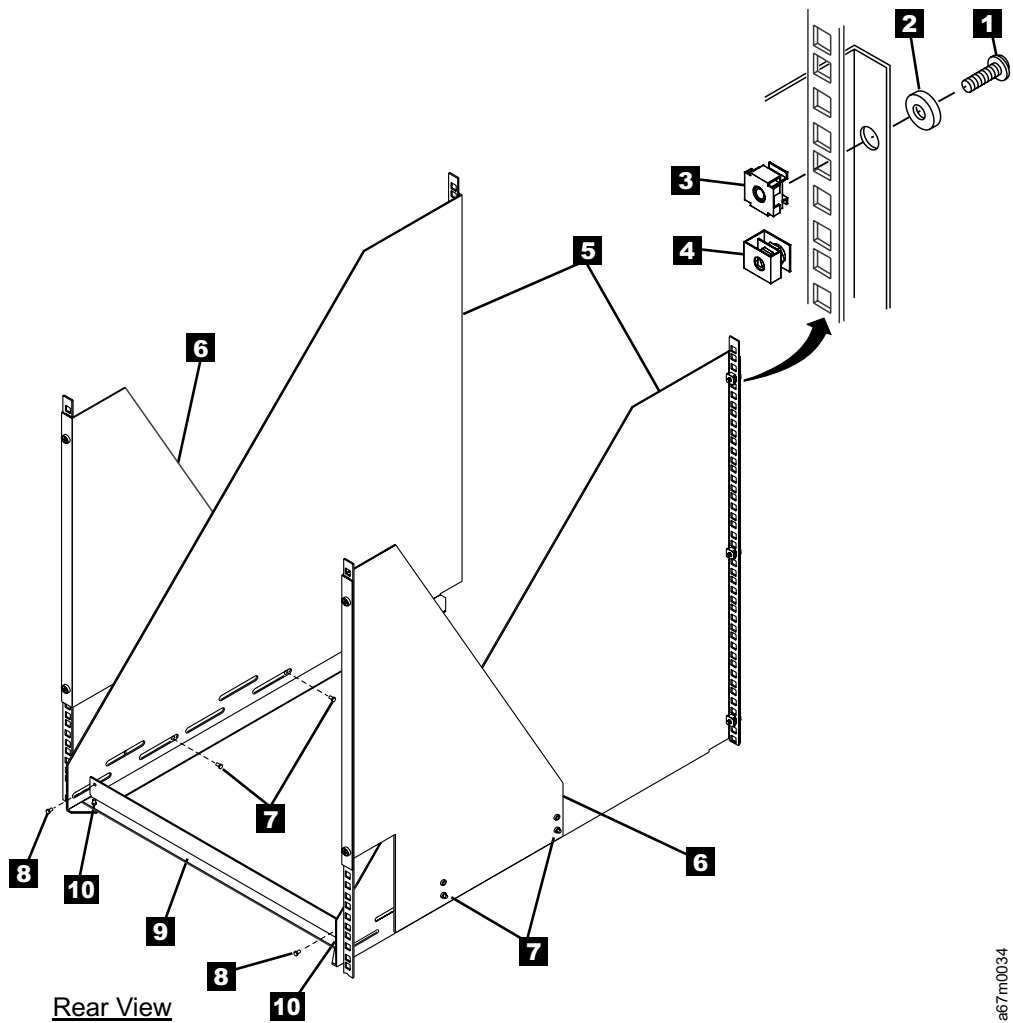


Figure 13. Components of the rackmount kit

a67m0034



## Installing the Rackmount Hardware

**Required tools (not supplied):** Phillips screwdriver and a 11/32-in. nut driver or wrench.

1. The 3583 Tape Library requires 14 U of space in a standard 19-in. rack. Ensure that the space is available and allocated in the rack.

**Note:** Each U is 4.45 cm (1.75 in.) and is usually marked by three holes in the rack (see Figure 14).

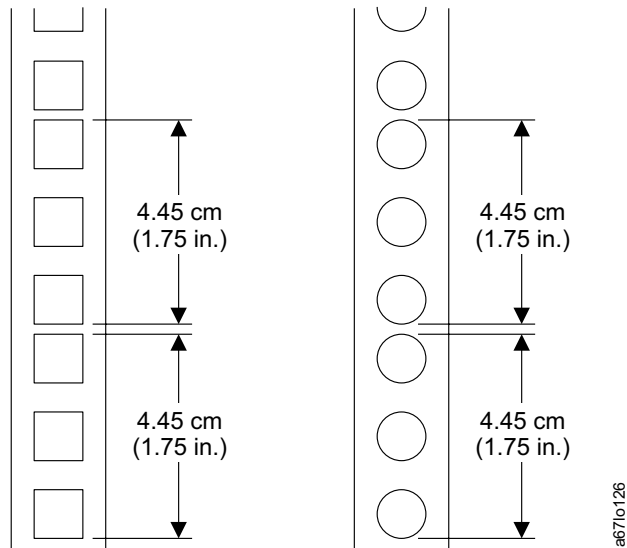


Figure 14. Example of standard racks

2. If you are installing the library into a rack that has a front door, remove the front door to simplify the subsequent steps.
3. If the rack has a stabilizing mechanism, such as wheel locks, ensure that they are locked and the rack is stable before proceeding.

- Place one of the front mounting brackets (see **7** in Figure 15) next to the rail **6**. Using the bracket as a template, install three cage nuts **3** (or clip nuts **4**) into the holes in the rail that are in line with the holes in the mounting bracket. Repeat this step for the second front mounting bracket.

**Note:** Figure 15 shows both clip nuts and cage nuts, but you must install only one type of nut.

- Perform one of the following:
  - For racks with square mounting holes, install cage nuts. Pinch the flanges of the nut together until it fits into the square on the vertical rail, then release the flanges.
  - For racks with round mounting holes, install clip nuts. Slide the clip nut onto the rail until it fits into the hole.
- Position the front mounting brackets **7** so that the flanges **5** are on the outside of the front vertical rails **6**.
- Secure the brackets to the rails with three Phillips screws **1** and three finishing washers **2**.

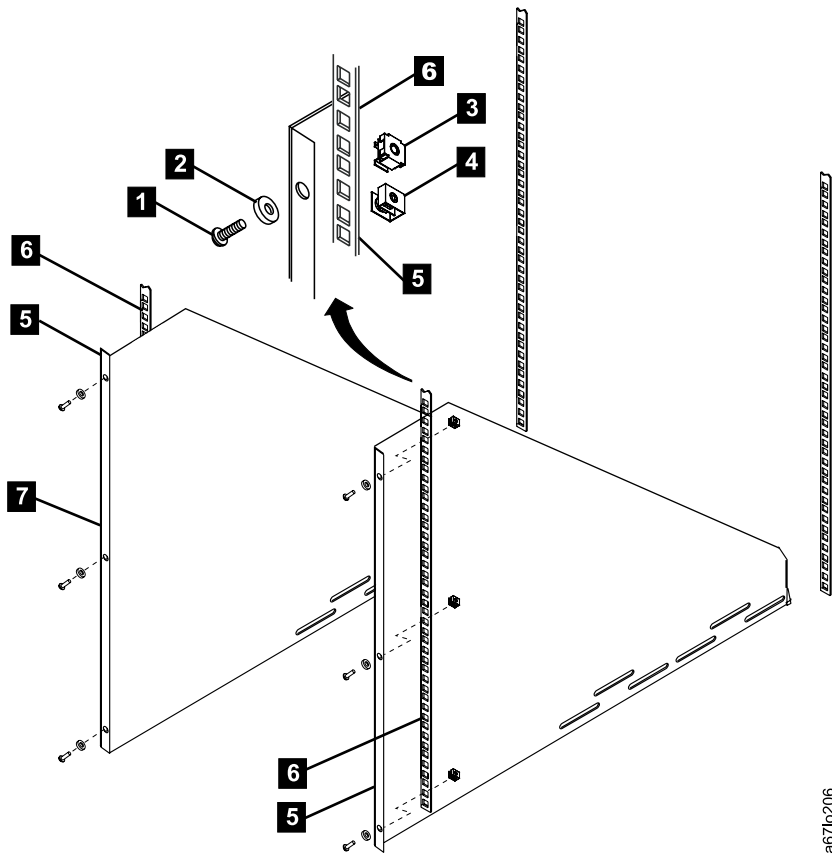


Figure 15. Installing the front mounting brackets

8. Place one of the rear mounting brackets (see **7** in Figure 16) next to the rail **6**. Using the bracket as a template, install two cage nuts **3** (or clip nuts **4**) into the holes in the rail that are in line with the holes in the mounting bracket. Repeat this step for the second rear mounting bracket.
9. Position the rear mounting brackets **7** so that the flanges **5** are on the outside of the rear vertical rails **6**.
10. Secure the brackets loosely to the rails with two Phillips screws **1** and two finishing washers **2**.

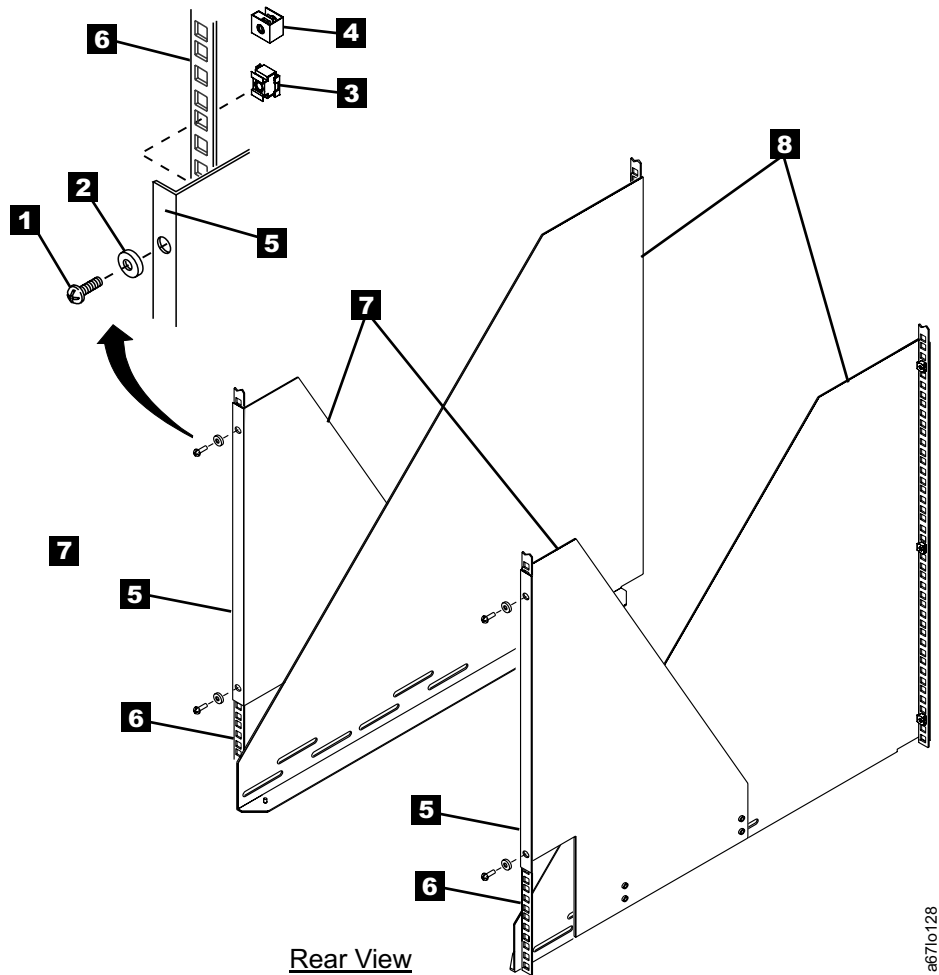


Figure 16. Installing the rear mounting brackets

11. Attach the front mounting brackets (see **2** in Figure 17) to the rear mounting brackets **1** by placing four screws **3** through the slots, two on each side. Secure the brackets loosely by tightening the screws.
12. Place the rear stop bracket **4** on the studs **5** located on the mounting brackets **2**. To have clearance for the rear stop bracket, you may need to push the front mounting brackets against the rear vertical rails. Secure the rear stop bracket by tightening the two nuts **6**.
13. Tighten all nuts and screws.

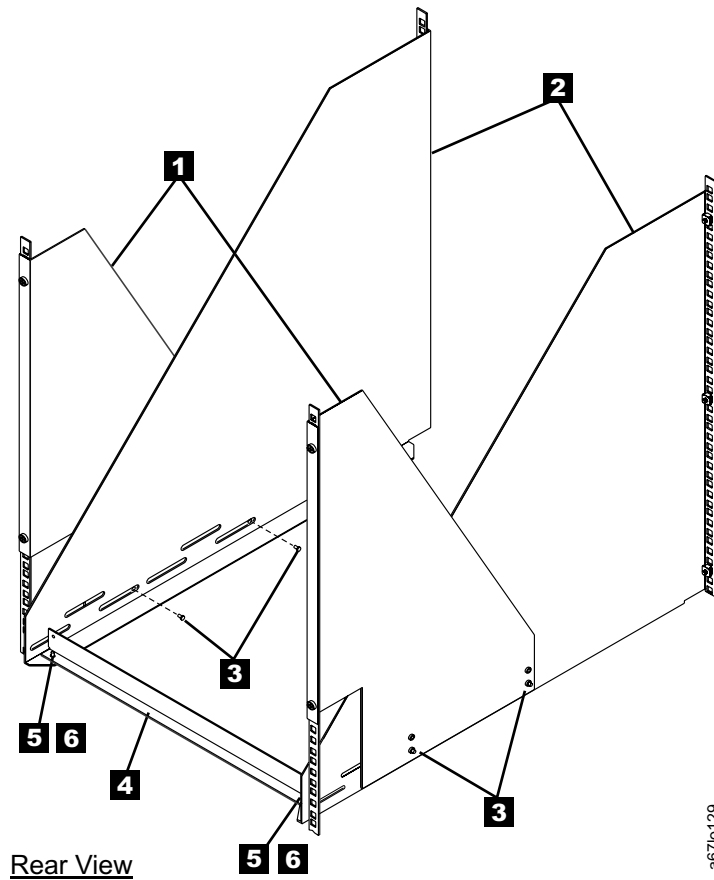


Figure 17. Installing the rear stop bracket

## Placing the Library Into the Rack

Required tools (not supplied): Phillips screwdriver and a 3/8-in. wrench

**Note:** When the library is secured in the rack you will not be able to see the serial number label located on the lower left corner on the back of the library. Locate the serial number label and record the serial number for future reference.



### CAUTION:

The weight of this part or unit is more than 55 kilograms (121.2 pounds). It takes four people with a lifting device to safely lift this part or unit.

1. Open the front door (see **1** in Figure 18) by inserting the key into the keylock **2** and turning it to the right.
2. Remove the band **3** that secures the picker assembly **4** to the frame.

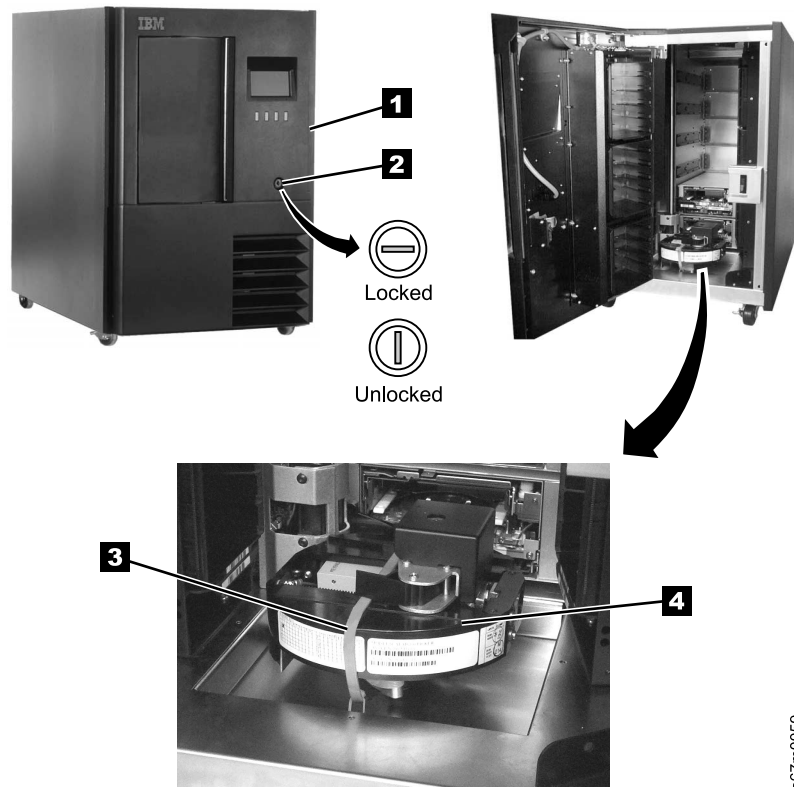


Figure 18. Removing the band that secures the picker

3. Remove all of the cartridges **1** and magazines **2** from the storage columns within the library (see Figure 19).
4. Close the front door securely.

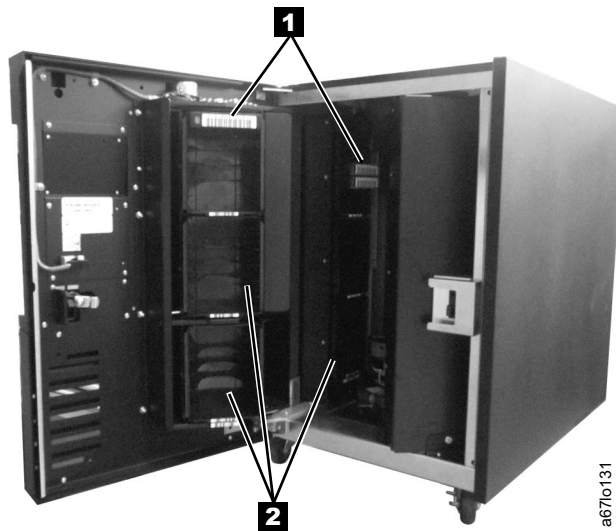


Figure 19. Removing cartridges and magazines

5. To reduce its weight, remove all drive sleds and dc power supplies that are installed in the library. Note the position of the drive sleds as you remove them; you will need to replace them in the same positions. Loosen the captive thumbscrews **1** and slide the drive sled **2** and dc power supply **3** out of the chassis (see Figure 20).

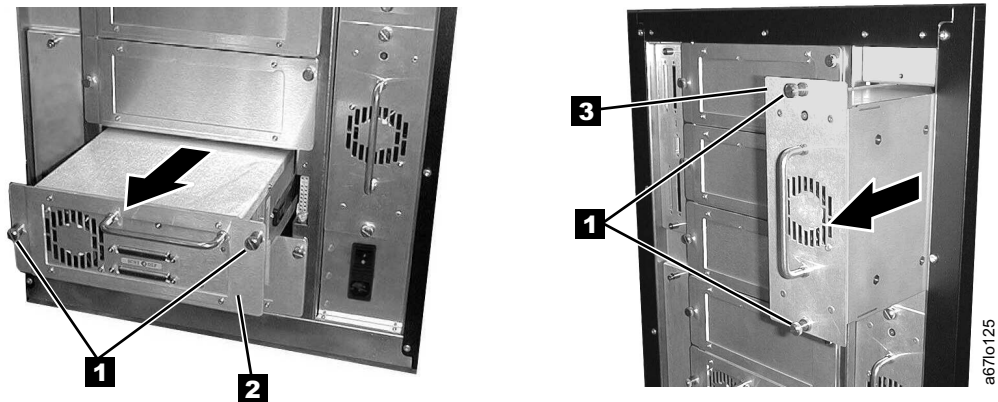
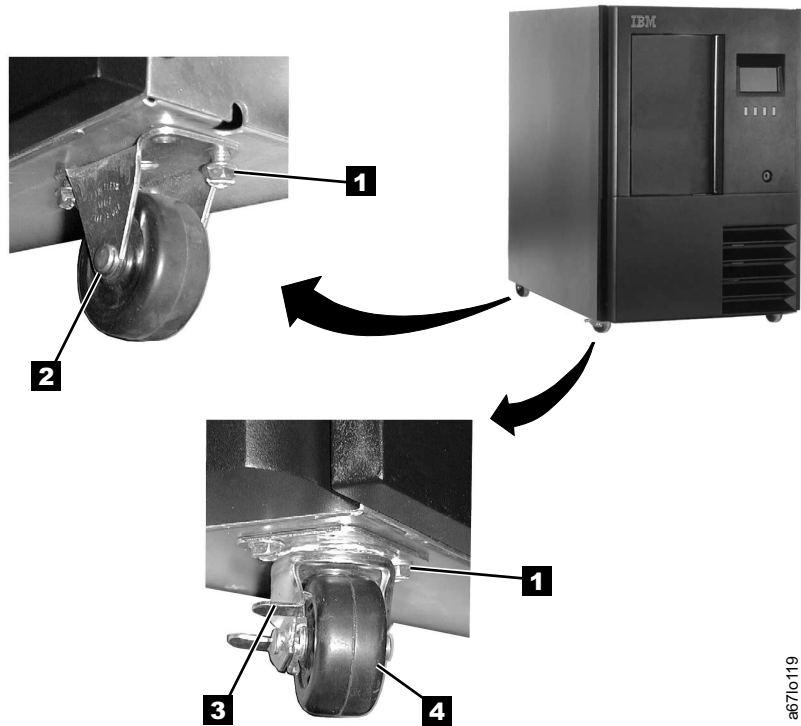


Figure 20. Removing the drive sleds and the DC power supplies

**Note:** For the next procedure, use the sling to place the library onto its side.

6. Remove the four casters (**2** and **4** in Figure 21 on page 37) from the bottom of the library. Use a 3/8-in. wrench to remove the bolts **1** that secure each caster to the frame (there can be up to four bolts).



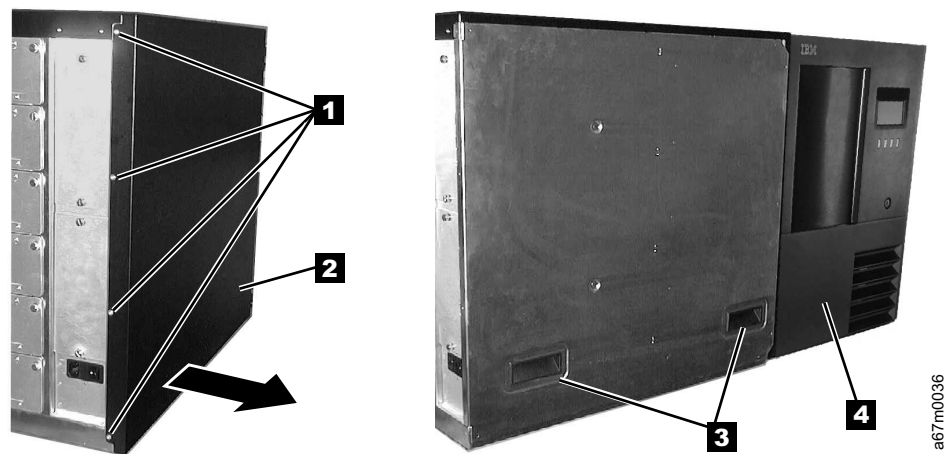
a671o119

Figure 21. Removing the casters

7. Return the library to its upright position.

**Note:** In the step that follows, open the front door (see **4** in Figure 22) completely before removing the side covers.

8. Remove the four Phillips screws **1** that secure each side cover **2**, then remove both side covers.
9. From the front of the rack, use the handles **3** located on both sides of the library to lift the library onto the rackmount hardware.



a67m0036

Figure 22. Removing the side covers

10. Slide the library ( **1** in Figure 23) onto the rackmount hardware until it stops against the rear stop bracket **3** . Using the two Phillips screws **2** , attach the library to the rear stop bracket **3** . This ensures that the library is secured to the rack and is properly grounded.

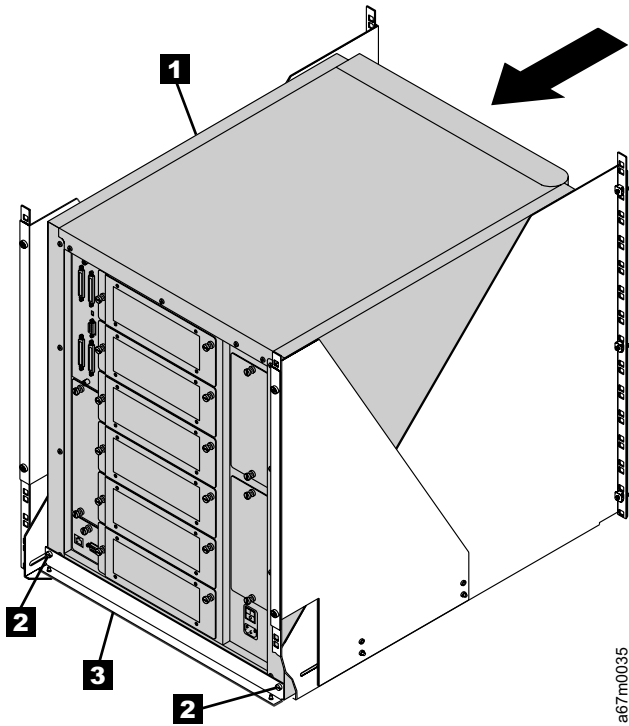


Figure 23. Placing the library into a rack

11. Use the following steps to install the drive sleds that you removed in step 5 on page 36.
  - a. From the rear of the library, locate the drive slot where you want to install a drive sled.
  - b. Slide the drive sled **2** into position and tighten the two captive thumbscrews **1** (see Figure 24).

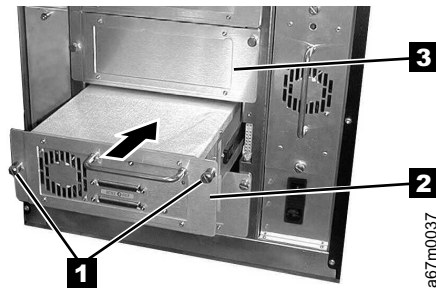


Figure 24. Installing a drive sled





**DANGER**

Up to 240 V ac is present at the power supply connectors when the main power cord is connected to a power source.  
(RSFTD010)

12. Use the following steps to install the dc power supplies that you removed in step 5 on page 36.
  - a. From the rear of the library, locate the slot where you want to install the dc power supply.

**Note:** Before inserting the dc power supply, be sure to orient the power supply so that the light-emitting diode (LED) **3** is located as shown in Figure 25.

- b. Slide the dc power supply **1** into position until it mates with the power distribution board and tighten the two captive thumbscrews **2**.

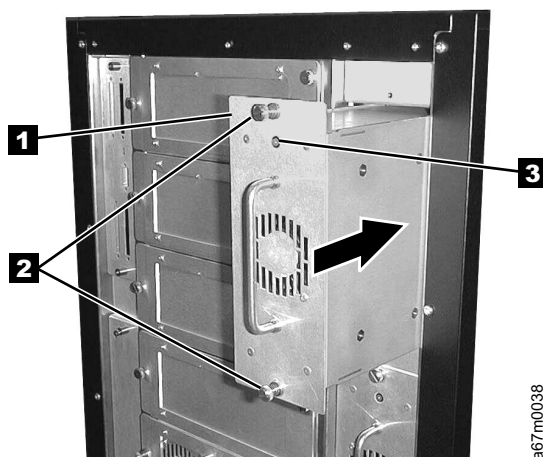


Figure 25. Proper orientation of the dc power supply

13. Reinstall the magazines and cartridges that you removed in step 3 on page 36.
14. If you intend to install one or more optional features, go to “Step 3. Installing Optional Features” on page 40. Otherwise, go to “Step 4. Attaching the Cables” on page 47.

---

## Step 3. Installing Optional Features

If you are not installing an optional feature, go to “Step 4. Attaching the Cables” on page 47.

If you ordered one or more optional features, install them now. Refer to the appropriate page:

- Additional drive sleds (page 40)
- Redundant dc power supply (page 42)
- SAN Data Gateway Module (page 44)
- 12-slot I/O station (page 45)
- Storage column (page 46)

### Installing a Drive Sled (optional FC8003 or FC8004)

When installing drive sleds in the 3583 Tape Library, you must insert the first sled in the bottom drive slot (slot 1). Add subsequent sleds directly above the last sled that is installed, from bottom to top (slots 2, 3, 4, 5, 6) with no empty slots (see Figure 26).

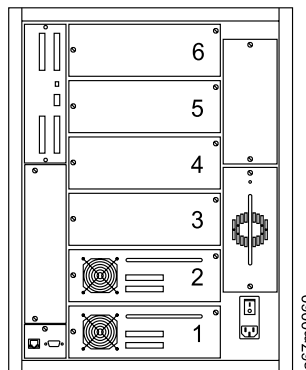


Figure 26. Correct order for installing drive sleds

Drive sleds that are attached to the same SCSI server must be installed next to each other in the library or the drive-to-drive cables may not reach. For example, if the library uses both LVD/HVD drives, all drive sleds that attach to the LVD/SE server must be together. If there is more than one server for the LVD/SE or HVD/DIFF drive sleds, the sleds that attach to the same server must be installed together.

**Note:** The 3583 Tape Library consists of up to seven SCSI devices: the library and up to six drives. The default settings for the SCSI IDs are 6 for the library and 0 through 5 for the drives. Depending on your requirements, you may need to change the default SCSI ID settings for your installation.

1. Use the server to set the library and the drives Offline for all attached servers.
2. Power-off the 3583 Tape Library by pushing O on the power switch (see **1** in Figure 65 on page 76).
3. From the rear of the library, locate the drive slot where you want to install the drive sled. Loosen the two captive thumbscrews on the filler plate (see **3** in Figure 27 on page 41) and remove the filler plate. Save the filler plate for future drive maintenance activity.

- Slide the tape drive sled **2** into position and tighten the two captive thumbscrews **1**.

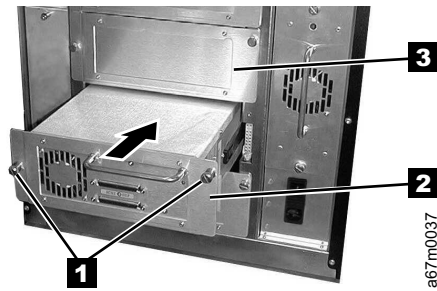


Figure 27. Installing a drive sled

- Install any additional optional features (see “Step 3. Installing Optional Features” on page 40). Otherwise, go to “Step 4. Attaching the Cables” on page 47.

## Installing a Redundant DC Power Supply (optional FC8008)



### DANGER

Up to 240 V ac is present at the power supply connectors when the main power cord is connected to a power source.  
(RSFTD010)

1. Verify that the correct dc power supply is currently installed in the library by locating the dc power supply at the rear of the library (see **1** in Figure 28 and examining it for a label:
  - If the new power architecture (NPA) label **2** is present, the redundant dc power supply must also bear the NPA label.
  - If the NPA label is not present, the redundant dc power supply must not bear the NPA label.
  - If the labels on the dc power supplies do not match, do not continue with this installation. Contact your IBM Business Partner or IBM Marketing Representative to order the correct dc power supply.
  - If the labels on the dc power supplies match, go to step 2 to continue the installation.

**Note:** The presence of the NPA label indicates that the 3583 Tape Library contains a new power architecture and requires a new level of dc power supply. The library will not operate properly if the power supplies and power architectures are not at the same level.

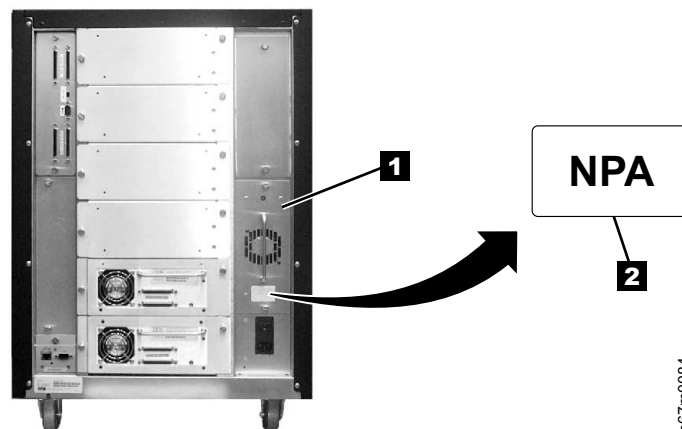


Figure 28. Installing a redundant dc power supply

2. Locate the slot where you want to install the redundant dc power supply. Loosen the two captive thumbscrews on the cover plate and remove the cover plate (see Figure 29 on page 43).

**Note:** Before inserting the dc power supply, be sure to orient the power supply so that the LED **3** is located as shown in Figure 29 on page 43.

3. Slide the power supply (**1** in Figure 29 on page 43) into position until it mates with the power distribution board and tighten the two captive thumbscrews **2**.

4. Inspect the rear panel to ensure that all LEDs are green. If all LEDs are green, the installation is complete. If any LEDs are not green, contact your Service Representative.
5. Install any additional optional features (see step “Step 3. Installing Optional Features” on page 40). Otherwise, go to “Step 4. Attaching the Cables” on page 47.

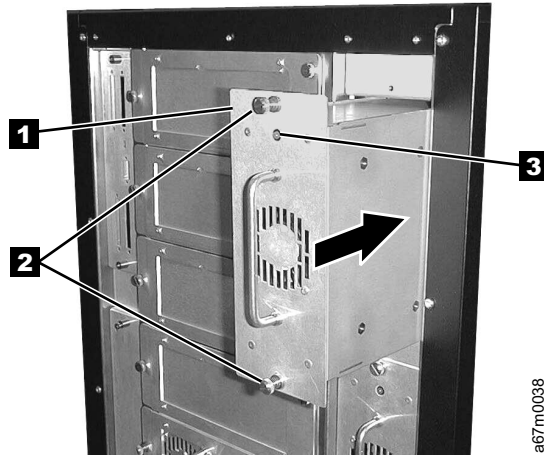


Figure 29. Installing a redundant dc power supply

## Installing a SAN Data Gateway Module (optional FC8005 )

1. From the rear of the 3583 Tape Library, locate the dc power supply (see **3** in Figure 30) and examine it for a label:
  - a. If the NPA label **4** is present, proceed with the installation of the SAN Data Gateway Module.
  - b. If the NPA label **4** is not present, the library does not have the required power architecture to support the SAN Data Gateway Module. Do not continue with this procedure. Contact your IBM Business Partner or IBM Marketing Representative to order the necessary parts.
2. Use the server to set the library and drives Offline for all attached servers.
3. Power-off the 3583 Tape Library by pushing O on the power switch (see **1** in Figure 65 on page 76).
4. From the rear of the library, locate the slot where you want to install the gateway (see Figure 30). Loosen the two captive thumbscrews on the cover plate and remove the cover plate.
5. Slide the gateway into position (see **1** in Figure 30) and tighten the two captive thumbscrews **2** .

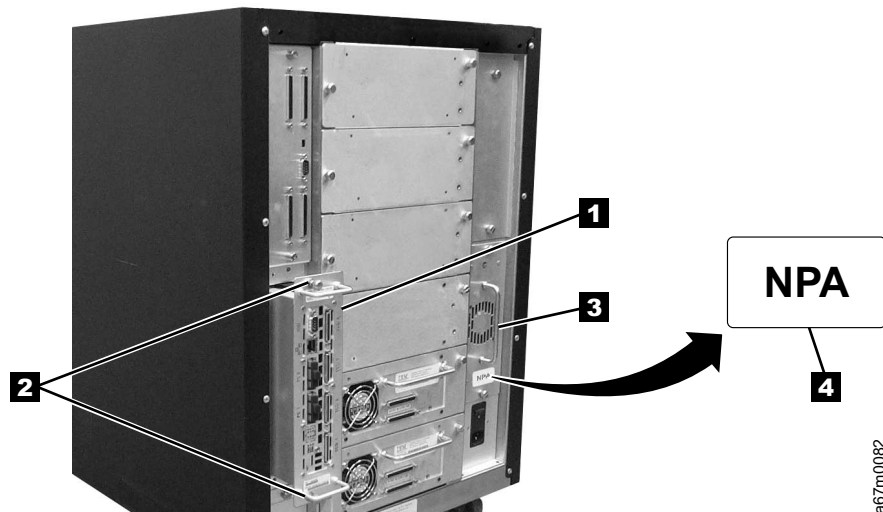


Figure 30. Installing a SAN Data Gateway Module

6. Install any additional optional features (see step “Step 3. Installing Optional Features” on page 40). Otherwise, go to “Step 4. Attaching the Cables” on page 47.

**Note:** After you have completed the installation of the library, go to the installation section in the *IBM Storage Area Network Data Gateway Module Setup, Operator, and Service Guide* to configure the gateway for use. IBM does not supply the fiber cable for this installation. To order the appropriate fiber cable, contact your IBM Business Partner or IBM Marketing Representative.

## Installing a 12 Slot I/O Station (optional FC8012)

**Required tools (not supplied):** T20 Torx driver and a 11/32-in. nut driver.

1. Use the server to set the library and drives Offline for all attached servers.
2. Power-off the 3583 Tape Library by pushing O on the power switch (see **1** in Figure 65 on page 76).
3. Open the library's front door.
4. If present, remove the cartridge from the single-slot I/O station.
5. Remove the four I/O station cable clamps (see **1** in Figure 31). Three of the cable clamps are attached to the door with a T20 Torx screw, and one is attached with a 11/32-in. nut.
6. Disconnect the I/O station cable connector **7** from the display assembly **2**.
7. Remove the eight 11/32-in. nuts **6** (four on each side) that secure the I/O station assembly to the front door.
8. Remove the single-slot I/O station.
9. The 12-slot I/O station is installed the same way as the single-slot I/O station. Perform the above steps in reverse order to install the 12-slot I/O station.
10. Insert two magazines **4** in the I/O station and one magazine **5** in the fixed location below the I/O station magazines.
11. Install any additional optional features (see step "Step 3. Installing Optional Features" on page 40). Otherwise, go to "Step 4. Attaching the Cables" on page 47.

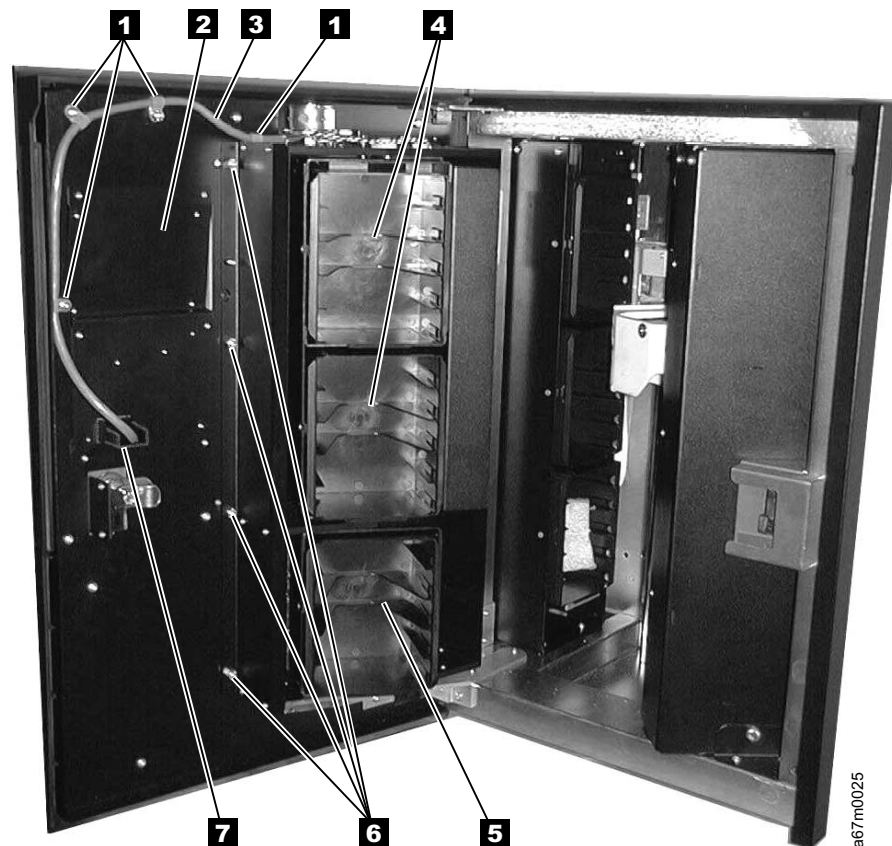


Figure 31. Installing the 12-slot I/O station

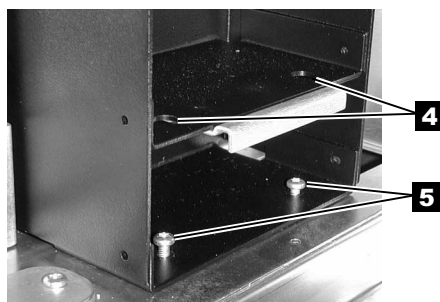
## Installing a Storage Column (optional FC8007)

**Required tools (not supplied):** 11-mm or 7/16-in. nut driver, allen wrench, and flashlight (optional).

1. Use the server to set the library and drives Offline for all attached servers.
2. Power-off the 3583 Tape Library by pushing O on the power switch (see **1** in Figure 65 on page 76).
3. Open the library's front door.
4. If necessary, move the picker assembly to a position in the Y-axis to allow access room and gently slide the storage column in place.
5. Depending on the column that you are installing, perform one of the following steps:
  - a. If you are installing column **4**, use the allen wrench to tighten the two bottom hex screws **5** that attach the storage column to the bottom chassis (see Figure 32).
  - b. If you are installing column **5**, use the 7/16-in. nut driver to tighten the bolt **3** that attaches the storage column to the bracket.
6. Install the top bolt **1** by using the 7/16-in. nut driver.
7. Install the magazines **2** in the storage column.
8. Install any additional optional features (see step "Step 3. Installing Optional Features" on page 40). Otherwise, go to "Step 4. Attaching the Cables" on page 47.



Top Attachment for all Storage Columns



Bottom Attachment for Storage Columns 2 and 4



Bottom Attachment for Storage Column 5

Figure 32. Installing a storage column



## Step 4. Attaching the Cables

The 3583 Tape Library supports both SCSI-2 HVD and LVD/SE attachments through a SCSI-2 cable with 68-pin D-connector.

**Note:** Although the LVD/SE hardware in the library is capable of operating in single-ended (SE) mode, SE operation is not recommended or supported.

1. Determine whether you intend to attach to the HVD connector **1** or the LVD/SE connector **3** on the host interface board (SCSI) (see Figure 33). You can attach to and use only one of the SCSI types on the host interface board. All devices on the bus with the host interface board (SCSI) must be the same SCSI type (HVD and LVD/SE cannot be mixed on the same bus).
2. Set the switch **2** for the SCSI type you will be using. Using a small-blade screwdriver, move the switch to the up position for HVD, or to the down position for LVD/SE.
3. If you are installing a standard SCSI tape library, go to “Cabling the Library for a Server with a SCSI Interface” on page 48 for cabling instructions. If you are installing a tape library that has an optional SAN Data Gateway Module, go to “Cabling the Library for a Fibre Channel Host Attach” on page 50 for cabling instructions.

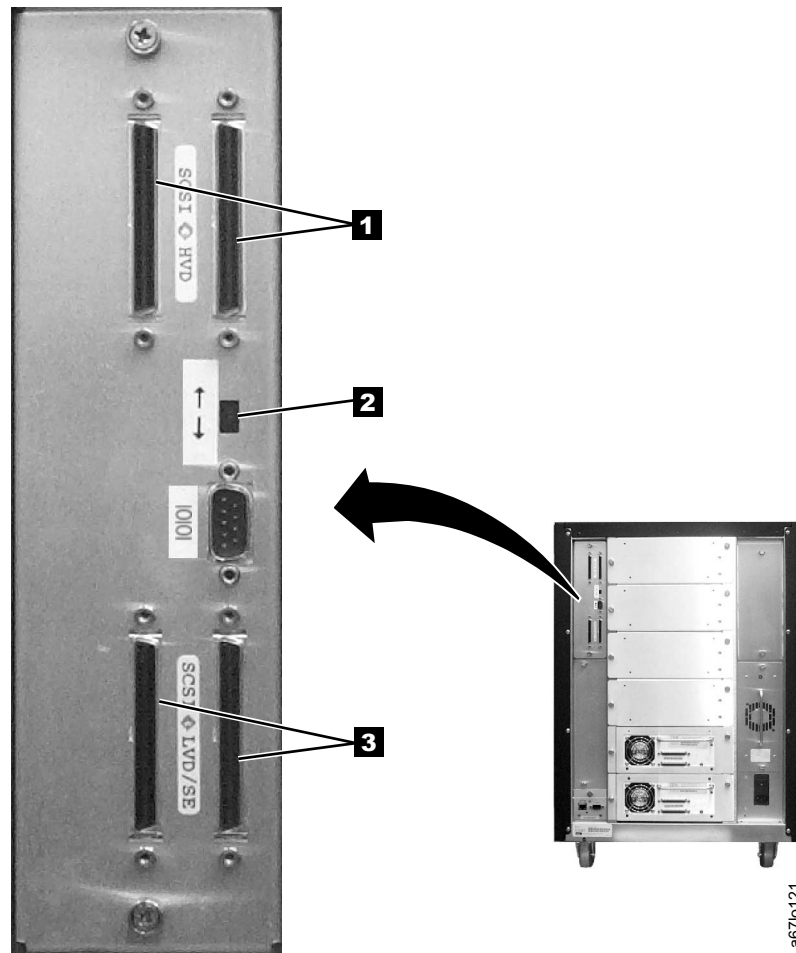


Figure 33. SCSI host interface board

## Cabling the Library for a Server with a SCSI Interface

If you are installing a standard SCSI tape library, proceed with these cabling instructions. If you are installing a tape library that has an optional SAN Data Gateway Module go to “Cabling the Library for a Fibre Channel Host Attach” on page 50 for cabling instructions.

Before installing the SCSI cables, inspect all cables for damage. Do not install a cable if it is damaged. Report the damage immediately by contacting your place of purchase.

The maximum allowable length of your bus cabling depends on the type of SCSI bus that you use (LVD or HVD). For LVD, the maximum length is 25 m (82 ft) if one device is attached, and 12 m (40 ft) if more than one device is attached. For HVD, the maximum length is 25 m (82 ft). The following guidelines ensure compliance with the maximum allowable bus lengths:

- For a server with an LVD SCSI bus:
  - Use a maximum system-to-device cable length of 10 m (33 ft) when attaching to the host interface board (SCSI) and one or two daisy-chained drives.
  - Use a maximum system-to-device cable length of 5 m (17 ft) when attaching to the host interface board (SCSI) and three to six daisy-chained drives.
  - Only use the maximum system-to-device cable length of 25 m (82 ft) when attaching directly to one device (a point to point interconnection).
- For a server with an HVD SCSI bus:
  - Use a maximum system-to-device cable length of 20 m (65 ft) when attaching to the host interface board (SCSI) and one to six daisy-chained drives.
  - Only use the maximum system-to-device cable length of 25 m (82 ft) when attaching directly to one device (a point-to-point interconnection).

## Host-to-Library SCSI Cable

Attach the cable from the host (server) into one connector of the host interface board (SCSI) (see **1** in Figure 34).

## Host Interface Board-to-Drive SCSI Cable

**Note:** The cabling configuration may affect performance. For more information see “Tape Drive Performance” on page 19.

1. Attach the cable **2** from the SCSI host interface board to the tape drive. See Figure 34 for examples of configurations (your library configuration may not be shown).
2. Depending on how many drives are installed, install drive-to-drive SCSI cables **3** as shown.
3. Install a terminator **4** on the last SCSI device on the bus.

**Note:** Ensure that you are using the correct terminator; LVD/SE and HVD/DIFF terminators cannot be intermixed.

4. Go to “Step 5. Turning on the Power” on page 52 to continue the installation of the library.

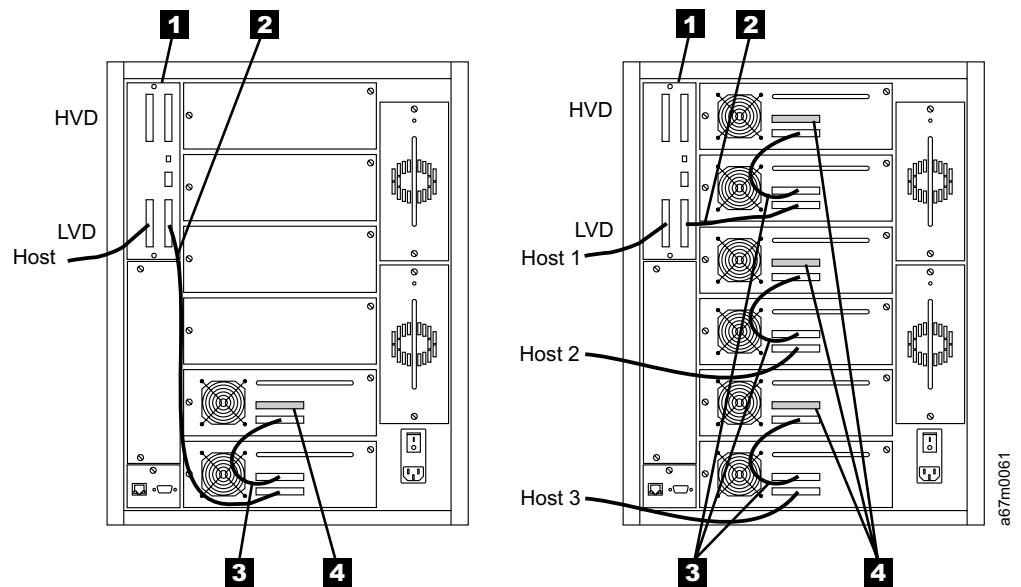


Figure 34. Examples of SCSI cable connections. A configuration for a single host is on the left; a configuration for multiple hosts is on the right. In the sample configuration for multiple hosts, only Host 1 has access to library functions.

## Cabling the Library for a Fibre Channel Host Attach

**Note:** IBM does not supply the fiber optic cable for this procedure. To order the appropriate fiber cable, contact your IBM Business Partner or IBM Marketing Representative.

If you are installing a tape library that has an optional SAN Data Gateway Module, proceed with these cabling instructions. If you are installing a standard SCSI tape library, go to “Cabling the Library for a Server with a SCSI Interface” on page 48 for cabling instructions.

IBM recommends that you use a fiber cable with 50-micron core fiber.

Before installing the fiber and SCSI cables, inspect all cables for damage. Do not install a cable if it is damaged. Report the damage immediately by contacting your place of purchase.

Figure 35 shows examples of the Fibre Channel and SCSI connectors.

- |          |                                   |          |                      |
|----------|-----------------------------------|----------|----------------------|
| <b>1</b> | LC Fibre Channel connector        | <b>4</b> | HD68 SCSI connector  |
| <b>2</b> | SC Fibre Channel connector        | <b>5</b> | VHDCI SCSI connector |
| <b>3</b> | LC-to-SC Fibre Channel interposer |          |                      |

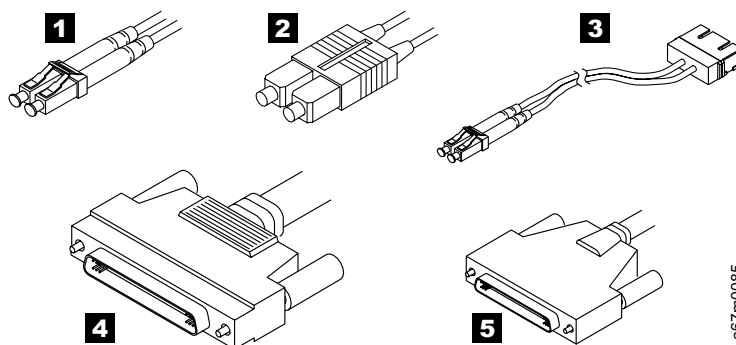


Figure 35. Cable connectors

### Host-to-Library Fiber Cable

Attach the fiber cable from the host (server) to the GBIC of one of the Fibre Channel connectors on the gateway ( **6** in Figure 36 on page 51).

**Note:** The short-wave, multimode GBICs that are installed in the gateway are SC-style and are capable of 2-Gbit speeds. They automatically switch to a 1-Gbit speed if attached to a 1-Gbit system. The installed GBICs support a maximum cable length of 300 m (984 ft) at 2-Gbit speeds and 500 m (1640 ft) at 1-Gbit speeds. If you are attaching to a server that has an LC-style connector, you will need to use an SC-to-LC fiber optic cable, or an SC-to-SC cable and an SC-to-LC interposer.

## SCSI Cables

Because the SCSI ports on the gateway are LVD/SE, only LVD/SE drives and the LVD/SE connections on the library SCSI host interface board (see **1** in Figure 36) can be used.

**Note:** The cabling configuration may affect performance. For more information see “Tape Drive Performance” on page 19.

1. Attach the cables **5** from the drives to the SCSI ports of the gateway **6**. Four 0.6-m VHDCI-to-HD68 SCSI cables are provided with each library. If more than four drives are installed in the library, the drives may need to be daisy-chained by using HD68-to-HD68 cables **3**. See Figure 36 for examples of configurations (your library configuration may not be shown).
2. Attach one of the LVD/SE connectors on the host interface board **1** to a SCSI port on the gateway **6** by using one of the 0.6-VHDCI-to-HD68 cables **5**, if available. Otherwise, daisy-chain the LVD/SE connector to one of the drives by using the 0.7-m HD68-to-HD68 cable **2**.
3. Ensure that the switch on the SCSI host interface board is set to select the LVD/SE set of connectors.

**Note:** Do not connect the gateway to the HVD set of connectors on the SCSI host interface board.

4. Install a terminator **4** on the last SCSI device on each SCSI bus. Each of the four gateway SCSI ports is a separate SCSI bus. Each one must be terminated at the last device on the bus.

**Note:** Ensure that you are using an LVD/SE terminator. Also, IBM provides a terminator for each drive but not for the library. If your library contains three (or fewer) drives, you will have an available gateway SCSI port for the library’s SCSI connection. However, if you do not have a terminator, you must daisy-chain the library to one of the drives.

5. Go to “Step 5. Turning on the Power” on page 52 to continue the installation of the library.

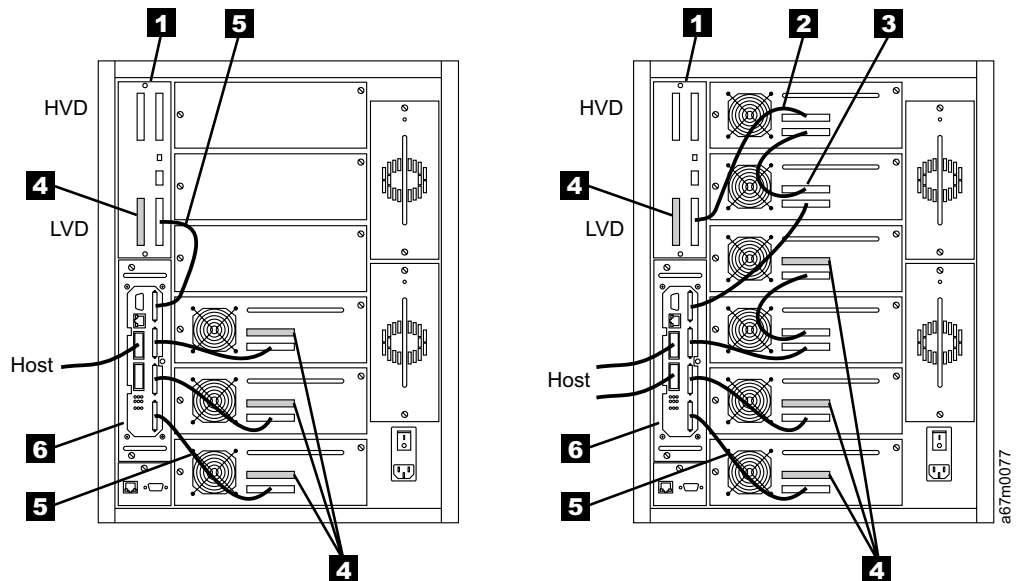


Figure 36. Examples of fiber and SCSI cable connections

## Step 5. Turning on the Power

1. Ensure that the power switch is set to off by pressing O on the power switch (see **1** in Figure 37).

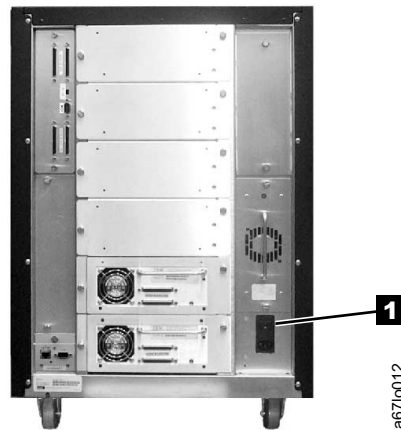


Figure 37. Main power switch

2. Plug the power cord into the 3583 Tape Library, then plug the other end into a grounded electrical outlet.
3. Check the write-protect switch on the data cartridge (scratch cartridge) **1** that was shipped with the library. Ensure that it is set so that data can be written to the tape (see “Setting the Write-Protect Switch” on page 159).
4. Open the front door and place the data cartridge into the single-slot I/O station (not shown) or into the top slot of the 12-slot I/O station **2**.

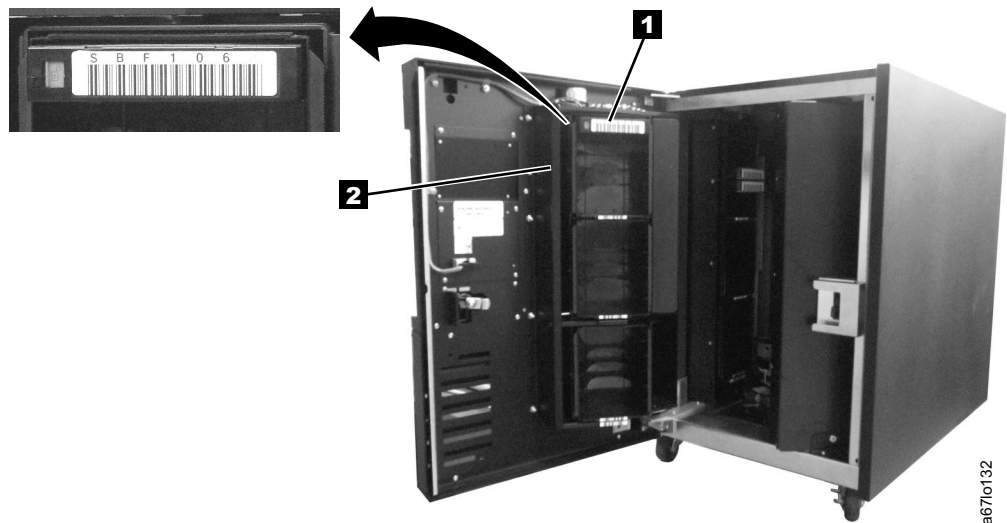


Figure 38. Inserting a data cartridge

5. Close the front door securely.
6. Push | on the power switch to turn on the power. The library takes a few minutes to perform initialization.
7. Inspect the rear panel to ensure that all LEDs are green. If all LEDs are green, proceed with the installation. If any LEDs are not green, contact your Service Representative.

8. The library firmware automatically initializes and starts the inventory/teach process. When the Main Menu displays on the operator panel ( **1** in Figure 39), place the library in the Offline state by pushing the button **2** below the **Online/Offline** softkey. Follow the instructions on the screen, then push the button **2** below the **OK** softkey.

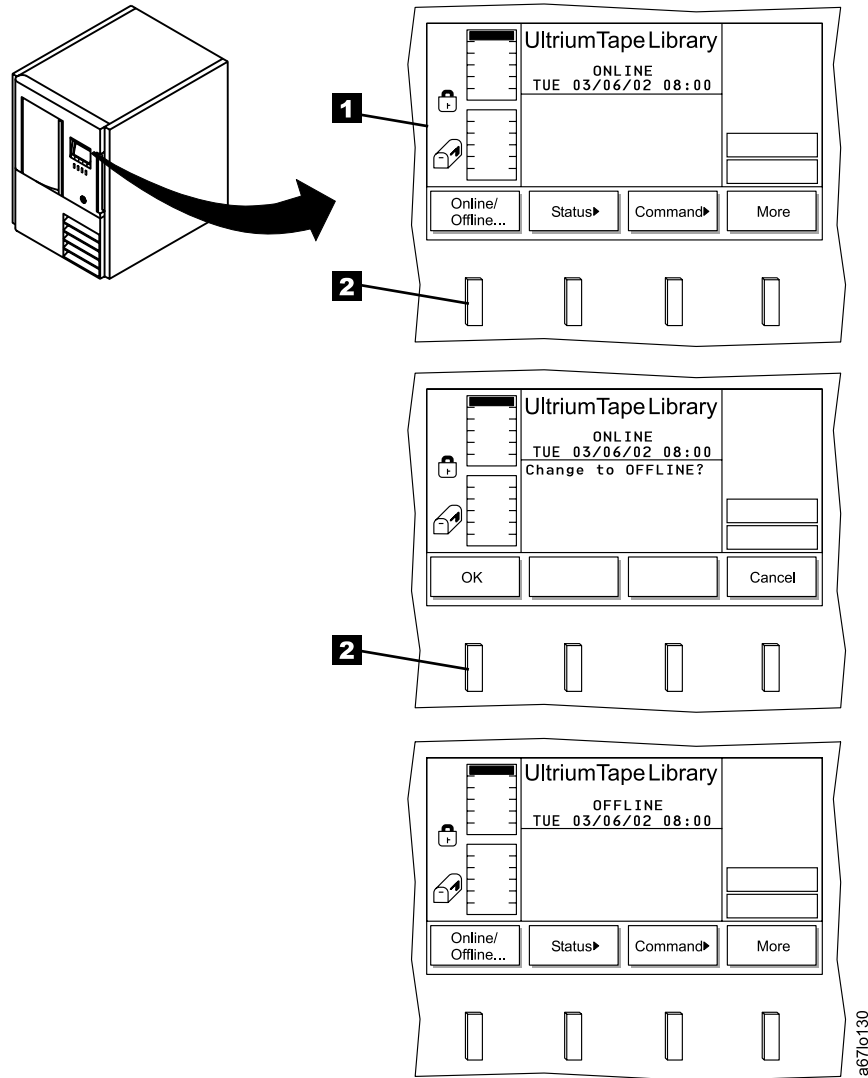


Figure 39. Operator panel

9. Run the FAST Read/Write test for each drive that is installed.
  - a. From the operator panel select **More** by pushing the button below the **More** softkey.
  - b. Select **Service**, then **Drives**. The Select Drive Dialog displays (see Figure 40).

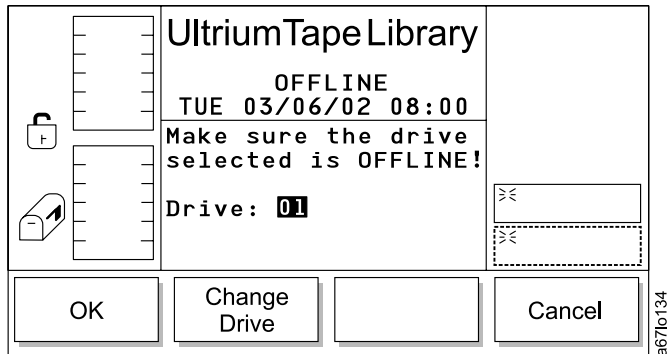


Figure 40. Select Drive Dialog

- c. To run the FAST Read/Write Test on the current drive, select **OK**. To run the test on a different drive, select **Change Drive** until the drive you want displays, then select **OK**, and then **Diags**. The Drive Diagnostics screen displays (see Figure 41).

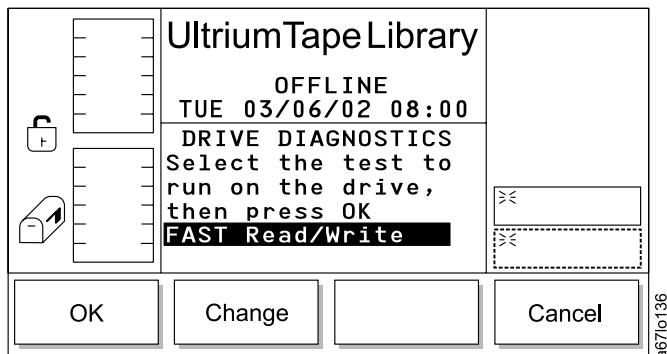


Figure 41. Drive Diagnostics screen

- d. Select **OK**. The FAST Read/Write screen displays (see Figure 42 on page 55).



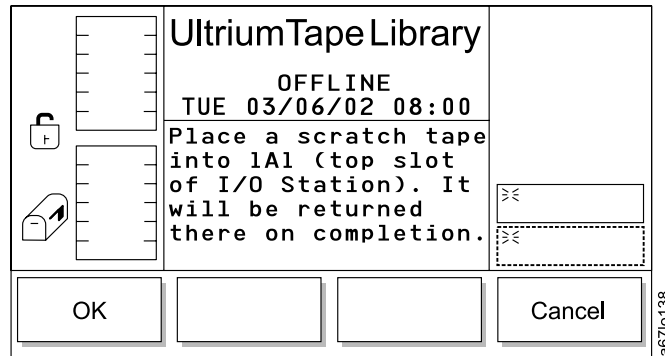


Figure 42. FAST Read/Write screen

- e. Select **OK**, and the FAST Read/Write Test begins. The operator panel displays the message Currently loading the cartridge..., then Diagnostic now in progress..., then Currently unloading the cartridge.... When the test is complete, the Command Complete screen displays (see Figure 43).

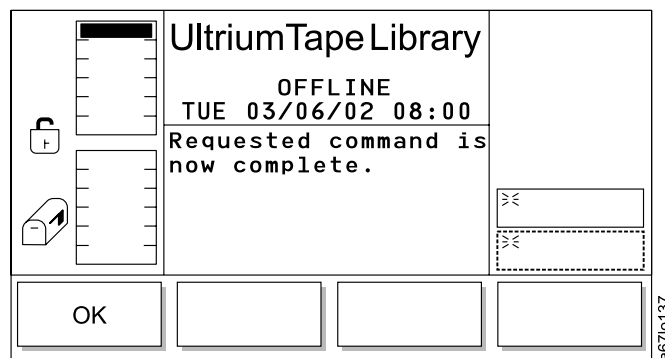


Figure 43. Command Complete screen

- f. Repeat step 9 on page 54 for each drive that is installed.

## Step 6. Configuring the RMU

The Remote Management Unit (RMU) is a removable circuit board that facilitates access to the web and the StorWatch Specialist. After you configure the RMU, you can perform all of the library's operator panel operations from a remote site.

To set up the RMU for proper operation, you must enter the RMU network address and hostname (obtain the address and hostname from your system administrator). The RMU network address consists of an IP address, subnet mask, and gateway IP address. The hostname is the name given by your system administrator to the library. After you establish the RMU network address and hostname, you can use a web browser to access the StorWatch Specialist application. By using the StorWatch Specialist, you can verify the RMU network address, create accounts, and create passwords. You can also broadcast the RMU network address and hostname to potential RMU users.

To configure the RMU for use, perform the following steps:

1. From the operator panel select **More** by pressing the button below the **More** softkey.
2. Select **Setup** → **Library** → **RMU**. The RMU dialog displays (see Figure 44).

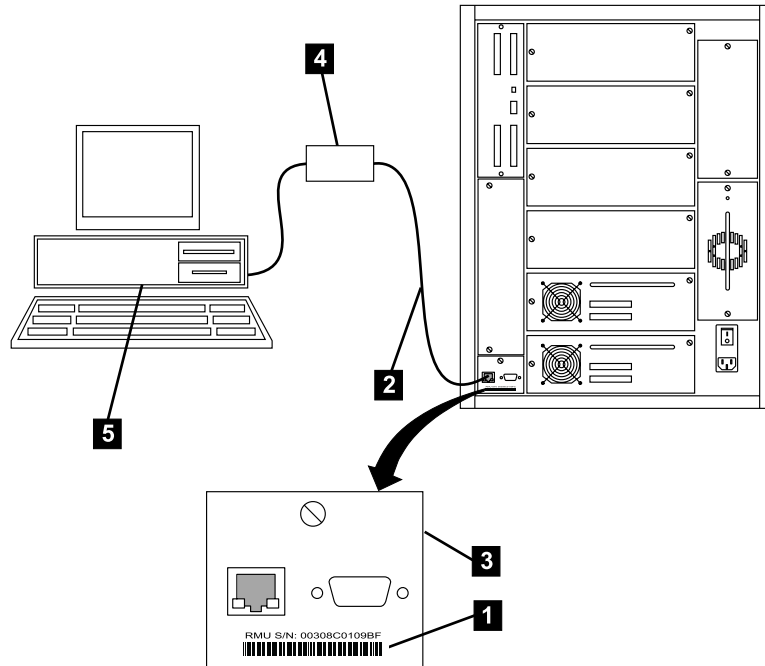
UltriumTape Library			
ONLINE			
TUE 03/06/02 08:00			
IP :	192.168.080.239		
Sub :	255.255.255.000		
Gate :	192.168.080.001		
Name :	XXXXXX		
	><		
	><		
Up	Down	Next	Cancel

Figure 44. RMU Dialog

- Note:** If the RMU dialog does not display and the operator panel displays the message Could not establish communication with the RMU board a problem exists with the RMU connection. Disconnect the RMU from the library by loosening its thumbscrews and pulling it out approximately 7 cm (3 in.). Wait 5 seconds, then reconnect the RMU (you do not have to power-off the library). Return to step 1 and restart the procedure.
3. Use the push buttons below the **Up** or **Down** softkeys to enter the IP address, subnet address, gateway, and name, similar to the example values shown in Figure 44. Press the button below the **Next** softkey to accept the current field and advance to the next field.
  4. After you have set the value for each field, press the button below the **OK** softkey to accept the settings and return to the Library menu.
  5. Attach an Ethernet cable ( **2** in Figure 45 on page 57) with RJ-45 connectors to the RMU **3** and an Ethernet hub **4** that is attached to a computer **5** .

**Note:** You can also attach a computer, without using an Ethernet hub, directly to the RMU by using a crossover cable (not shown).

When you configure the 3583 Tape Library to a network the media access control address (*MAC ID*) that appears on the RMU (see **1** in Figure 45) must match the MAC Address that displays on the Library Status screen of the StorWatch Specialist (see Figure 46 on page 58). The MAC ID is the RMU's serial number. It appears on the RMU as RMU S/N: xxxxxxxxxx (where xxxxxxxxxx equals the serial number); the same number must appear on the Library Status screen of the StorWatch Specialist, although colons typically separate the characters.



a67/m0079

Figure 45. Connecting the RMU to a computer

6. On the terminal of your server, use a web browser to type the IP address or the hostname of the RMU. The StorWatch Specialist Status page displays (see Figure 46 on page 58).

**IBM Ultrium Tape Library Specialist**  
Name: RMU ( IBM ULT3583-TL )

Logout    Status    Configuration    Firmware    Diagnostics file    Operator panel    Logs

**IBM ULT3583-TL**

**Library Status**    Online

Drive Status	LTO: 6 drives
RMU User	admin from 192.1.1.100
Hostname	RMU
IP Address	192.1.1.101
MAC Address	00:30:8C:01:09:BF
Library Serial #	IBM9161327
SNMP Alerts	SNMP Off
Library Firmware	2.50.0004
RMU Firmware	130B.00003

© Copyright IBM Corporation 2001, Licensed Materials, Property of IBM, All Rights Reserved.  
IBM is a registered trademark of IBM Corp. US Government Users Restricted Rights -  
Use, duplication, or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.

Figure 46. Status page

7. Select the Configuration tab. The Login page displays (see Figure 47 ).

**IBM Ultrium Tape Library Specialist**  
Name: RMU ( IBM ULT3583-TL )

Logout

**IBM ULT3583-TL**

**No Current User.**

Enter Login Name   

Enter your password   

Submit

Figure 47. Login page

8. Enter the login name and password (the initial login name is admin and the initial password is secure), then click on Submit. The Configuration page displays (see Figure 48 on page 59). You can now add new users and change the password.

**IBM StorWatch** **Ultrium Tape Library Specialist** Name: RMU ( IBM ULT3583-TL )

Logout    Status    **Configuration**    Firmware    Diagnostics file    Operator panel    Logs

<b>Network Configuration</b>		<b>User Configuration</b>	
Hostname	RMU	Management Action	No Action
IP Address	192.1.1.101	User Name	admin
Subnet Mask	0.0.0.0	Re-enter Password	
Gateway	0.0.0.0	Date and Time	
<b>SNMP Configuration</b>		Date (mm/dd/yy)	00/00/00
Alerts Enabled	OFF	Time (hh:mm)	00:00
Server	192.168.80.105		
Public Name	public		
Private Name	private		

Submit    Reset

www.ibm.com    Copyright 2001

a671o179

Figure 48. Configuration page

- Verify that the StorWatch Specialist functions are operational (see “StorWatch Specialist Menu Description” on page 70).

---

## Step 7. Configuring the SAN Data Gateway Module (optional)

If you choose to use the library's SAN Data Gateway Module, refer to the instructions for configuring the gateway in the *IBM Storage Area Network Data Gateway Module Setup, Operator, and Service Guide*.

---

## Step 8. Setting the SCSI IDs

The 3583 Tape Library consists of up to seven SCSI devices: the library and up to six drives. The default settings for the SCSI IDs are 6 for the library and 0 through 5 for the drives. Depending on your requirements, you may need to change the SCSI ID default settings for your installation.

### Notes:

1. Do not select an ID that is already in use on the same SCSI bus.
2. Do not select the SCSI ID of the SCSI host adapter card. On the SCSI bus, any initiator (such as a host adapter card) that needs to communicate with the library must have its SCSI ID set from 0 to 7. The SCSI ID of the SCSI host adapter card is usually higher than any device on the SCSI bus. Generally, the SCSI ID for the host adapter is 7.

## Setting the SCSI ID of the Library

To determine the existing SCSI ID for the library, perform the following steps:

1. From the library's main menu, select **More** by pressing the button below the **More** softkey.
2. Select **Setup** → **Library** → **SCSI**. The SCSI dialog screen displays (see Figure 49). The existing ID is the value in the SCSI ID: CURRENT field.

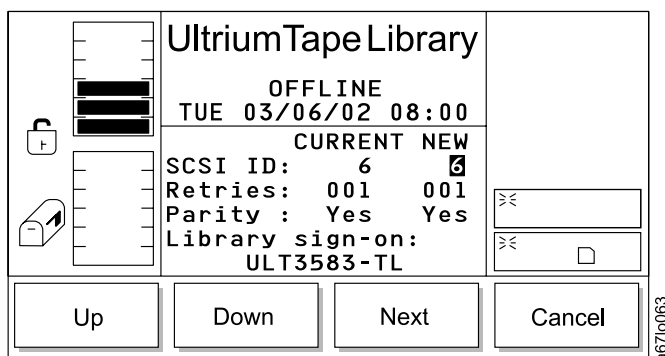


Figure 49. Library SCSI dialog screen

To change the SCSI ID setting for the library, perform the following steps:

1. Press the button below the **Up** or **Down** softkey until the ID that you want displays in the SCSI ID: NEW field.
2. Press the button below the **Next** softkey until the **OK** softkey displays.
3. Press the button below the **OK** softkey to accept the new ID.
4. To activate the new SCSI ID, cycle power to the library (turn it off, then on again).

## Setting the SCSI IDs of the Drives

To determine the existing SCSI IDs for the drives, perform the following steps:

1. From the main menu, select **More** by pressing the button below the **More** softkey.
2. Select **Setup** → **Drives** → **SCSI**. The Drive SCSI Dialog screen displays (see Figure 50). The current drive is the value in the Drive: field. The existing drive's SCSI ID is the value in the SCSI ID: CURRENT field.

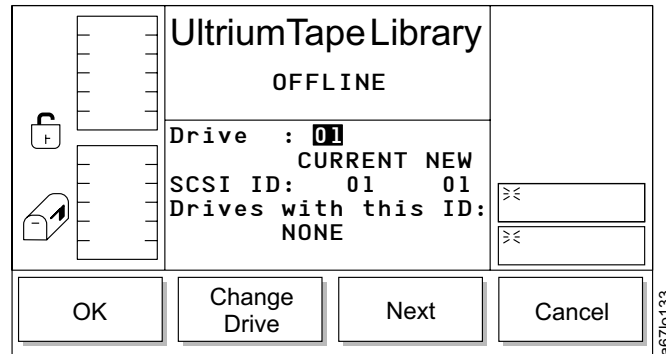


Figure 50. Drive SCSI Dialog

To change the current drive, press the button below the **Change Drive** softkey until the number of the drive you want displays in the Drive: field, then select **OK**.

To change the SCSI ID setting for the drive, perform the following steps:

1. Press the button below the **Next** softkey. The Drive SCSI ID Dialog displays (see Figure 51).

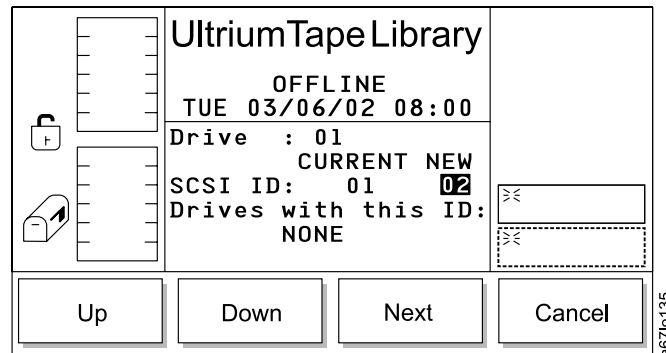


Figure 51. Drive SCSI ID Dialog

2. Press the button below the **Up** or **Down** softkey until the ID that you want displays in the SCSI ID: NEW field.
3. Press the button below the **Next** softkey until the **OK** softkey displays.
4. Press the button below the **OK** softkey to accept the new ID.
5. To activate the new SCSI ID, cycle power to the library (turn it off, then on again).

---

## Step 9. Verifying Firmware Levels

Refer to “Updating Firmware” on page 80 to:

- Ensure that the drives, library, RMU, and optional SAN Data Gateway Module are loaded with the most current firmware
- Ensure that all library components are loaded with the same level of firmware
- If necessary, download and install new firmware

**Note:** If you choose to update the firmware by using the SCSI bus, you must first install the IBM device drivers (see “Step 10. Installing the SCSI Host Adapter Card (if required)”). Instructions for determining compatible device drivers are given in “Supported Device Drivers” on page 5. If your configuration uses the IBM AS/400 or iSeries server, do not install IBM device drivers (they are already installed).

---

## Step 10. Installing the SCSI Host Adapter Card (if required)

You may need to install a host adapter card in the server. If so, determine the type of host adapter card that your server needs: LVD/SE, HVD/DIFF, or Fibre Channel.

To install an adapter, refer to the instructions that accompany it, as well as to the section about SCSI card installation in the documentation for your server. For a list of supported adapters and required interposers, go to the Technical Support section on the web at <http://www.ibm.com/storage/1to>.

Although the LVD/SE hardware in the 3583 Tape Library is capable of operating in the single-ended (SE) mode, SE operation is not recommended or supported.

---

## Step 11. Installing the Device Drivers and Backup Software

A device driver is host firmware that enables the 3583 Tape Library to interact with a variety of servers. Install device drivers for the library as follows:

- If you intend to use the library with existing or new commercial backup application software (see “Supported Software” on page 4), refer to that application’s installation instructions to install the device driver and to configure the library. IBM recommends that you do not install any device driver from the CD that was shipped with the tape drive. Conflicts could occur over which driver controls the drive. Only install a device driver from the CD if the instructions from your backup application software tell you to do so. Do not install IBM device drivers if your configuration uses the IBM AS/400 or iSeries server; they are already installed.
- If you do not intend to use the library with commercial backup application software, install the device driver from the CD that was shipped with the library. Refer to the installation instructions in the *Ultrium Device Driver Installation and User’s Guide*, which is on the CD and also included in published form. The CD contains drivers and installation instructions for the supported operating systems.

---

## Step 12. Configuring the Tape Library to the Server

To configure the 3583 Tape Library for use, refer to the documentation for your server and application software.



---

## Post-Installation Considerations

Store the 3583 Tape Library's key, manuals, device driver software, and other miscellaneous hardware in a safe location for preventive maintenance or service activity.



## Chapter 3. Operation

You can issue commands to the 3583 Tape Library through the server, the operator panel, the RMU, or the optional SAN Data Gateway Module. This chapter describes the methods of controlling the library. It also provides a summary of library operations, such as starting up, shutting down, handling media, updating firmware, and cleaning drives.

### Operator Panel

The operator panel provides push buttons and a liquid crystal display (LCD) that let you control the 3583 Tape Library. By using the push buttons and the messages that appear on the display, you can interact with the library to perform the operations that you want. The operator panel includes the following components:

- |          |                         |          |              |
|----------|-------------------------|----------|--------------|
| <b>1</b> | I/O station status area | <b>4</b> | Message area |
| <b>2</b> | Library status area     | <b>5</b> | Softkeys     |
| <b>3</b> | Drive status area       | <b>6</b> | Push buttons |

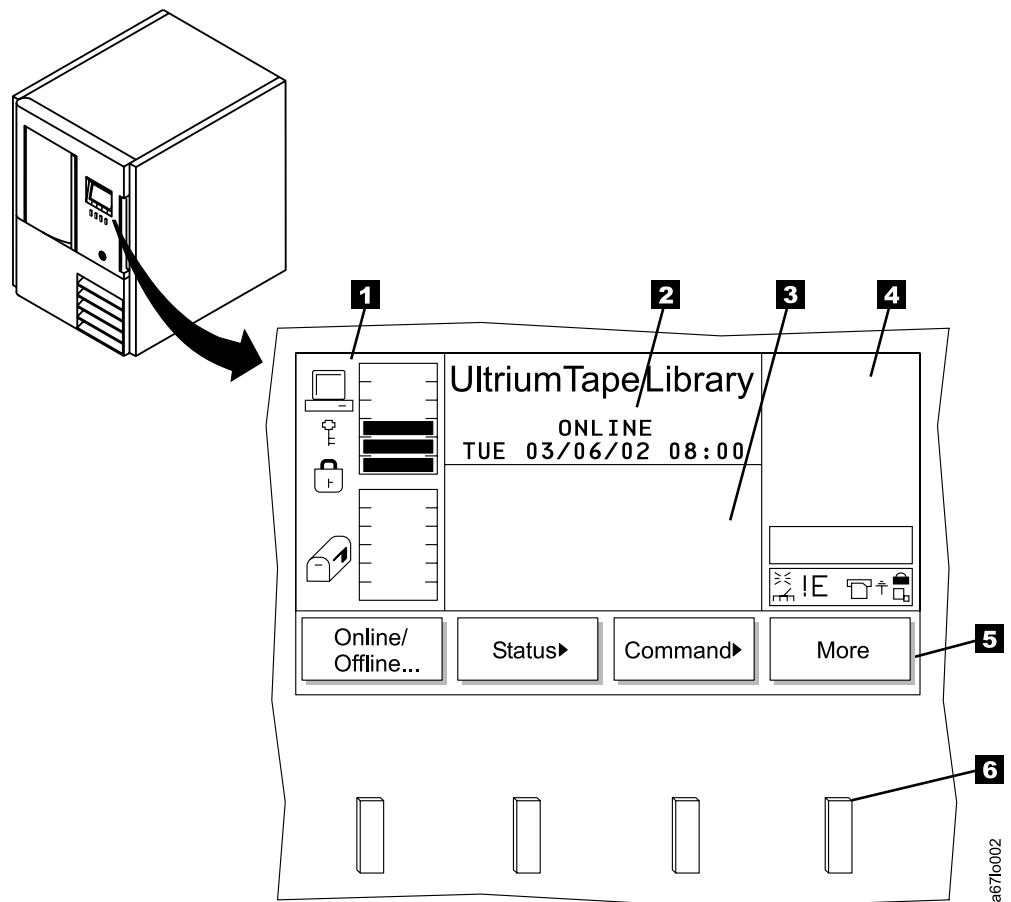


Figure 52. Operator panel

## I/O Station Status Area

The I/O station status area continually provides information about the I/O station (see **1** in Figure 53).

Table 9 on page 67 describes the icons in the I/O station status area.

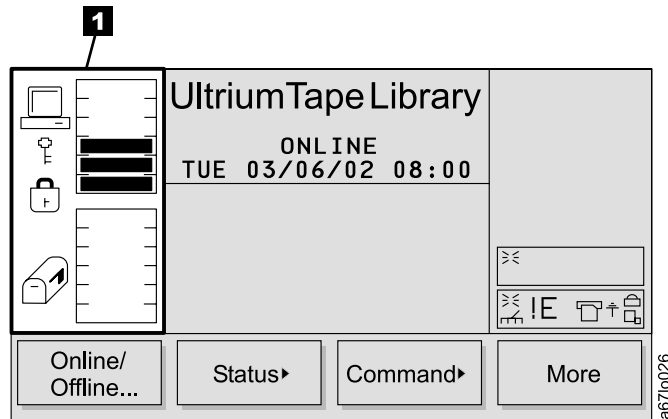


Figure 53. I/O station status area

## Library Status Area

The library status area displays the current action, activity, or state of the library (see **1** in Figure 54).

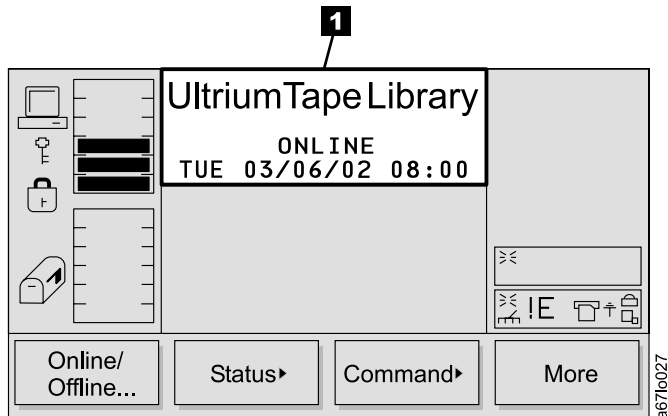













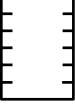
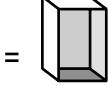
Figure 54. Library Status Area

Table 8 describes the text displayed in the library status area.

Table 8. Library status area

Text	Definition
OFFLINE	The media changer equipment is in an Offline state.
ONLINE	The media changer equipment is in an Online state.
Status or Attention Message	The library reports status or messages to solicit operator intervention.

Table 9. Icons in the I/O station status area

Icon	Description
	<p>This icon is displayed on screen if the server has issued a <b>PREVENT/ALLOW MEDIUM REMOVAL</b> SCSI command and locked the I/O station.</p>
 	<p>This icon is displayed on screen if the I/O station is locked. The I/O station can be locked by the following conditions:</p> <ul style="list-style-type: none"> <li>• The server issues a <b>PREVENT/ALLOW MEDIUM REMOVAL</b> SCSI command and locks the I/O station.</li> <li>• The library is in the process of accessing an I/O station slot.</li> <li>• The I/O station has been configured as all storage slots (rather than solely I/O slots).</li> </ul> <p>This icon is displayed if the I/O station is unlocked.</p>
     	<p>These icons are displayed on screen for the six I/O station states.</p> <p><b>State 1:</b> The I/O station door is closed. Any cartridge in the I/O station has previously been inventoried.</p> <p><b>State 2:</b> The I/O station door is partially open. Any cartridge in the I/O station has previously been inventoried.</p> <p><b>State 3:</b> The I/O station door is fully open. Any cartridge in the I/O station has previously been inventoried. For an import operation, a cartridge can be inserted.</p> <p><b>State 4:</b> The I/O station door is closed. A cartridge has been exported and not yet removed.</p> <p><b>State 5:</b> The I/O station door is partially open. A cartridge has been exported and not yet removed.</p> <p><b>State 6:</b> The I/O station door is fully open. A cartridge has been exported and not yet removed. While in this state, an exported cartridge can be removed.</p>
   	<p>These icons display on screen to show the possible configurations of the I/O station.</p> <p><b>Type 1:</b> Displays when a single-slot I/O station is installed in the library.</p> <p><b>Type 2:</b> Displays when a 12-slot I/O station is installed in the library. Cartridges are indicated by black slots. A total of 12 slots are available.</p> <p><b>Type 3:</b> This icon displays when a 12-slot I/O station is installed in the library and is configured as storage. A total of 12 slots are available.</p>

## Drive Status Area

The drive status area continually provides information about the drives (see **1** in Figure 55).

Table 10 on page 69 describes the icons in the drive status area.

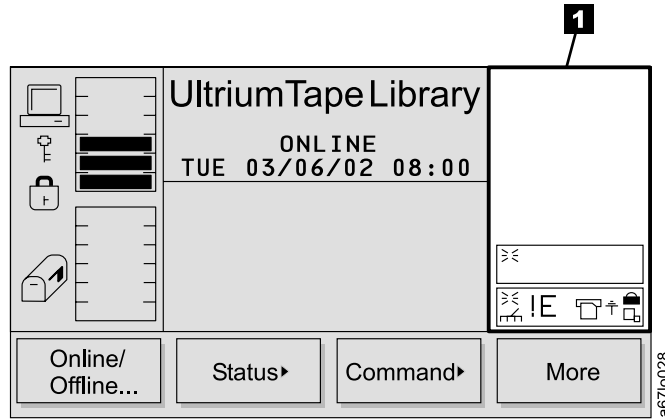


Figure 55. Drive status area

## Message Area

The message area displays six lines of text, graphic representations, or a combination of both (see **1** in Figure 56). Each text line can be up to 20 characters long. The lines communicate interactive dialogs, special messages, alerts, library configurations, and error codes. For more information about the error codes that display, see Appendix G, "Error Messages" on page 195.

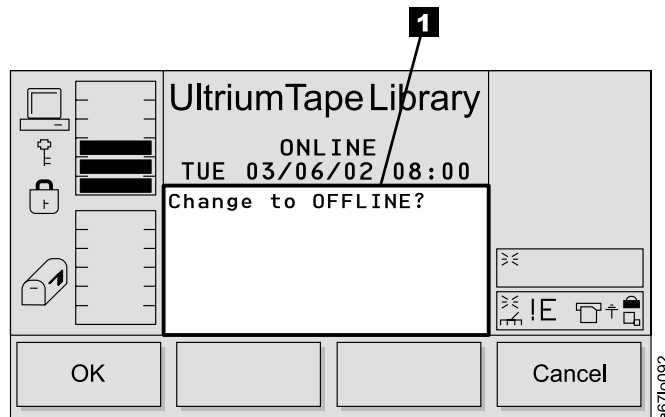

















Figure 56. Message area

Table 10. Icons in the drive status area

Status	Icon	Description
Drive Present		A tape drive is present but does not contain a cartridge.
Power On		If power is applied to the tape drive, the Power On icon displays.
Cleaning Required		If tape drive cleaning is required, the Cleaning Required icon displays.
Error Code		If a drive error occurs, an error code displays. See "Drive Error Codes" on page 205 for a list of drive error codes. n represents the character that displays.
Compression On		If the tape drive is compressing data on tape, the Compression On icon displays.
Write Protect		If the tape cartridge is write protected, the Write Protect icon displays.
Tape Activity		A tape drive is loading a cartridge.
		A tape drive has a cartridge loaded.
		A tape drive is rewinding a cartridge.
		A tape drive is unloading a cartridge.
		A tape drive has unloaded a cartridge.
		A tape drive is reading data from a cartridge.
		A tape drive is writing data to a cartridge.
		A tape drive is erasing data from a cartridge.
		A tape drive is locating data on a cartridge.

## RMU with StorWatch Specialist

The Remote Management Unit (RMU) provides remote access to the 3583 Tape Library over a network. You can attach the library to the network through a 10/100 Ethernet port on the RMU. Any server on the network can access the library if it has a web browser installed. All available functions are accessible without the need of a dedicated server or separate software. With the RMU and the StorWatch Specialist software application you can access the functions that are described in the following sections.

## StorWatch Specialist Menu Description

The StorWatch Specialist Home page is divided into three areas, the left navigation frame **1**, the center navigation frame **2**, and the top information frame **3** (see Figure 57).

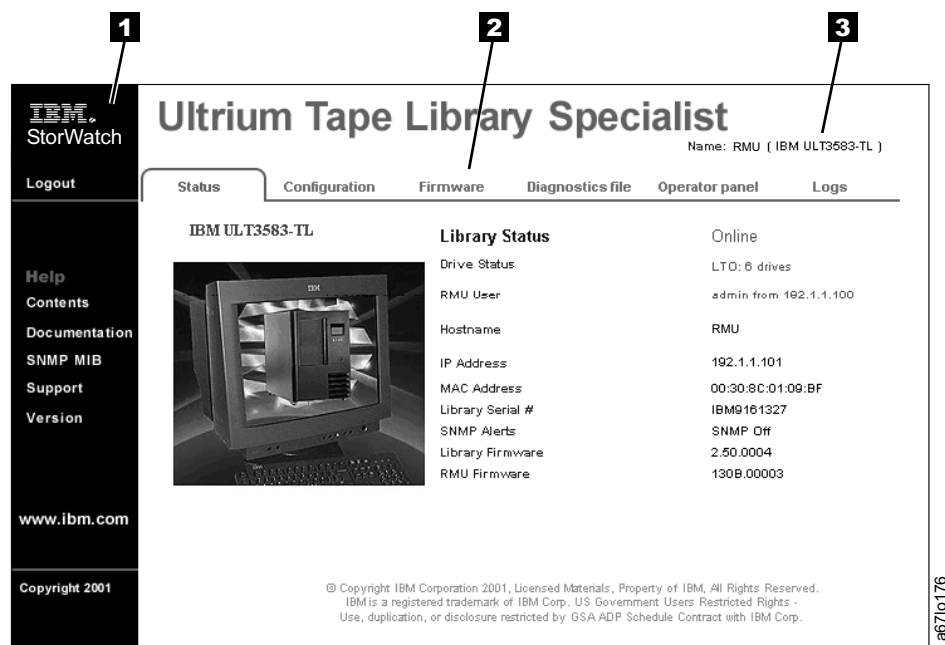


Figure 57. StorWatch Specialist home page

### Left Navigation Frame

The left navigation frame (**1** in Figure 57) contains hyperlinks that are described in the following list:

- Logout** Logs out the current user and returns to the Status page.
- Contents** Opens a page that displays a brief description of the tabs for Status, Configuration, Firmware, Diagnostic files, Operator panel, and Logs.
- Documentation** Opens a page that contains links to the library's online documentation.
- SNMP MIB** Opens a page that displays an explanation of the Simple Network Management Protocol (SNMP) management information base (MIB). This page also contains an option to download the SNMP MIB.



**Support**

Opens a page that displays technical support contact information.

**Version**

Opens a page that displays the current version of the RMU's firmware.

**www.ibm.com**

Opens the Home page for the IBM web site.

**Center Navigation Frame**

The center navigation frame ( **2** in Figure 57 on page 70) has the following tab-style hyperlinks:

- Status
- Configuration
- Firmware
- Diagnostics file
- Operator panel
- Logs

The hyperlinks in the center navigation frame are described in the following sections.

**Status**

The status page displays the current status of the library. From this page you can easily see if there are problems with the system (see Figure 58).

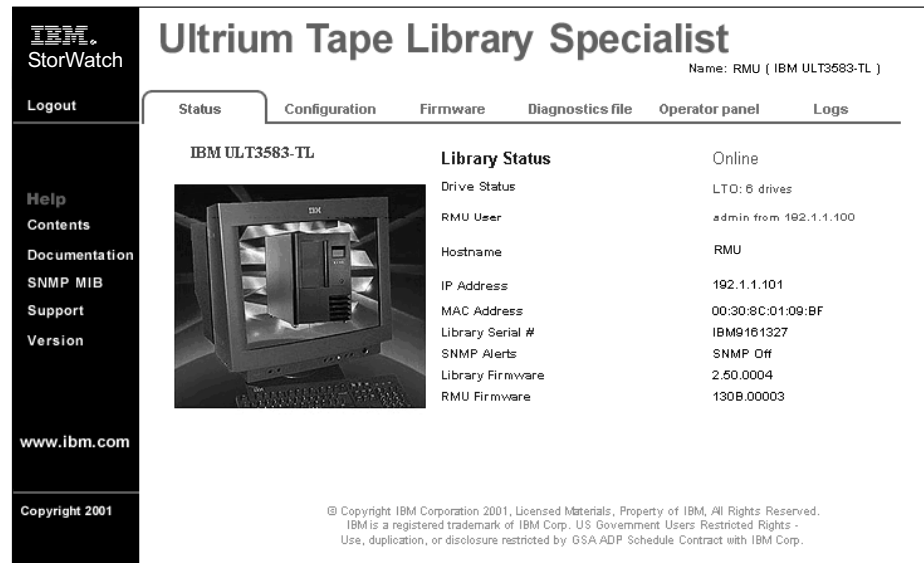


Figure 58. Status page

The status page is not protected by a password and is active even when you are not logged into the RMU. If you select any tab other than the Status tab, a login page displays (see Figure 59 on page 72). The initial login name is admin and the initial password is secure.

**Note:** A regular user cannot log into the RMU while an existing admin user is logged into the RMU. Only one regular user can be logged into the RMU at a time.



Figure 59. Login Page

## Configuration

The configuration page is protected by a password and allows you to configure the remote management unit. Network configuration (including SNMP), user configuration (adding users, setting passwords), and date and time setup are all entered on this page (see Figure 60). The initial RMU network configuration is done through the library operator panel during library installation and setup (see “Step 6. Configuring the RMU” on page 56).

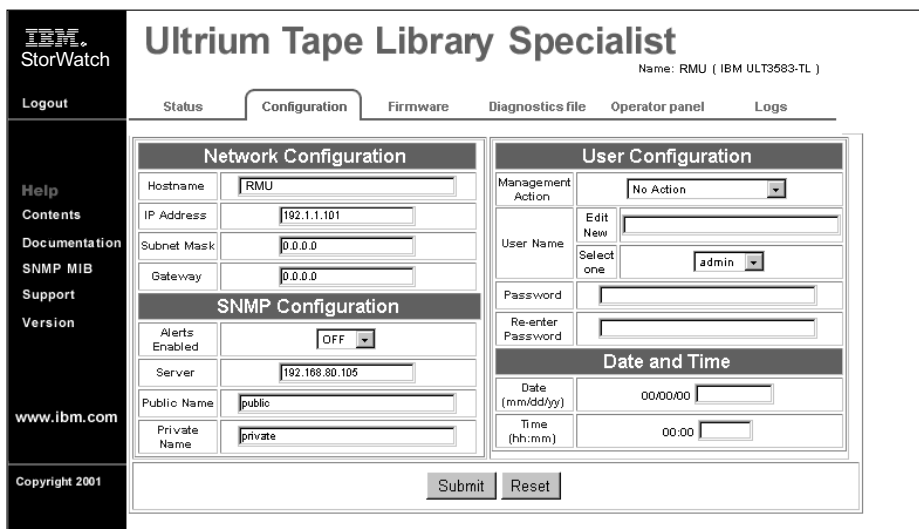


Figure 60. Configuration page

## Firmware

The firmware page is protected by a password and allows you to update the firmware of the attached library, the RMU, or the drives in the library (see Figure 61).

To update firmware using the RMU, perform the following steps:

1. Obtain the new firmware image by visiting the web at <http://www.ibm.com/storage/1to> (see the Technical Support section).
2. Download the new firmware file to a directory on your PC. The following are examples of filenames:
  - C:\xxxxxx.lif for library firmware
  - C:\xxxxxx.if1 for RMU firmware
  - C:\xxxxxx.fmr for drive firmware
3. Open the RMU web page and click on the Firmware tab (login if necessary).
4. Select the item that you want to update (Library, RMU, or DriveX).
5. Enter the path and firmware filename or browse for the file on your PC (the file that you previously downloaded from the web).
6. Select **Update Firmware**.

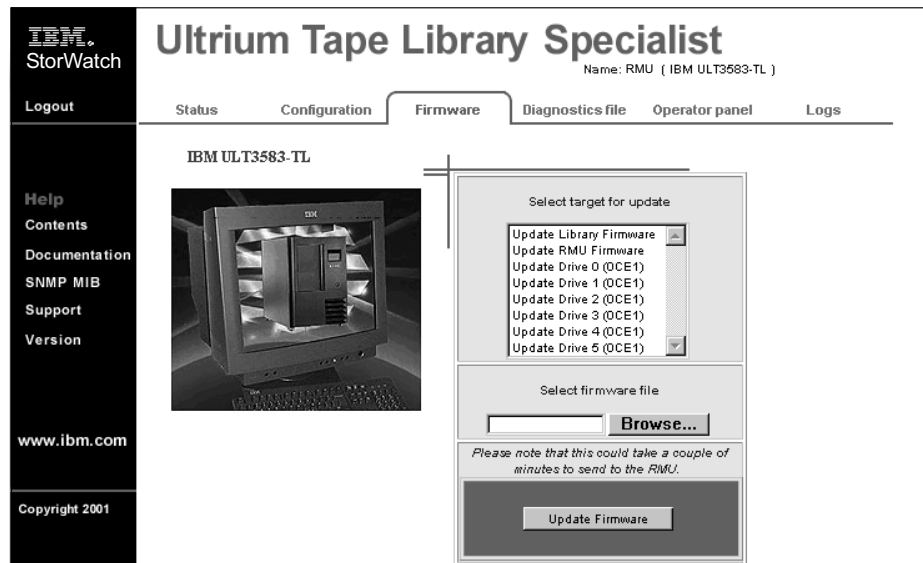


Figure 61. Firmware page

## Diagnostics File

The diagnostics file page is protected by a password and allows you to upload (to a local computer) the diagnostic information from the attached library. The diagnostic information may be useful to service personnel in diagnosing problems. Information from the library (command and error logs) and information from the RMU (error log) can be retrieved in text form. The system snapshot is a machine-decodable file which can only be used by service personnel (see Figure 62).

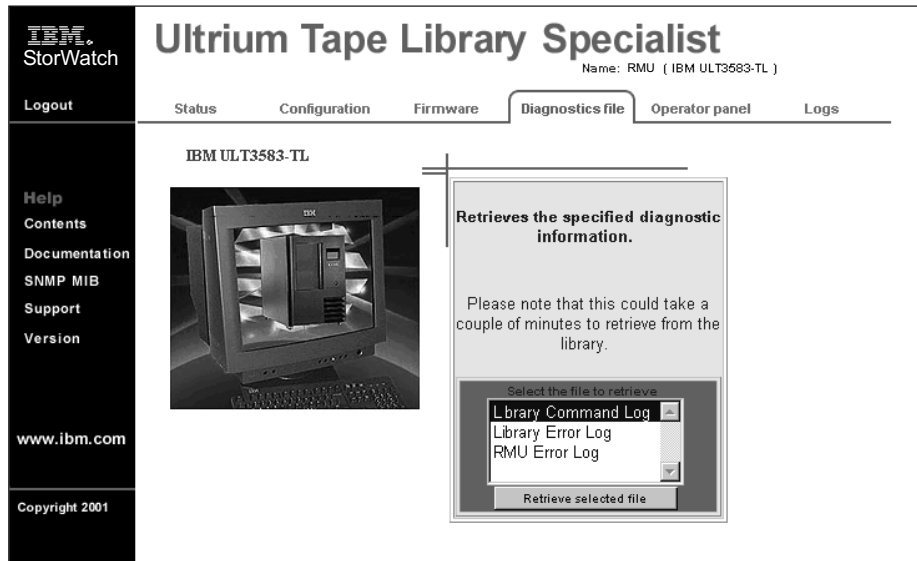


Figure 62. Diagnostics file page

## Operator Panel

The operator panel page is protected by a password and is a direct interface to the operator panel of the attached library. It allows you to monitor the activity of the library. Any action that you perform (for example, pressing a button) is shown both on this page and on the attached library (see Figure 63).



Figure 63. Operator panel page

## Logs

The logs page is protected by a password and shows the last few entries of the library command log (see Figure 64). To view the entire log, download it from the diagnostics file page Figure 62 on page 74.



The screenshot shows the IBM StorWatch Ultrium Tape Library Specialist interface. The top navigation bar includes 'Logout', 'Status', 'Configuration', 'Firmware', 'Diagnostics file', 'Operator panel', and 'Logs'. The 'Logs' tab is selected. The main content area is titled 'IBM ULT3583-TL' and 'Current Command Log'. A small image of the tape library is shown on the left. The log entries are as follows:

```
000 ENDMM[26]: SCC OK 0 04/24/01 07:54:19
001 MC[26] SCC 04 820,ED-1234,4ED 04/24/01 07:54:10
002 ENDMM[25]: SCC OK 0 04/24/01 07:54:10
003 MC[25] SCC 04 AAE,1234-BD,4ED 04/24/01 07:54:00
004 ENDMM[24]: SCC OK 0 04/24/01 07:54:00
005 MC[24] SCC 04 30C,BD-1234,4ED 04/24/01 07:53:51
006 ENDMM[23]: SCC OK 0 04/24/01 07:53:51
007 MC[23] SCC 04 59E,662-BD,4ED 04/24/01 07:53:46
008 ENDMM[22]: IVV OK 00,00,00 04/24/01 07:53:45
009 MC[22] IVV 01 2B0,112D-112D,4CE 04/24/01 07:53:41
010 ENDMM[21]: SCC OK 0 04/24/01 07:53:41
011 MC[21] SCC 04 59E,721-1234,4ED 04/24/01 07:53:34
012 ENDMM[20]: MER OK 00,00,4B5 04/24/01 07:53:33
013 MC[20] MER 03 AAE,11EC-11EC,4B5 04/24/01 07:53:30
014 ENDMM[1F]: MER OK 00,00,4B5 04/24/01 07:53:29
```

Figure 64. Logs page

## Top Information Frame

The top information frame ( **3** in Figure 57 on page 70) contains information for you to identify the tape library that you are remotely managing. The frame shows the URL identifier and library type. The URL identifier is the hostname given to the library during initial configuration. The library type is the ID string of the library and is taken from standard inquiry data.

## SAN Data Gateway Module

The SAN Data Gateway Module is the connection between the SCSI devices that make up the 3583 Tape Library and the SAN. Once configured, the gateway operates with little operator intervention. Gateway operations include reconfiguration, status checking, event logging and analysis, and health check analysis. Most of these functions are available through the StorWatch Specialist on a network.

The StorWatch Specialist menus allow you to perform various actions including selecting views of one or more gateways and the devices connected to them. The major menu groups are shown in the following list:

- File
- View
- Admin
- Tools
- Controls
- Help

For detailed information about the operation of the gateway, see the *IBM Storage Area Network Data Gateway Module Setup, Operator, and Service Guide*.

---

## Turning on the Power to the Tape Library

Perform the following to start the 3583 Tape Library:

1. Securely latch the front door. The library does not require the door to be locked to operate properly. You can lock the front door for library security or to prevent the door from being opened accidentally.
2. Push | on the main power switch ( **1** in Figure 65) to turn on the power.



**CAUTION:**  
Movements of mechanical components in the tape library can cause serious injury. Before turning the main power switch ON, confirm that no danger exists to personnel or property.

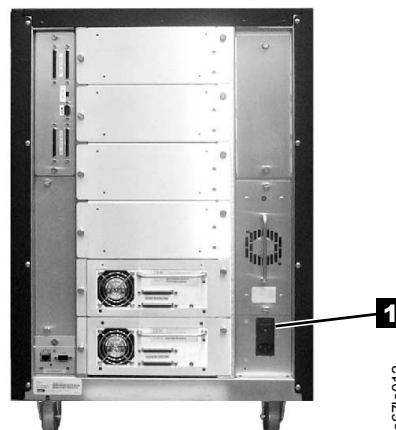


Figure 65. Main power switch

Power is applied to the tape library. The firmware starts the boot process with an introductory splash screen (see Figure 66).

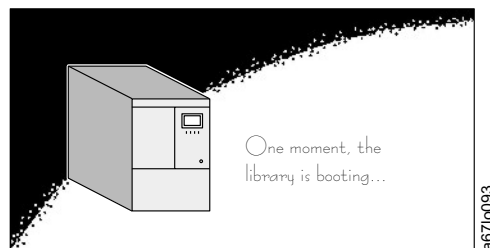


Figure 66. Splash screen

The firmware initiates a SELF-TEST, TEACHING (auto-configuration), and SCANNING operation. After all of the firmware procedures are completed, the LCD screen on the operator panel displays the Main Menu (initial screen) (see Figure 76 on page 89).

---

## Shutting Down the Tape Library

You can shut down the 3583 Tape Library normally or by the emergency shutdown method.

**Attention:** Except in emergencies, stop the library with the normal shutdown procedure before switching off the main power switch. IBM is not responsible for damage that is caused by improper use of the main power switch. All risk lies entirely with the user.

### Performing a Normal Shutdown

To properly shut down the 3583 Tape Library, perform the following steps:

1. Ensure that all cartridges are removed from the drives and are stored in the library's storage slots.
2. Push O on the main power switch ( **1** in Figure 65 on page 76) to turn off the power. Power is removed from the tape library.

### Performing an Emergency Shutdown

**Attention:** Perform the following in cases of emergency only.

Push O on the main power switch ( **1** in Figure 65 on page 76) to turn off power. Power is removed from the tape library. All picker movements stop immediately.

---

## Restarting the Tape Library

Perform the following to restart the 3583 Tape Library:

1. If applicable, correct any conditions that required a shutdown of the tape library.
2. See "Turning on the Power to the Tape Library" on page 76 for instructions about powering-on the tape library.

---

## Inserting Media

You can insert media into the 3583 Tape Library by using the I/O station or by opening the front door (a method called *direct insertion*). Use direct insertion the first time that you insert media into the library. The sections that follow describe each method.

### I/O Station

Placement of new media into the library is best accomplished by using the I/O station. Using the I/O station to insert cartridges (import) does not disrupt library operations. To insert cartridges through the I/O station, perform the following procedure:

1. Open the I/O station door.
2. Insert the cartridge into an empty storage slot.
3. Close the I/O station.  
The library locks the I/O station and executes the TEACH and INVENTORY procedures for column 1. The library unlocks the I/O station.
4. Move the cartridge to the desired storage slot by using one of the following methods:
  - Use the server's software application.
  - Issue the SCSI MOVE MEDIUM command from the server, with the source I/O station element address and the destination storage element address.
  - Use the Import command from the operator panel (see "Import Dialog" on page 115).
  - Use the Move Media command from the operator panel (see "Move Media Dialog" on page 106).

### Direct Insertion into the Tape Library

To directly insert media, perform the following procedure:

1. Use the operator panel to place the library into the Offline state (**Main Menu** → **Online/Offline** → **OK**).  
The picker completes any current task.
2. Unlock and open the library door.
3. Place the cartridge into the desired storage slot.
4. Close and lock the door.  
The library executes the TEACH and INVENTORY procedures.



---

## Ejecting Media

There are two ways to remove media from the library: through the I/O station or directly.

### I/O Station

Use the I/O station to remove media from the library. Using the I/O station to remove cartridges (export) does not disrupt library operations. To remove cartridges through the I/O station, perform the following procedure:

1. Select which cartridges you want to move to the I/O station by using one of the following methods:
  - Use the server's software application.
  - Issue a SCSI MOVE MEDIUM command from the server with the source storage element address and the destination I/O station element address.
  - Use the Export command from the operator panel (see "Export Dialog" on page 116).
  - Use the Move Media command from the operator panel (see "Move Media Dialog" on page 106).
2. Pull on the handle to open the I/O station.
3. Remove the cartridge from the storage slot.
4. Close the I/O station.

The library locks the I/O station and executes the TEACH and INVENTORY procedures for column 1. The library unlocks the I/O station.

### Direct Removal from the Tape Library

To directly remove media, perform the following procedure:

1. Use the operator panel to place the library into the Offline state (**Main Menu** → **Online/Offline** → **OK**). The picker completes any current task.
2. Unlock and open the library door.
3. Remove the cartridge from the desired storage slot.
4. Close and lock the door.

The library executes the TEACH and INVENTORY procedures.

## Updating Firmware

**Attention:** To ensure optimum performance from the 3583 Tape Library, use the latest level of firmware. It is the customer's responsibility to obtain and install all firmware.

You can update firmware for the drives, the library, or the RMU. You can use the following methods to update firmware:

- RMU
- SCSI bus
- FMR tape (drive firmware only)
- Library serial port (library firmware only)
- SAN Data Gateway Module (optional)

If the library has an optional SAN Data Gateway Module installed you can update firmware by using the gateway. For more information, see the section about updating firmware in the *IBM Storage Area Network Data Gateway Module Setup, Operator, and Service Guide*.

**Note:** Before updating firmware on the drives, the library, or the RMU, use the server to set the library OFFLINE for all attached server.

To find out whether the drives, the library, or the RMU is loaded with the most current firmware, go to the web at <http://www.ibm.com/storage/1> to (see the **Technical Support section**) and check this against the firmware on the device.

- To view the level of firmware currently loaded on a drive, select **Status** → **Drives**. The Drives Dialog displays (see Figure 67).

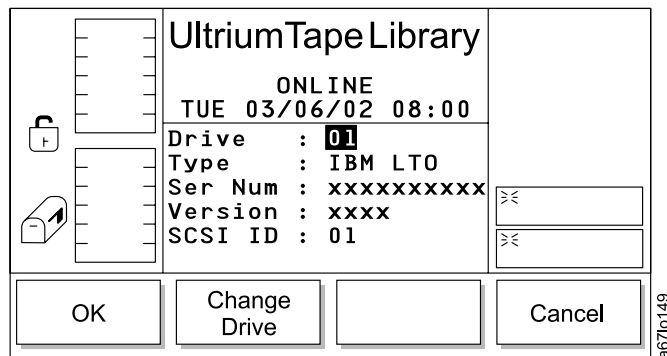


Figure 67. Drives Dialog

- To view the level of firmware currently loaded on the library, select **More** → **About**. The About Menu displays (see Figure 68).

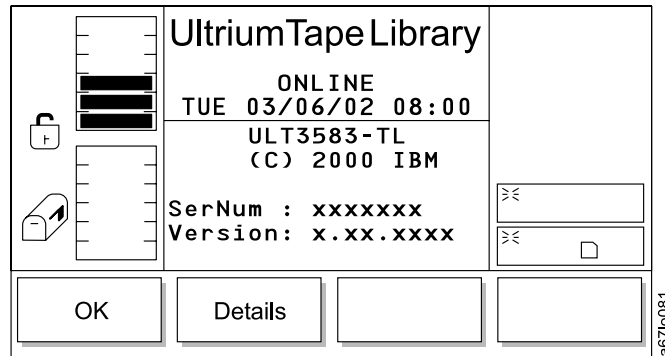


Figure 68. About Menu

- You can also view the level of firmware currently loaded on the library or the RMU by opening the RMU web page and selecting the Status tab. The current status of the library displays (see Figure 69).

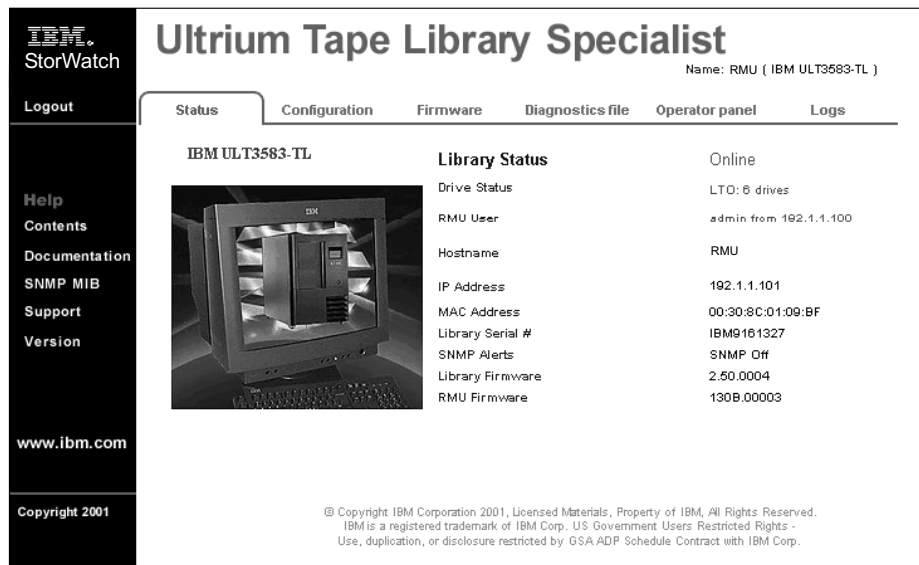


Figure 69. Status page

## Updating Firmware by Using the RMU

To update firmware for the drives, the library, or the RMU using the RMU perform the following steps:

**Note:** Updating firmware on the drives using the RMU will take approximately 50 minutes for the first drive and 15 minutes for each additional drive. If you update firmware on the first drive using the RMU you can update firmware on additional drives using an FMR tape. To create an FMR tape go to “Updating Drive Firmware by Using an FMR Tape” on page 83.

1. Obtain the new firmware image by visiting the web at <http://www.ibm.com/storage/1to> (see the **Technical Support section**).
2. Download the new firmware file to a directory (or diskette) on your PC. Examples of filenames are shown below:
  - C:\xxxxxx.lif for library firmware
  - C:\xxxxxx.if1 for RMU firmware
  - C:\xxxxxx.fmr for drive firmware
3. Open the RMU web page and select the Firmware tab, login if necessary (see Figure 70).
4. Select the item that you want to update (Library, RMU, or DriveX).
5. Enter the path and firmware filename or Browse for the file on your PC (the file you previously downloaded from the web).
6. Select Update Firmware.

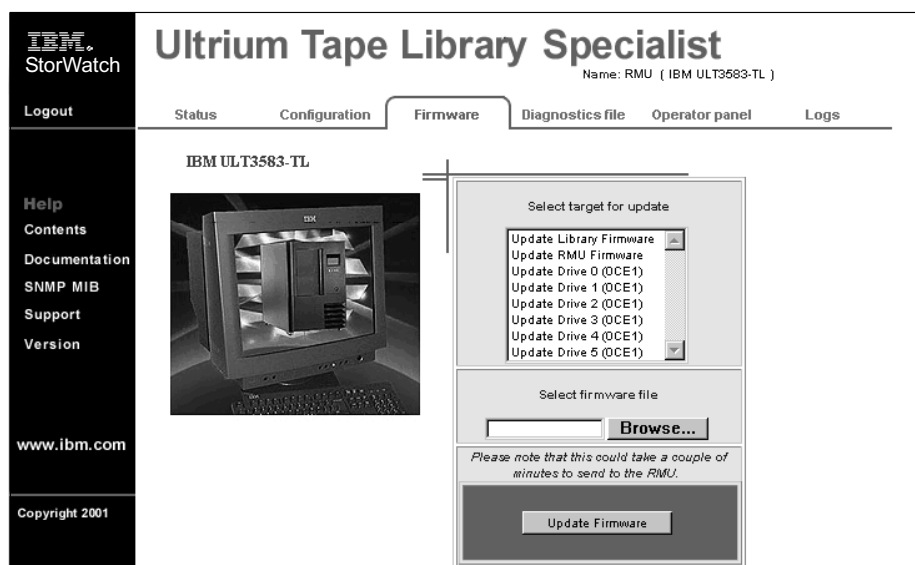


Figure 70. RMU firmware page

## Updating Firmware by Using the SCSI Bus

Use the following information to assist you in downloading library and drive firmware from your server (host) over the SCSI bus by using the device drivers and utilities supplied by IBM.

For instructions on using the IBM device drivers and utilities (NTUTIL or TAPEUTIL) refer to the *IBM Ultrium Device Drivers Installation and User's Guide* that was shipped with the library. Or for the latest version of the user's guide visit the web at <http://www.ibm.com/storage/1to> (see the **Technical Support section**).

**Note:** It may be necessary to disable or remove a device driver supplied with a commercial backup application before using the device driver supplied by IBM. Refer to the *IBM Ultrium Device Drivers Installation and User's Guide* and the documentation provided with your backup application software to determine if there are conflicts.

After downloading firmware, verify the installation by using the inquiry command available on the utilities menu of your server, or from the library operator panel select **More** → **About** (to determine the version of the firmware in the About Menu; see Figure 68 on page 81).

**Note:** Some backup application software packages will not reflect the firmware change until the registry is refreshed by rebooting the server.

## Updating Drive Firmware by Using an FMR Tape

You can create an FMR tape from a drive that is installed in the library if that drive has the latest level of firmware loaded. Select **More** → **Service** → **Drives** → **OK** or **Change Drive** → **FMR Tape** → **OK**. The FMR Tape Dialog displays (see Figure 71).

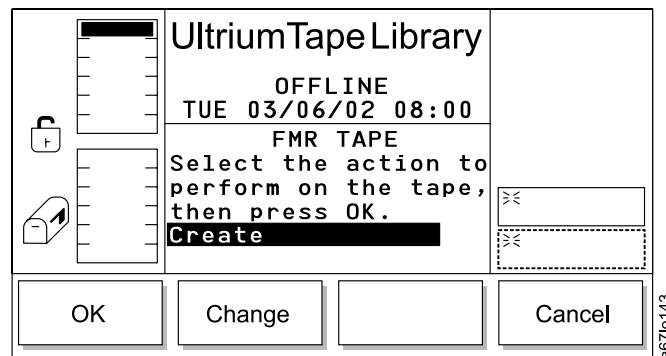


Figure 71. FMR Tape Dialog

To install the new firmware image using the FMR tape select **Command** → **Drives** → **Firmware Update**. The Firmware Update Dialog displays (see Figure 72 on page 84).

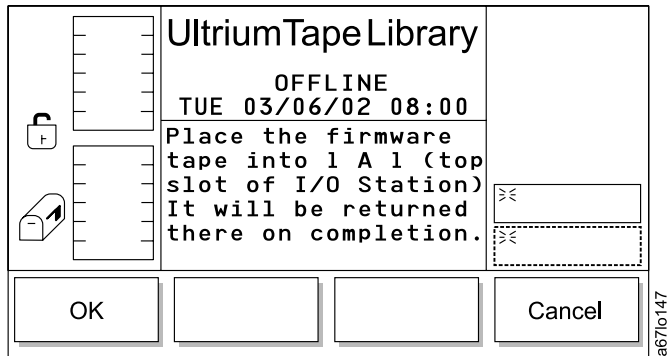


Figure 72. Firmware Update Dialog

1. Open the I/O station.
2. Place the FMR tape into the top slot of the I/O station.
3. Close the I/O station. The library executes the TEACH and INVENTORY procedures.
4. Select **OK**. The Select Drives Dialog displays (see Figure 73).

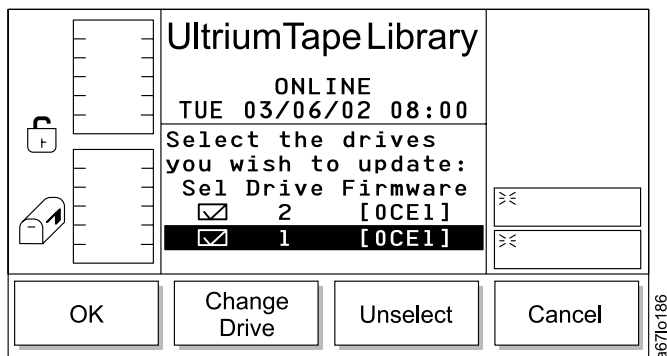


Figure 73. Select Drives Dialog

5. Select **Unselect** or **Select** to include drives in the firmware migration procedure.
6. When your drive selection is complete, select **OK**. The Firmware Update Dialog displays (see Figure 74).

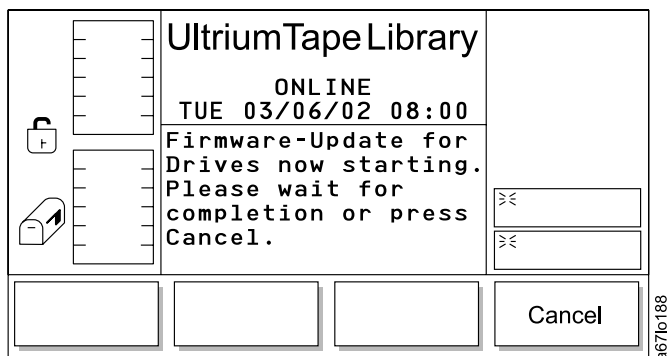


Figure 74. Firmware Update Dialog

The picker takes the FMR tape out of the I/O station and places it into the selected drive. The drive updates the firmware and unloads the FMR tape. The picker removes the FMR tape from the drive and returns it to the I/O station. If you are updating more than one drive the picker places the FMR tape into each drive that you selected. When the migration is complete the picker returns the FMR tape to the I/O station.

When the update firmware procedure is complete you can erase the FMR tape so that you can use it as a data cartridge. Select **More** → **Service** → **Drives** → **OK, Change Drive** → **FMR Tape** → **Erase** → **OK** (see Figure 71 on page 83).

## Updating Library Firmware by Using the Library's Serial Port

Go to the web at <http://www.ibm.com/storage/1to> (see the **Technical Support section**), download `appcode.exe` to a temporary directory on your PC, and execute it. The downloaded file, `appcode.exe`, creates two files: the latest library firmware (for example, `V2.62.01.lif`) and an executable file (`download.exe`).

1. Power-off the library.
2. Open a command prompt window and change the current directory to the temporary directory where `appcode.exe` was extracted.
3. Connect the serial cable P/N 19P1945 between the PC and the serial port located on the SCSI host interface board.
4. From the command prompt, type the following command and press Enter:

```
download -cx -fxxxxx.lif
```

Where:

<b>download</b>	Firmware Download Command
<b>-c</b>	Required characters that precede the Communication Port Number
<b>-x</b>	Communication Port Number
<b>-f</b>	Required characters that precede the file name
<b>xxxxxx.lif</b>	File name (for example, <code>v2.00.00.lif</code> )

The message `Waiting for ALIVE message` displays

**Note:** For help enter the command:

```
download -h
```

5. After the message `Waiting for ALIVE message` displays, power-on the library.

After downloading firmware, verify the installation by using the inquiry command available on the utilities menu of your server, or from the library operator panel select **More** → **About** (to determine the version of the firmware in the About Menu; see Figure 68 on page 81).

**Note:** Some backup application software packages will not reflect the firmware change until the registry is refreshed by rebooting the server.

---

## Retrieving Inquiry Data

Two methods are available for retrieving the SCSI inquiry identification of the tape library:

### Host utility

To retrieve SCSI inquiry data by using your server and a utility such as TAPEUTIL or NTUTIL, refer to the documentation for your server.

**RMU** To retrieve inquiry data using the RMU, open a web browser and type the IP address or hostname of the RMU. The StorWatch Specialist Status page displays. The SCSI inquiry data of the library is shown in the upper right corner of the web page (for example, Name: RMU (IBM ULT3583-TL)).

---

## Cleaning Drives

Whenever a drive requires cleaning, it alerts you with a message on the library operator panel or host console. The library uses the LTO Ultrium cleaning cartridge to clean the drive with whatever cleaning method that you choose. In all methods, cleaning is performed after the data cartridge has been unloaded from the drive and before the next load. All LTO Ultrium cleaning cartridges processed by the library must have a bar code label.

**Note:** The volume serial number (VOLSER) on the cartridge bar code label must begin with **CLNI**, or the library treats the cleaning cartridge as a data cartridge during an inventory.

There are two methods available for cleaning drives in the tape library:

### Host cleaning

Host/Application maintained and activated is the default condition. Host cleaning enables the server to detect the need to clean an Ultrium Tape Drive and to control the cleaning process. The cleaning cartridge must be stored in one of the available storage slots within the library. For more information, see the section about cleaning in your application software documentation.

### Manual cleaning

Manual cleaning requires that you use the Move Media command from the library's operator panel to insert a cleaning cartridge into the library to perform cleaning on one or more of the Ultrium Tape Drives (see "Move Media Dialog" on page 106).

Cleaning the drive on a periodic basis is not recommended. Only clean the drive when the cleaning symbol displays in the drive status area of the operator panel (see Figure 55 on page 68).



---

## Chapter 4. Menus and Commands

Use the following table of contents to quickly locate menus.

Using the Operator Panel Menu . . . . .	88
Main Menu . . . . .	89
Online/Offline Selection . . . . .	90
Status Menu . . . . .	92
Library Submenu . . . . .	92
System Dialog . . . . .	93
Slot Dialog . . . . .	94
Media Dialog . . . . .	97
Drives Dialog . . . . .	99
Logs Submenu . . . . .	99
Command Log Dialog . . . . .	100
Error Log Dialog . . . . .	101
Drive Log Dialog . . . . .	102
Command Menu . . . . .	105
Move Submenu . . . . .	105
Move Media Dialog . . . . .	106
Position Picker Dialog . . . . .	109
Scan Barcode Dialog . . . . .	111
I/O Station Submenu . . . . .	114
Import Dialog . . . . .	115
Export Dialog . . . . .	116
Drives Submenu . . . . .	118
Unload Dialog . . . . .	118
Reset Dialog . . . . .	119
Firmware Update Dialog . . . . .	120
Setup Menu . . . . .	121
Library Submenu. . . . .	122
SCSI Dialog . . . . .	122
RMU Dialog . . . . .	124
Drives Submenu . . . . .	124
Drive SCSI Dialog . . . . .	125
Utils Submenu . . . . .	126
Date/Time Dialog . . . . .	127
Config Dialog . . . . .	128
Secure Dialog . . . . .	129
Service Menu . . . . .	132
Start Dialog. . . . .	133
Normal Service Dialog. . . . .	133
Advanced Service Dialog. . . . .	134
Library Submenu. . . . .	134
Firmware Update Dialog . . . . .	135
Diags Submenu . . . . .	135
Exercise Submenu . . . . .	143
Drives Dialog . . . . .	148
Drive Service Dialog . . . . .	148
About Menu . . . . .	151
Details Dialog . . . . .	152

## Using the Operator Panel Menu

Each menu is accessible through the operator panel push buttons. See “Operator Panel” on page 65 for an illustration and definition of the push buttons. See Figure 75 for an illustration of the menu tree mapping. Go to “Main Menu” on page 89 for the actual menus.

**Note:** The information menus do not dynamically update. To view changes, reselect the menu that was changed.

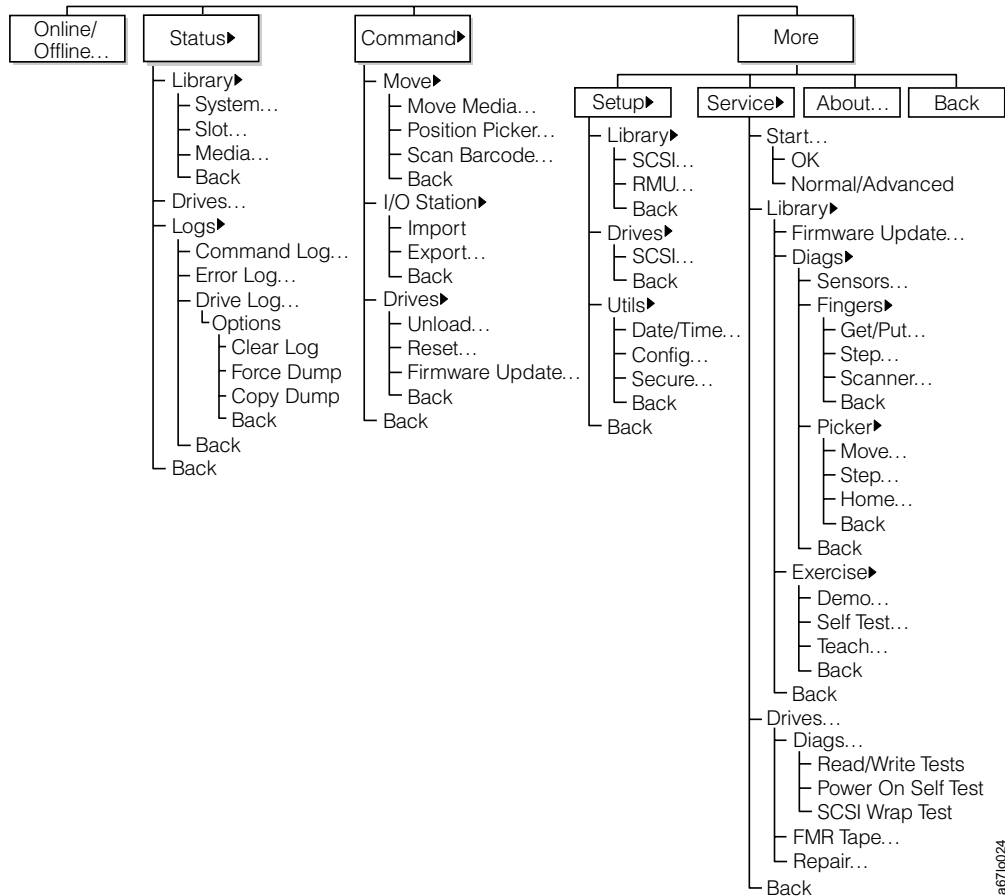


Figure 75. Menu Tree

## Menu Guidelines

All menus and respective options are grouped according to function. The special characters following the softkey menu titles are described below.

- A keyword leading to another menu is followed by a black arrow. Example: **Move▶**
- A keyword leading to a dialog box is followed with three closely spaced dots. Example: **Move Media...**
- A keyword leading to an immediate action has no suffix.
- Most fields on the menus, submenus, dialogs, and screens are read-only. The fields that are writable are highlighted by white characters on a black background. Example: **ON**

## Main Menu

The Main Menu is the first interactive menu that displays after you turn the power on. The Main Menu consists of the initial screen and the alternate screen. You can select all subsequent menus and options from the Main Menu. Eight options are available, with four of the options present at all times. Figure 76 shows the Main Menu's initial screen.

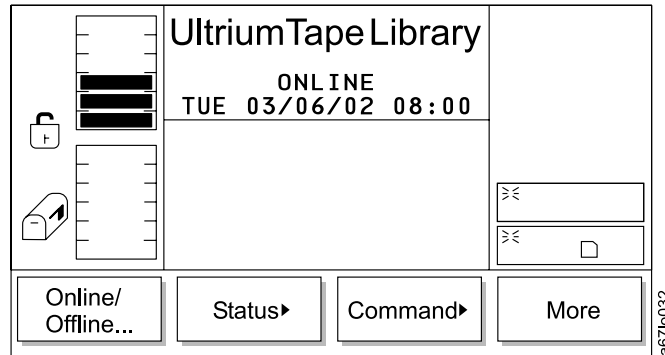


Figure 76. Main Menu (initial screen)

Pressing the button below the **More** softkey causes the Main Menu's alternate screen to display (see Figure 77).

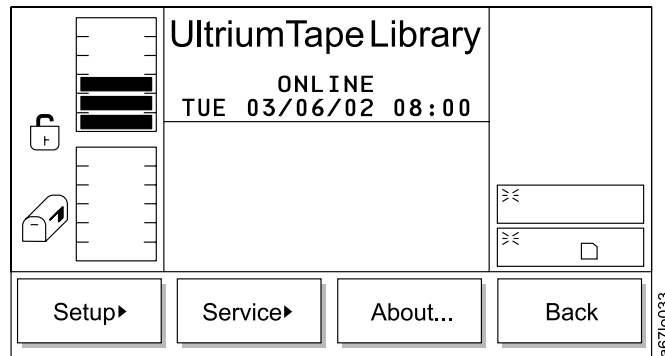


Figure 77. Main Menu (alternate screen)

Pressing the button below the **Back** softkey causes the Main Menu's initial screen to display again. To choose any of the selections, press the button below the desired softkey selection.

## Online/Offline Selection

Use the **Online/Offline** selection to change the operating state of the library after startup, before shutdown, or before diagnostic operations. To select **Online/Offline** from the Main Menu (initial screen), press the button below the **Online/Offline** softkey.

You can change the state of the library from Offline to Online or from Online to Offline. The sections that follow describe how to make the change.

## Using Commands That Require an Offline State

The commands listed under the **Commands** and **Service** menus require that the library be in an Offline state. If you attempt these commands while the library is Online, the library prompts you to take it Offline by using the following dialogs.

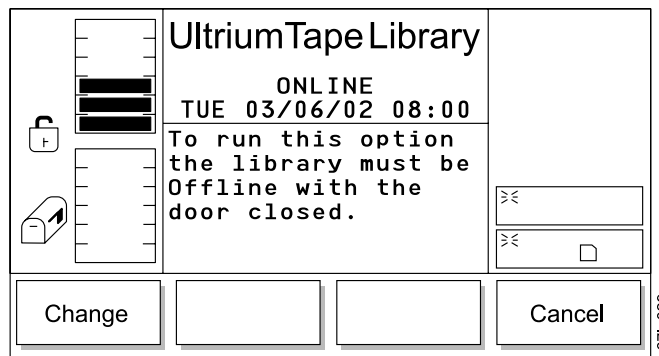


Figure 78. Change Dialog

To choose one of the selections from the Change Dialog, press the button below the desired softkey.

- If **Change** is selected, the Offline Confirmation Dialog displays (see Figure 79).
- If **Cancel** is selected, the operation is canceled and the originating menu displays.

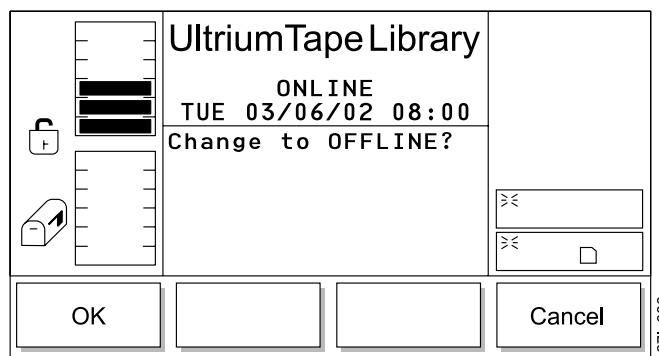


Figure 79. Offline Confirmation Dialog

To choose one of the selections from the Offline Confirmation Dialog, press the button below the desired softkey.

- If **OK** is selected, the Completed Verification Dialog displays (see Figure 80 on page 91 ) and the library goes offline.

- If **Cancel** is selected, the operation is canceled and the originating menu displays.

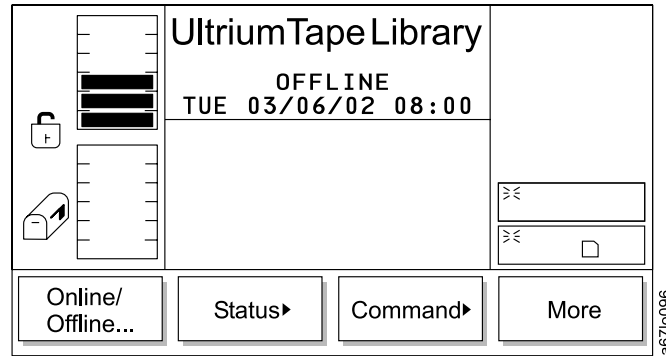


Figure 80. Completed Verification Dialog

## Operator Intervention Message

If a problem causes an operator intervention message to appear, see Table 16 on page 202 for an explanation of the parameters in the message.

## Operator Information Message

During the course of normal operation, operator information messages appear. See "Operator Information Messages" on page 204 for a list of the available messages.

## Status Menu

Use the Status Menu to provide static and dynamic operating statistics. Select **Status** from the Main Menu (initial screen) by pressing the button below the **Status** softkey (see Figure 76 on page 89). The Status Menu displays (see Figure 81).

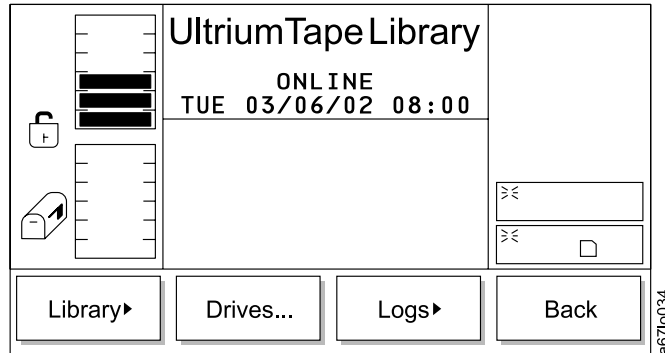


Figure 81. Status Menu

To choose one of the selections from the Status Menu, press the button below the desired softkey.

- If **Library** is selected, the Library Submenu displays (see Figure 82).
- If **Drives** is selected, the Drives Dialog displays (see Figure 95 on page 99).
- If **Logs** is selected, the Logs Submenu displays (see Figure 96 on page 99).
- If **Back** is selected, the Main Menu displays (see Figure 76 on page 89).

## Library Submenu

The Library Submenu is a collection of library status options.

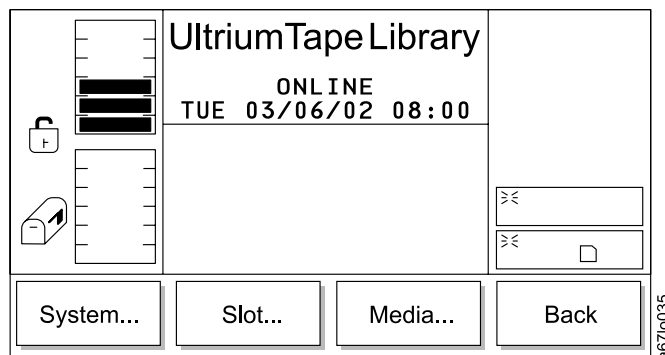


Figure 82. Library Submenu

To choose one of the selections from the Library Submenu, press the button below the desired softkey.

- If **System** is selected, the System Dialog displays (see Figure 83 on page 93).
- If **Slot** is selected, the Slot Dialog displays (see Figure 85 on page 94).
- If **Media** is selected, the Media Dialog displays (see Figure 92 on page 97).
- If **Back** is selected, the Status Menu displays (see Figure 81).

## System Dialog

Use the System Dialog to view the current library's physical and statistical characteristics.

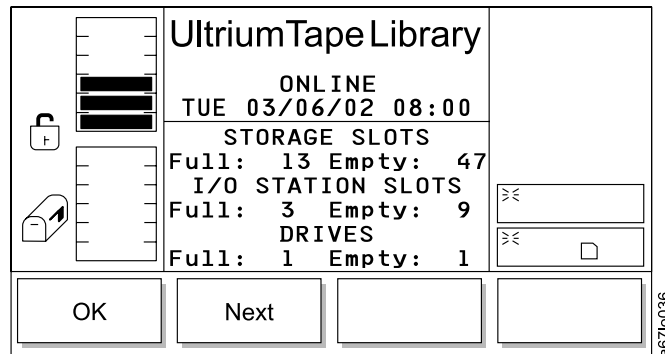


Figure 83. System Dialog

To choose one of the selections from the System Dialog, press the button below the desired softkey.

- If **OK** is selected, the Library Submenu displays (see Figure 82 on page 92).
- If **Next** is selected, the Statistics Dialog displays (see Figure 84).

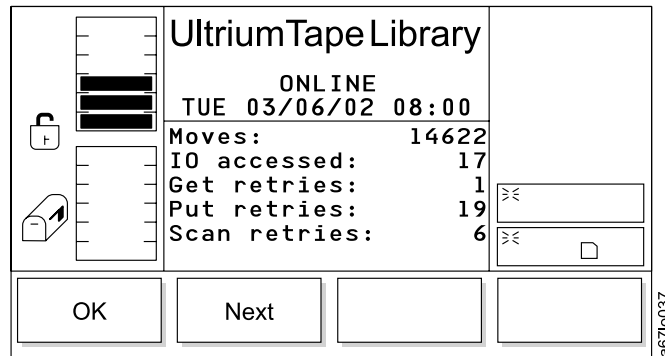


Figure 84. Statistics Dialog

To choose one of the selections from the Statistics Dialog, press the button below the desired softkey.

- If **OK** is selected, the Library Submenu displays (see Figure 82 on page 92).
- If **Next** is selected, the first screen of the Statistics Dialog redisplay.

## Slot Dialog

Use the Slot Dialog to view details about a specific slot in the library.

**Note:** The column, magazine, and slot parameter selections are interactive. The combination of the three parameters generates the element address.

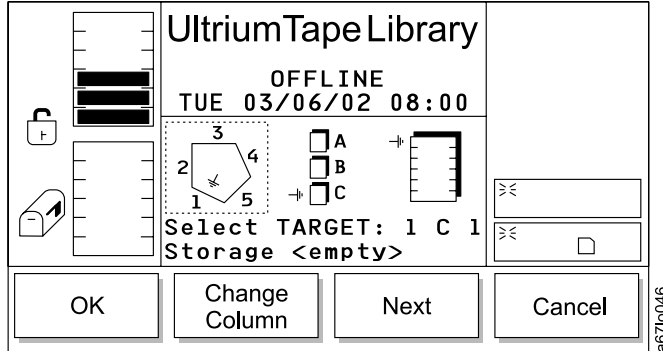


Figure 85. Slot Dialog

To choose one of the selections from the Slot Dialog, perform the following steps:

1. Press the button below the desired softkey.
  - If **OK** is selected, the source parameters are accepted, and the Slot Information Dialog displays (see Figure 89 on page 96).
  - If **Change Column** is selected, the column indicator moves clockwise to the next column address. Repeat until the desired column is indicated.

**Note:** If the chosen column element is a drive (column 3), no slot or magazine parameters are available. The current source parameter changes from column to drive and the Change Drive Dialog displays (see Figure 86).

- If **Next** is selected, the current source parameter changes from column to magazine and the Change Magazine Dialog displays (see Figure 87 on page 95).
- If **Cancel** is selected, the Library Submenu displays (see Figure 82 on page 92).

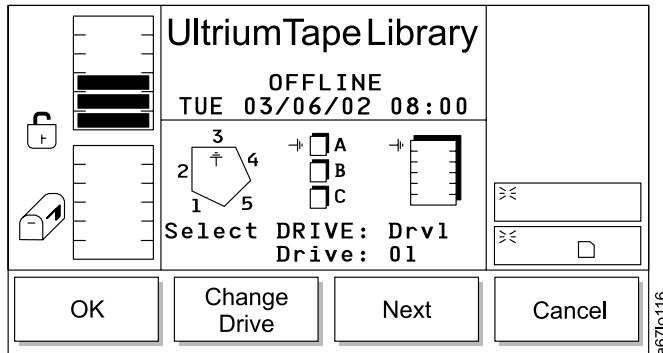


Figure 86. Change Drive Dialog



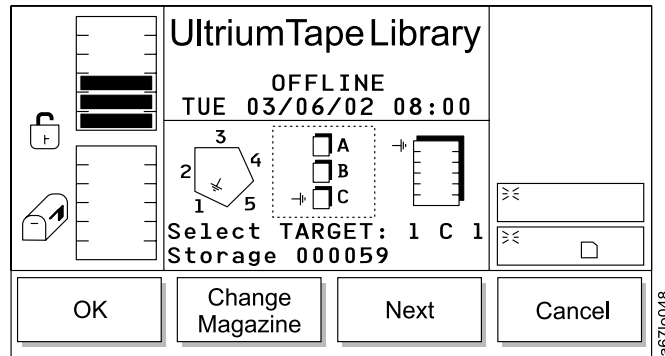


Figure 87. Change Magazine Dialog

2. From the Change Magazine Dialog, press the button below the desired softkey.
  - If **OK** is selected, the source parameters are accepted, and the Slot Information Dialog displays (see Figure 89 on page 96).
  - If **Change Magazine** is selected, the magazine indicator steps downward to the next magazine address. Repeat until the desired magazine is indicated.
  - If **Next** is selected, the current source parameter changes from magazine to slot and the Change Slot Dialog displays (see Figure 88).
  - If **Cancel** is selected, the Library Submenu displays (see Figure 82 on page 92).

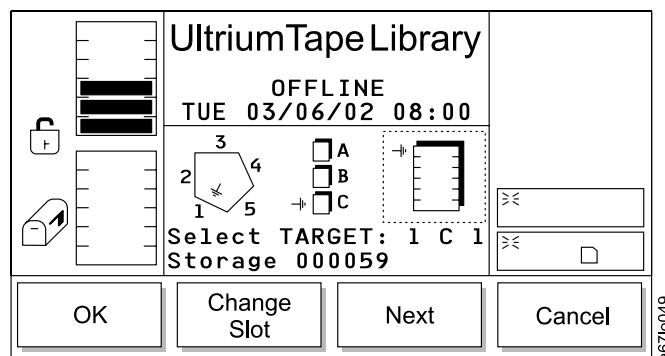


Figure 88. Change Slot Dialog

3. From the Change Slot Dialog, press the button below the desired softkey.
  - If **OK** is selected, the source parameters are accepted, and the Slot Information Dialog displays (see Figure 89 on page 96).
  - If **Change Slot** is selected, the slot indicator steps downward to the next slot address. Repeat until the desired slot is indicated.
  - If **Next** is selected, the current source parameter changes from slot to column as shown in the Slot Dialog (see Figure 85 on page 94).
  - If **Cancel** is selected, the Library Submenu displays (see Figure 82 on page 92).

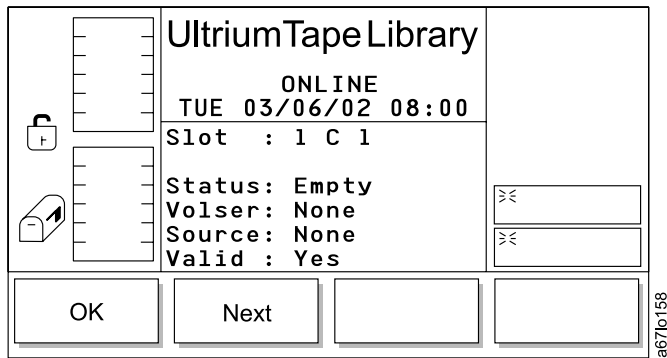


Figure 89. Slot Information Dialog

4. From the Slot Information Dialog, press the button below the desired softkey.
  - If **OK** is selected, the Slot Dialog displays (see Figure 85 on page 94).
  - If **Next** is selected, the Put/Get Information Dialog displays (see Figure 90).

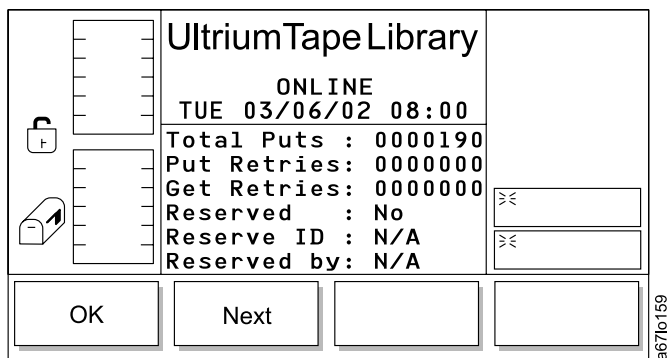


Figure 90. Put/Get Information

- If **OK** is selected, the Slot Dialog displays (see Figure 85 on page 94).
- If **Next** is selected, the Position Dialog displays (see Figure 91).

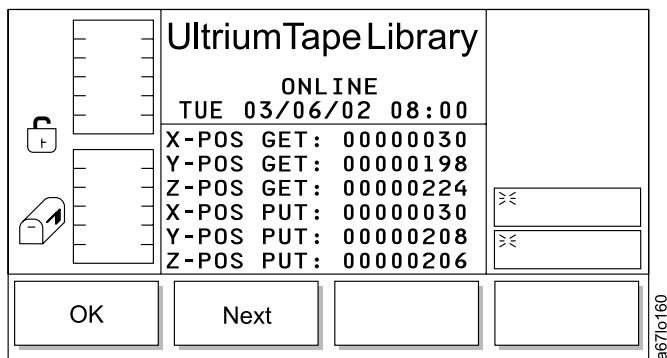


Figure 91. Position Dialog

- If **OK** is selected, the Slot Dialog displays (see Figure 85 on page 94).
- If **Next** is selected, the Slot Information Dialog displays (see Figure 89).

## Media Dialog

The Media Dialog allows you to view the VOLSER, column, section, row, and cell number for each cartridge in the library.

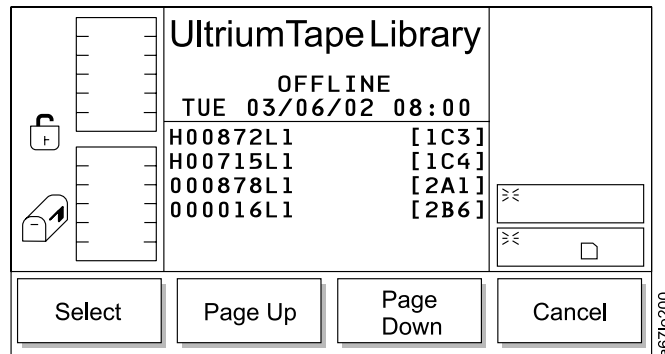


Figure 92. Media Dialog

To choose one of the selections from the Media Dialog, press the button below the desired softkey.

- If **Select** is selected, the Select Media Dialog displays (see Figure 93).
- If **Page Up** is selected, the display scrolls to the next page of media.
- If **Page Down** is selected, the display scrolls to the previous page of media.
- If **Cancel** is selected, the Library Submenu displays (see Figure 82 on page 92).

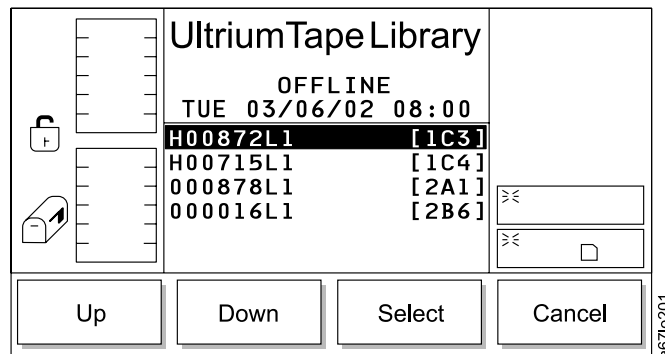


Figure 93. Select Media Dialog

To choose one of the selections from the Select Media Dialog, press the button below the desired softkey.

- If **Up** is selected, the display scrolls to the previous item in the list.
- If **Down** is selected, the display scrolls to the next item in the list.
- If **Select** is selected, the Media Information Dialog displays (see Figure 94 on page 98).
- If **Cancel** is selected, the Media Dialog displays (see Figure 92).

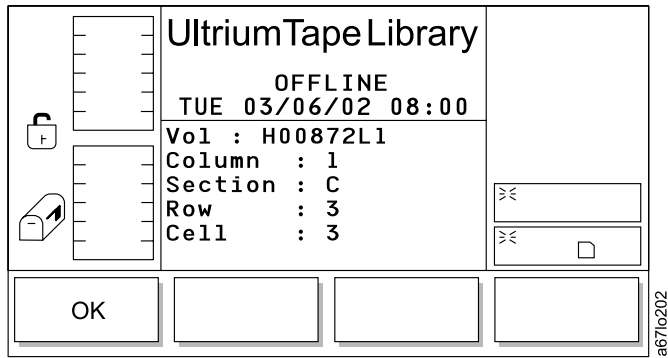


Figure 94. Media Information Dialog

From the Media Information Dialog, select **OK**. The Media Dialog displays (see Figure 92 on page 97).

## Drives Dialog

The Drives Dialog is a collection of specific drive information.

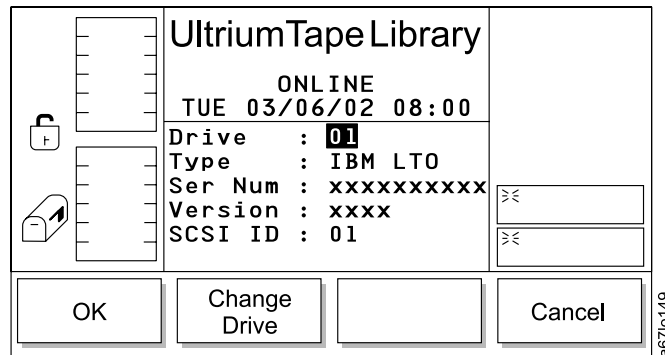


Figure 95. Drives Dialog

To choose one of the selections from the Drives Dialog, press the button below the desired softkey.

- If **OK** is selected, the Status Menu displays (see Figure 81 on page 92).
- If **Change Drive** is selected, the next drive in the library is chosen. The display refreshes with the information for the current drive selection.
- If **Cancel** is selected, the Status Menu displays (see Figure 81 on page 92).

## Logs Submenu

The Logs Submenu offers various log information.

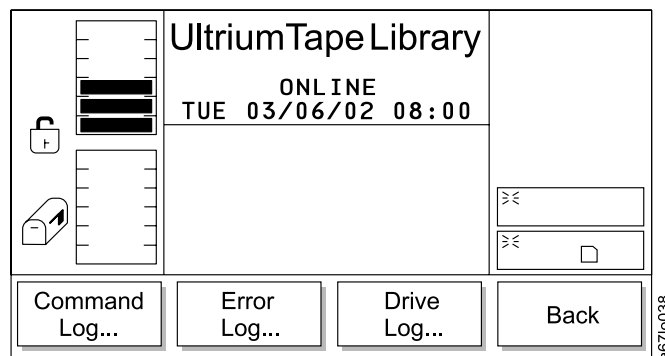


Figure 96. Logs Submenu

To choose one of the selections from the Logs Submenu, press the button below the desired softkey.

- If **Command Log** is selected, the Command Log Dialog displays (see Figure 97 on page 100).
- If **Error Log** is selected, the Error Log Dialog displays (see Figure 99 on page 101).
- If **Drive Log** is selected, the Drive Log Dialog displays (see Figure 102 on page 102). (If the library contains more than one drive, the Select Drive Dialog displays; see Figure 101 on page 102.)
- If **Back** is selected, the Status Menu displays (see Figure 81 on page 92).

## Command Log Dialog

Use the Command Log Dialog to view a history log of library operations, with the option to dump the log to the serial port. For HyperTerminal connections and settings, see the section about retrieving command and error logs in the *IBM 3583 Ultrium Scalable Tape Library Maintenance Information* manual.

The log display starts at the most recent entry. The log keeps a maximum of 50 entries.

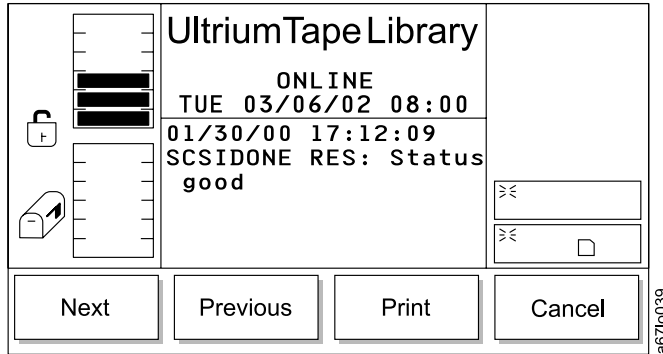


Figure 97. Command Log Dialog

To choose one of the selections from the Command Log Dialog, press the button below the desired softkey.

- If **Next** is selected, the next command log displays.
- If **Previous** is selected, the previous command log displays.
- If **Print** is selected, the Print Dialog displays (see Figure 98).
- If **Cancel** is selected, the Logs Submenu displays (see Figure 96 on page 99).

**Print Dialog:** Use the Print Dialog to print a history log of library operations.

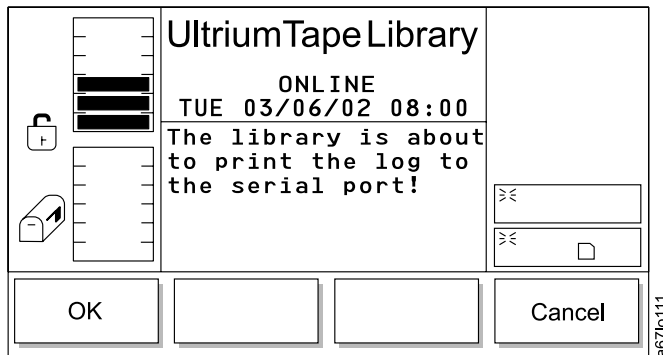


Figure 98. Print Dialog

To choose one of the selections from the Print Dialog, press the button below the desired softkey.

- If **OK** is selected, the command log is output on the serial port.
- If **Cancel** is selected, the Command Log Dialog displays (see Figure 97).

## Error Log Dialog

Use the Error Log Dialog to view a history log of error conditions, with the option to dump the log to the serial port. The log display starts at the most recent entry. The log keeps a maximum of 213 entries.

**Note:** The error code that displays in the Error Log Dialog is for Engineering use only; it is not the Service Action Code (SAC).

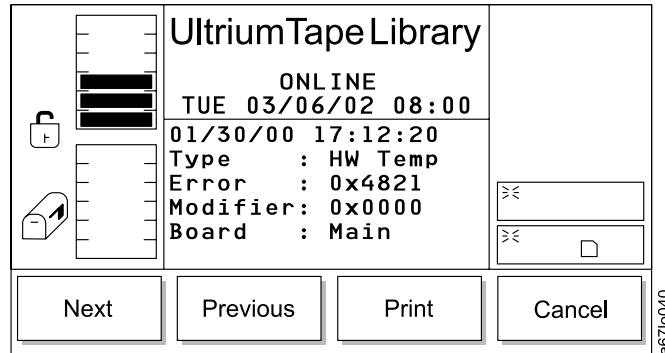


Figure 99. Error Log Dialog

To choose one of the selections from the Error Log Dialog, press the button below the desired softkey.

- If **Next** is selected, the next error log displays.
- If **Previous** is selected, the previous error log displays.
- If **Print** is selected, the Print Dialog displays (see Figure 100).
- If **Cancel** is selected, the Logs Submenu displays (see Figure 96 on page 99).

**Print Dialog:** Use Print Dialog to print a history log of library errors.

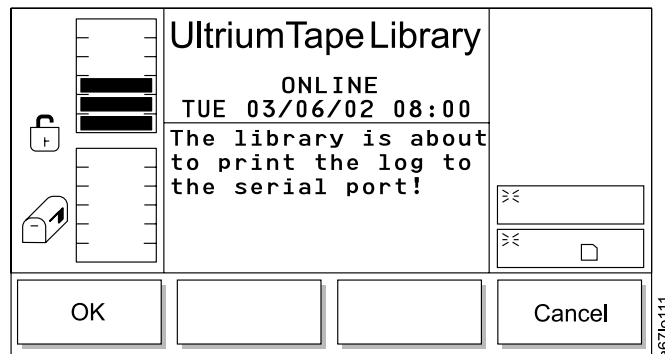


Figure 100. Print Dialog

To choose one of the selections from the Print Dialog, press the button below the desired softkey.

- If **OK** is selected, the error log is output on the serial port.
- If **Cancel** is selected, the Error Log Dialog displays (see Figure 99).

## Drive Log Dialog

When Drive Log is selected, the **Select Drive Dialog** displays (see Figure 101). Use this option to choose the drive which contains the log that you want to view.

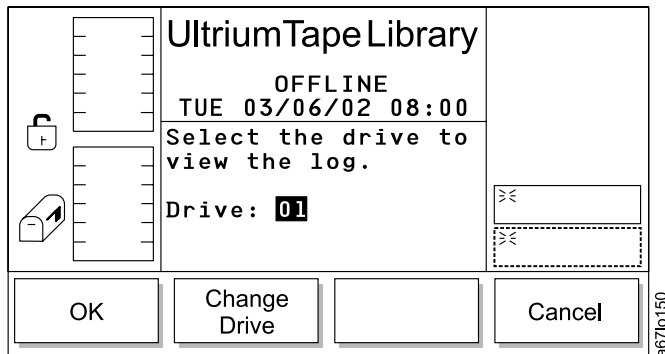


Figure 101. Select Drive Dialog

To choose one of the selections from the Select Drive Dialog, press the button below the desired softkey.

- If **OK** is selected, the Drive Log Dialog displays (see Figure 102).
- If **Change Drive** is selected, the next drive in the library is chosen. To view the Drive Log Dialog select **OK**. The Drive Log Dialog displays (see Figure 102).
- If **Cancel** is selected, the Logs Submenu displays (see Figure 96 on page 99).

**Drive Log Dialog:** Use the Drive Log Dialog to view a history log of drive errors.

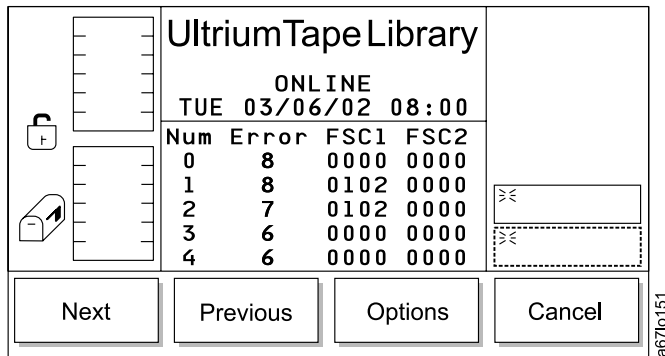


Figure 102. Drive Log Dialog

To choose one of the selections from the Drive Log Dialog, press the button below the desired softkey.

- If **Next** is selected, the next set of logs displays.
- If **Previous** is selected, the previous set of logs displays.
- If **Options** is selected, the Drive Error Log Options Dialog displays (see Figure 103 on page 103).
- If **Cancel** is selected, the Logs Submenu displays (see Figure 96 on page 99).



*Drive Error Log Options Dialog:* Use the Drive Error Log Options Dialog to choose an option for the drive log.

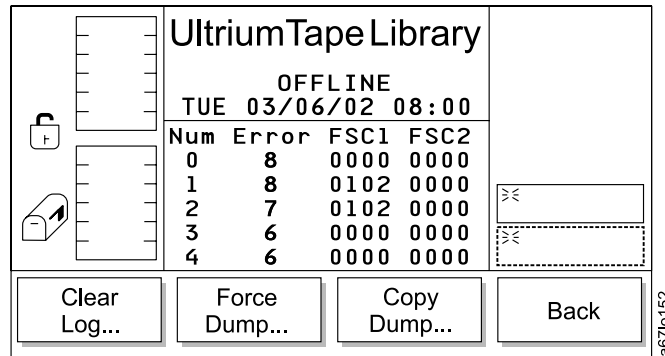


Figure 103. Drive Error Log Options Dialog

To choose one of the selections from the Drive Error Log Options Dialog, press the button below the desired softkey.

- If **Clear Log** is selected, the Clear Log Dialog displays (see Figure 104).
- If **Force Dump** is selected, the Force Dump Dialog displays (see Figure 105 on page 104).
- If **Copy Dump** is selected, the Copy Dump Dialog displays (see Figure 106 on page 104).
- If **Back** is selected, the Drive Log Dialog displays (see Figure 102 on page 102).

*Clear Log Dialog:* Use the Clear Log Dialog to clear the drive log errors.

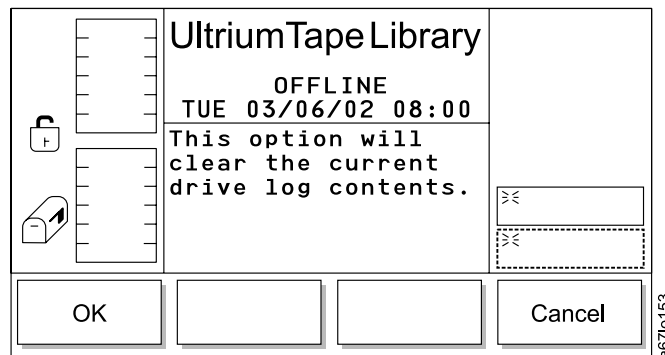


Figure 104. Clear Log Dialog

To choose one of the selections from the Clear Log Dialog, press the button below the desired softkey.

- If **OK** is selected, the error log is cleared.
- If **Cancel** is selected, the Drive Error Log Options Dialog displays (see Figure 103).

*Force Dump Dialog:* Use the Force Dump Dialog to obtain a dump of the drive log.

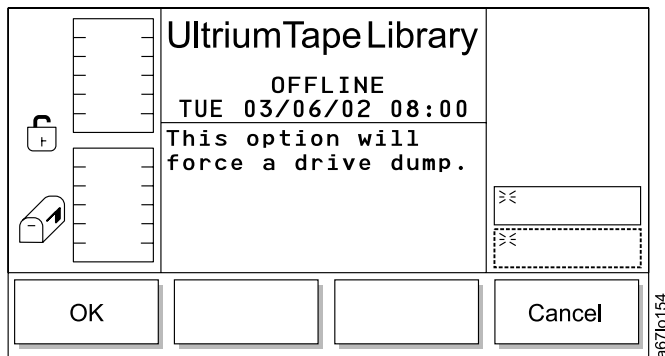


Figure 105. Force Dump Dialog

To choose one of the selections from the Force Dump Dialog, press the button below the desired softkey.

- If **OK** is selected, the drive performs a dump.
- If **Cancel** is selected, the Drive Error Log Options Dialog displays (see Figure 103 on page 103).

*Copy Dump Dialog:* Use Copy Dump Dialog to copy a dump of the drive log to a scratch tape.

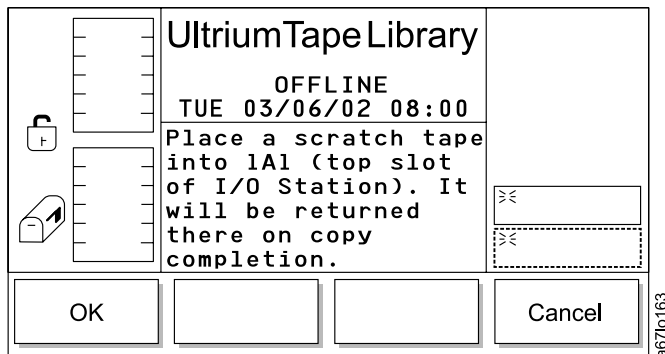


Figure 106. Copy Dump Dialog

To choose one of the selections from the Copy Dump Dialog, press the button below the desired softkey.

- If **OK** is selected, the drive performs a dump.
- If **Cancel** is selected, the Drive Error Log Options Dialog displays (see Figure 103 on page 103).

## Command Menu

Use the Command Menu to initiate motion commands. Select **Command** from the Main Menu by pressing the button below the **Command** softkey (see Figure 76 on page 89). The Command Menu displays (see Figure 107).

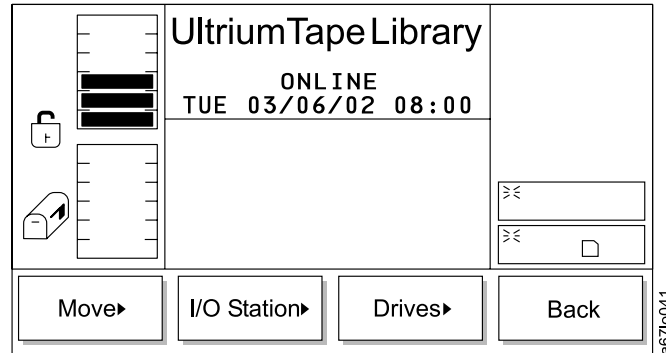


Figure 107. Command Menu

To choose one of the selections from the Command Menu, press the button below the desired softkey.

- If **Move** is selected, the Move Submenu displays (see Figure 108).
- If **I/O Station** is selected, the I/O Station Submenu displays (see Figure 126 on page 114).
- If **Drives** is selected, the Drives Submenu displays (see Figure 132 on page 118).
- If **Back** is selected, the Main Menu displays (see Figure 76 on page 89).

## Move Submenu

The Move Submenu contains a group of movement options.

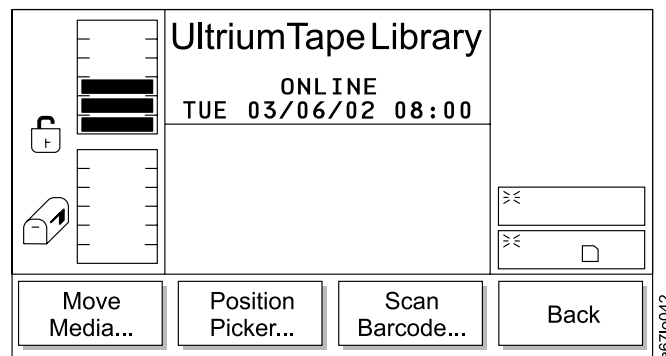


Figure 108. Move Submenu

To choose one of the selections from the Move Submenu, press the button below the desired softkey.

- If **Move Media** is selected, the Source Move Media Dialog displays (see Figure 109 on page 106).
- If **Position Picker** is selected, the Position Picker Dialog displays (see Figure 114 on page 109).
- If **Scan Barcode** is selected, the Scan Barcode Dialog displays (see Figure 118 on page 111).

- If **Back** is selected, the Command Menu displays (see Figure 107 on page 105).

### Move Media Dialog

The Source Move Media Dialog moves a cartridge from one element location to another.

**Note:** The column, magazine, and slot parameter selections are interactive. The combination of the three parameters generates the element address.

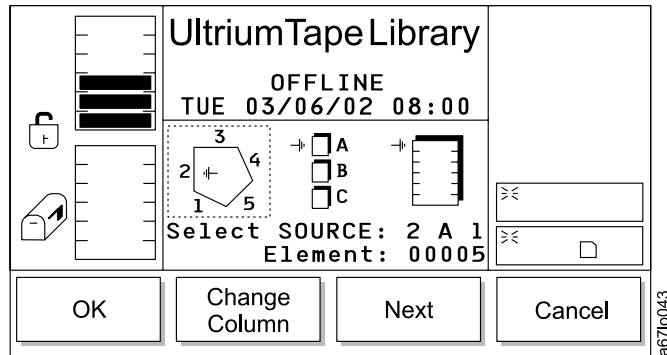


Figure 109. Source Move Media Dialog

To choose one of the selections from the Source Move Media Dialog, perform the following steps:

1. Press the button below the desired softkey.
  - If **OK** is selected, the source parameters are accepted and the Target Move Media Dialog displays (see Figure 113 on page 108).
  - If **Change Column** is selected, the column indicator moves clockwise to the next column address. Repeat until the desired column is indicated.

**Note:** If the chosen column element is a drive (column 3), no slot or magazine parameters are available. The current source parameter changes from column to drive and the Change Drive Dialog displays (see Figure 110 on page 107).

- If **Next** is selected, the current source parameter changes from column to magazine and the Change Magazine Dialog displays (see Figure 111 on page 107).
- If **Cancel** is selected, the Move Submenu displays (see Figure 108 on page 105).

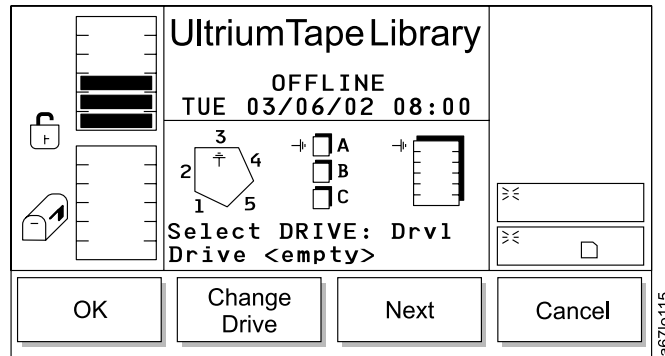


Figure 110. Change Drive Dialog

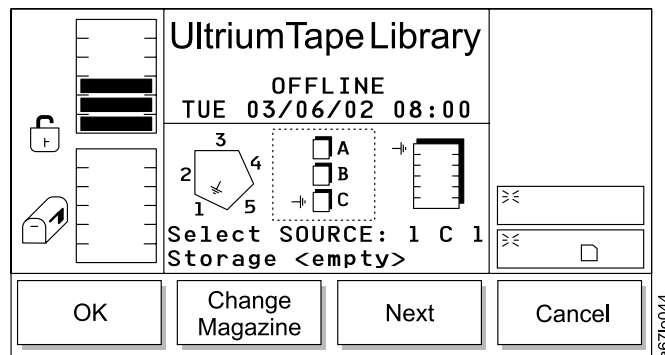


Figure 111. Change Magazine Dialog

2. From the Change Magazine Dialog, press the button below the desired softkey.
  - If **OK** is selected, the source parameters are accepted and the Target Move Media Dialog displays (see Figure 113 on page 108).
  - If **Change Magazine** is selected, the magazine indicator steps downward to the next magazine address. Repeat until the desired magazine is indicated.
  - If **Next** is selected, the current source parameter changes from magazine to slot and the Change Slot Dialog displays (see Figure 112 on page 108).
  - If **Cancel** is selected, the Move Submenu displays (see Figure 108 on page 105).

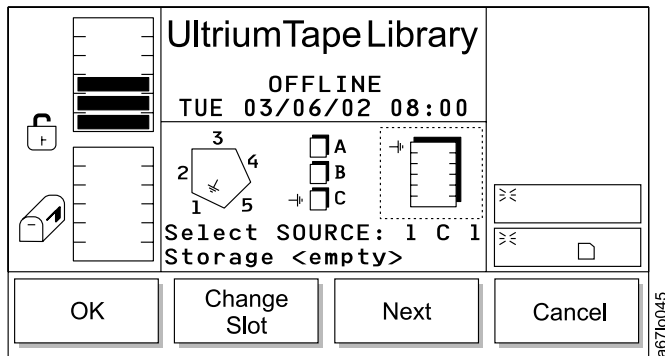


Figure 112. Change Slot Dialog

3. From the Change Slot Dialog, press the button below the desired softkey.
  - If **OK** is selected, the source parameters are accepted and the Target Move Media Dialog displays (see Figure 113).
  - If **Change Slot** is selected, the slot indicator steps downward to the next slot address. Repeat until the desired slot is indicated.
  - If **Next** is selected, the current source parameter changes from slot to column (see Figure 109 on page 106).
  - If **Cancel** is selected, the Move Submenu displays (see Figure 108 on page 105).

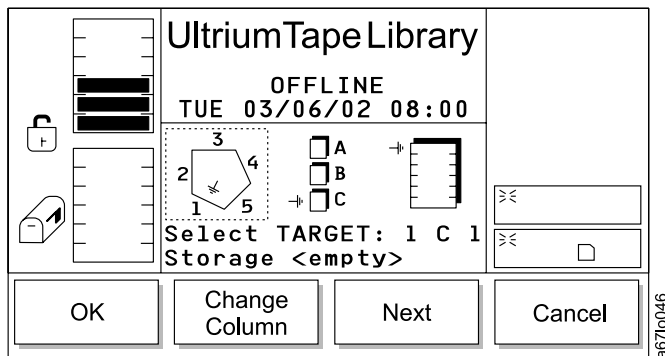


Figure 113. Target Move Media Dialog

4. To establish the Target Move element address, repeat the Source Move procedure (step 1 through step 3 in “Move Media Dialog” on page 106). The library moves the cartridge from the chosen source element address to the chosen target element address.

## Position Picker Dialog

The Position Picker Dialog places the picker in front of a specific element.

**Note:** The column, magazine, and slot parameter selections are interactive. The combination of the three parameters generates the element address.

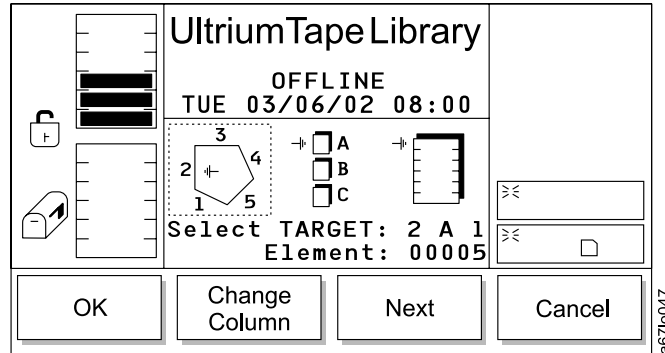


Figure 114. Position Picker Dialog

To choose one of the selections from the Position Picker Dialog, perform the following steps:

1. Press the button below the desired softkey.
  - If **OK** is selected, the source parameters are accepted, and the picker moves to the chosen element address.
  - If **Change Column** is selected, the column indicator moves clockwise to the next column address. Repeat until the desired column is indicated.

**Note:** If the chosen column element is a drive (column 3), no slot or magazine parameters are available. The current source parameter changes from column to drive and the Change Drive Dialog displays (see Figure 115).

- If **Next** is selected, the current source parameter changes from column to magazine and the Change Magazine Dialog displays (see Figure 116 on page 110).
- If **Cancel** is selected, the Move Submenu displays (see Figure 108 on page 105).

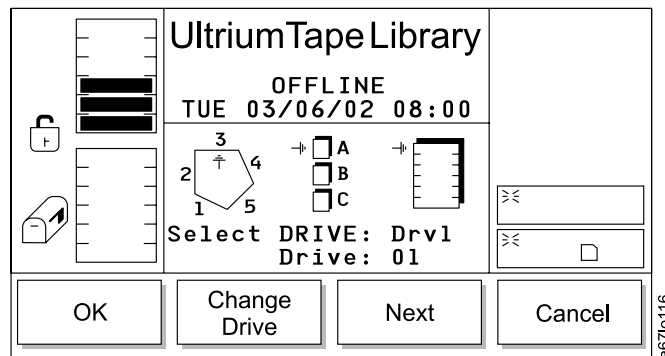


Figure 115. Change Drive Dialog

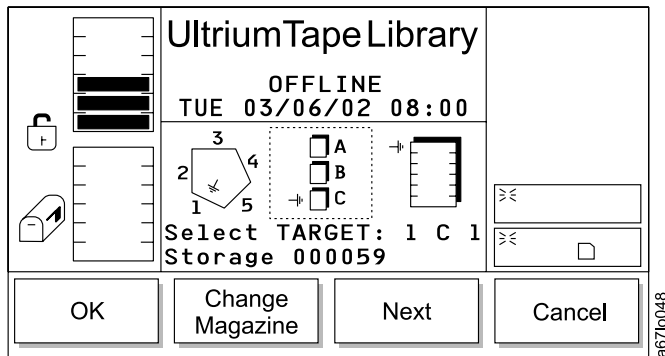


Figure 116. Change Magazine Dialog

2. From the Change Magazine Dialog, press the button below the desired softkey.
  - If **OK** is selected, the source parameters are accepted, and the picker moves to the chosen element address.
  - If **Change Magazine** is selected, the magazine indicator steps downward to the next magazine address. Repeat until the desired magazine is indicated.
  - If **Next** is selected, the current source parameter changes from magazine to slot and the Change Slot Dialog displays (see Figure 117).
  - If **Cancel** is selected, the Move Submenu displays (see Figure 108 on page 105).

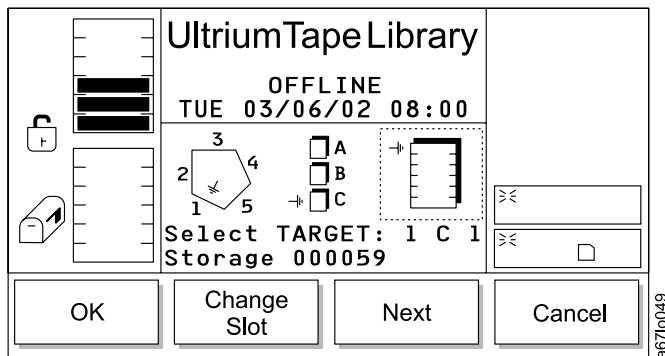


Figure 117. Change Slot Dialog

3. From the Change Slot Dialog, press the button below the desired softkey.
  - If **OK** is selected, the source parameters are accepted, and the picker moves to the chosen element address.
  - If **Change Slot** is selected, the slot indicator moves downward to the next slot address. Repeat until the desired slot is indicated.
  - If **Next** is selected, the current source parameter changes from slot to column as shown in the Position Picker Dialog (see Figure 114 on page 109).
  - If **Cancel** is selected, the Move Submenu displays (see Figure 108 on page 105).



## Scan Barcode Dialog

The Scan Barcode Dialog performs an inventory on a range of slots.

**Note:** The column, magazine, and slot parameter selections are interactive. The combination of the three parameters generates the element address.

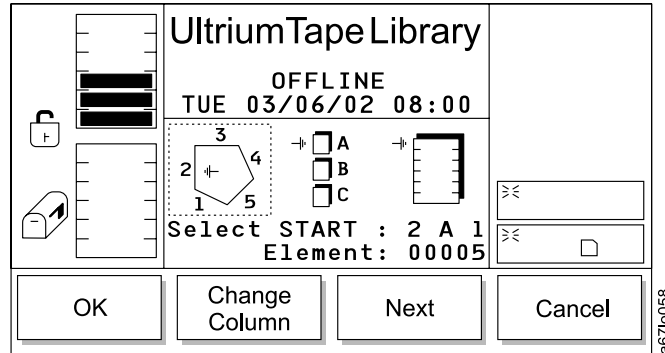


Figure 118. Scan Barcode Dialog

To choose one of the selections from the Scan Barcode Dialog, perform the following steps:

1. Press the button below the desired softkey.
  - If **OK** is selected, the fields are accepted and the Select Slots Dialog displays (see Figure 122 on page 113).
  - If **Change Column** is selected, the column indicator moves clockwise to the next column address. Repeat until the desired column is indicated.

**Note:** If the chosen column element is a drive (column 3), no slot or magazine parameters are available. The current source parameter changes from column to drive and the Change Drive Dialog displays (see Figure 119).

- If **Next** is selected, the current source parameter changes from column to magazine and the Change Magazine Dialog displays (see Figure 120 on page 112).
- If **Cancel** is selected, the Move Submenu displays (see Figure 108 on page 105).

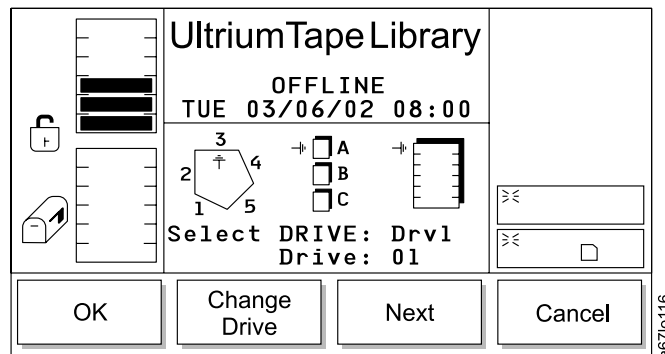


Figure 119. Change Drive Dialog

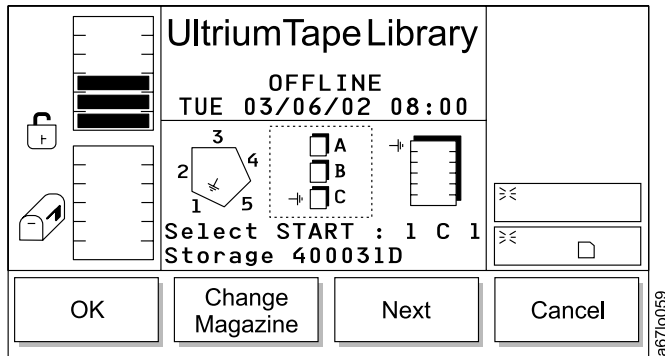


Figure 120. Change Magazine Dialog

2. From the Change Magazine Dialog, press the button below the desired softkey.
  - If **OK** is selected, the fields are accepted and the Select Slots Dialog displays (see Figure 122 on page 113).
  - If **Change Magazine** is selected, the magazine indicator steps downward to the next magazine address. Repeat until the desired magazine is indicated.
  - If **Next** is selected, the current source parameter changes from magazine to slot and the Change Slot Dialog displays (see Figure 121).
  - If **Cancel** is selected, the Move Submenu displays (see Figure 108 on page 105).

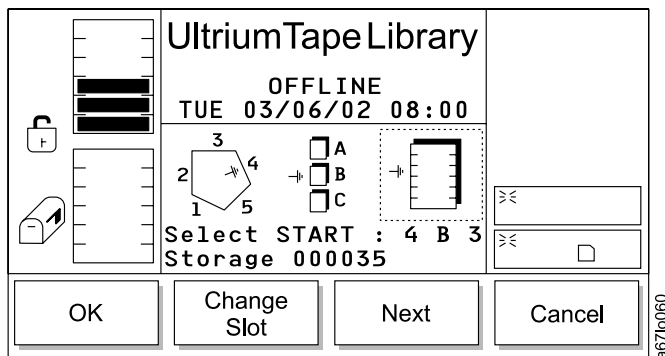


Figure 121. Change Slot Dialog

3. From the Change Slot Dialog, press the button below the desired softkey.
  - If **OK** is selected, the fields are accepted and the Select Slots Dialog displays (see Figure 122 on page 113).
  - If **Change Slot** is selected, the slot indicator moves downward to the next slot address. Repeat until the desired slot is indicated.
  - If **Next** is selected, the current source parameter changes from slot to column as shown in the Scan Barcode Dialog (see Figure 118 on page 111).
  - If **Cancel** is selected, the Move Submenu displays (see Figure 108 on page 105).

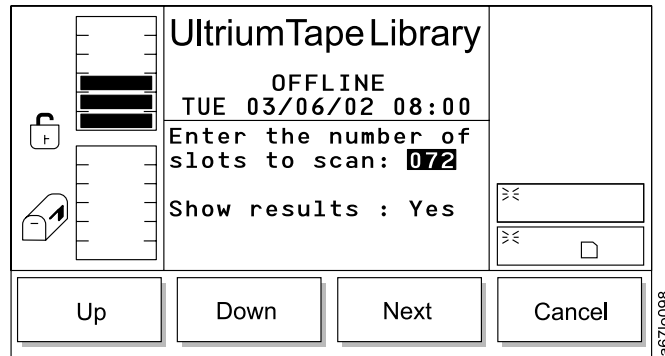


Figure 122. Select Slots Dialog

4. From the Select Slots Dialog, press the button below the desired softkey.
  - If **Up** is selected, the value of the current field is increased.
  - If **Down** is selected, the value of the current field is decreased.
  - If **Next** is selected, the next field in the list becomes the active field (see the Confirm Dialog in Figure 123).
  - If **Cancel** is selected, the Scan Barcode Dialog displays (see Figure 118 on page 111).

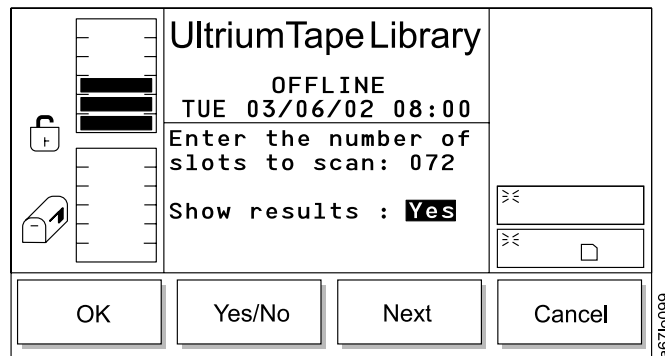


Figure 123. Confirm Dialog

5. From the Confirm Dialog, press the button below the desired softkey.
  - If **OK** is selected, the fields are accepted and the Progress Dialog displays followed by the Completion Dialog (see Figure 124 on page 114 and Figure 125 on page 114).
  - If **Yes/No** is selected, the value of the current field is toggled.
  - If **Next** is selected, the next field in the list becomes the active field (see Figure 122).
  - If **Cancel** is selected, the Scan Barcode Dialog displays (see Figure 118 on page 111).

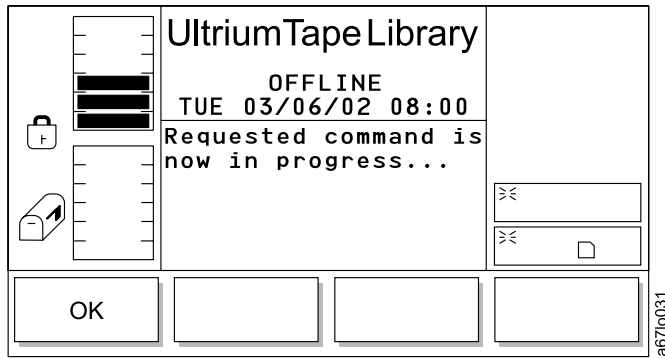


Figure 124. Progress Dialog

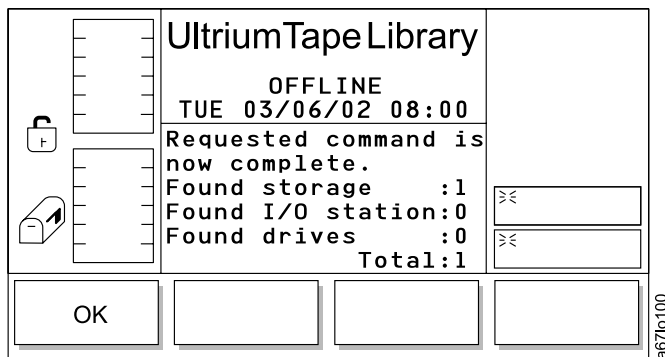


Figure 125. Completion Dialog

## I/O Station Submenu

The I/O Station Submenu imports and exports cartridges to and from the library.

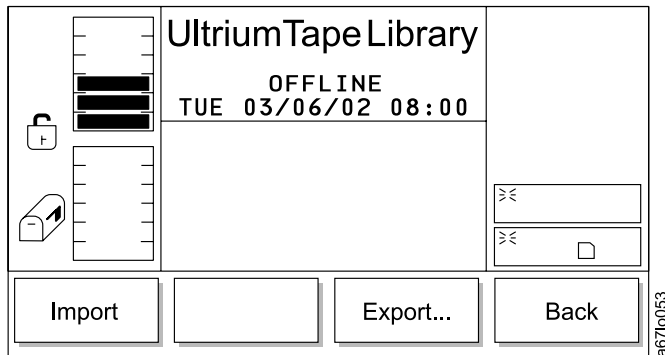


Figure 126. I/O Station Submenu

To choose one of the selections from the I/O Station Submenu, press the button below the desired softkey.

- If **Import** is selected, the Import Dialog displays (see Figure 127 on page 115).
- If **Export** is selected, the Export Dialog displays (see Figure 129 on page 116).
- If **Back** is selected, the Command Menu displays (see Figure 107 on page 105).

## Import Dialog

The Import Dialog imports cartridges from the I/O station to the drives and storage slots.

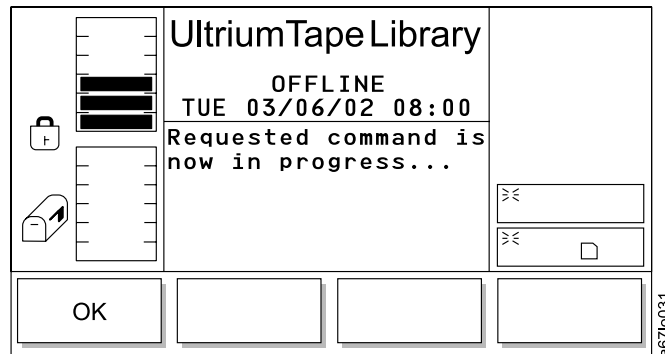


Figure 127. Import Dialog

The picker scans the cartridge and moves the cartridge from the I/O station to the first available empty slot. The Command Completed screen displays (see Figure 128).

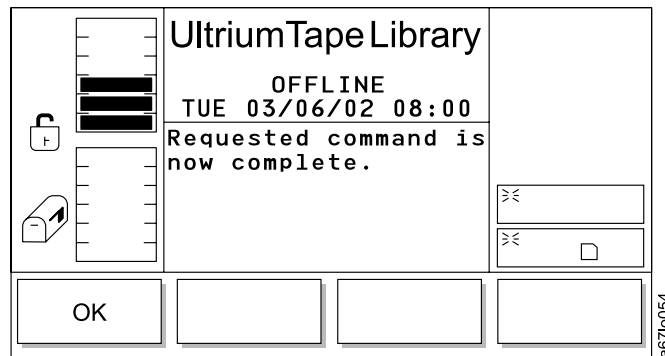


Figure 128. Command Completed screen

The picker has completed the Import operation.

If **OK** is selected from the Command Completed screen, the I/O Station Submenu displays (see Figure 126 on page 114).

## Export Dialog

The Export screen exports cartridges from the drives and the storage slots to the I/O station. Each cartridge that is exported reduces the maximum export limit.

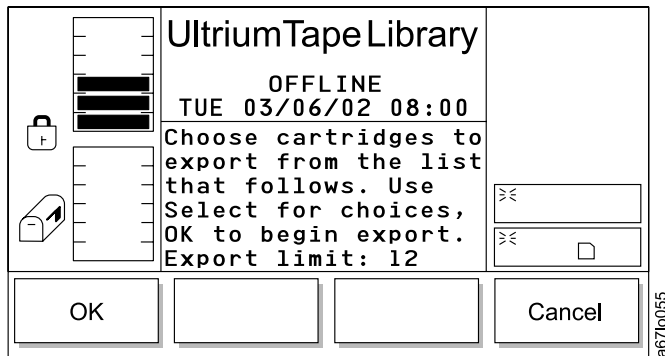


Figure 129. Export Dialog

To choose one of the selections from the Export Dialog, press the button below the desired softkey.

- If **OK** is selected, the Export List Dialog displays (see Figure 130 on page 117).
- If **Cancel** is selected, the I/O Station Submenu displays (see Figure 126 on page 114).

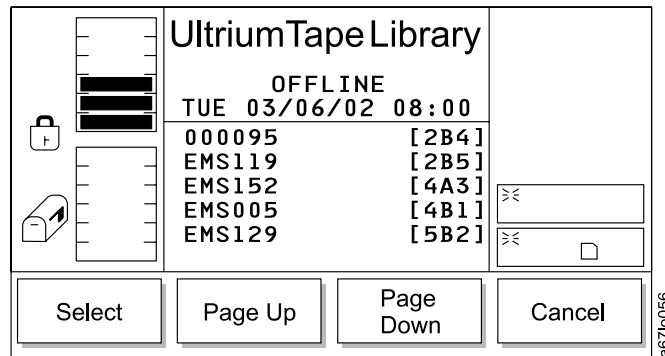


Figure 130. Export List Dialog

To choose one of the selections from the Export List Dialog, press the button below the desired softkey.

- If **Select** is selected, the selection cursor displays beside the first item in the list (see Figure 131).
- If **Page Up** is selected, the dialog refreshes with the previous set of list items.
- If **Page Down** is selected, the dialog refreshes with the next set of list items.
- If **Cancel** is selected, the I/O Station Submenu displays (see Figure 126 on page 114).

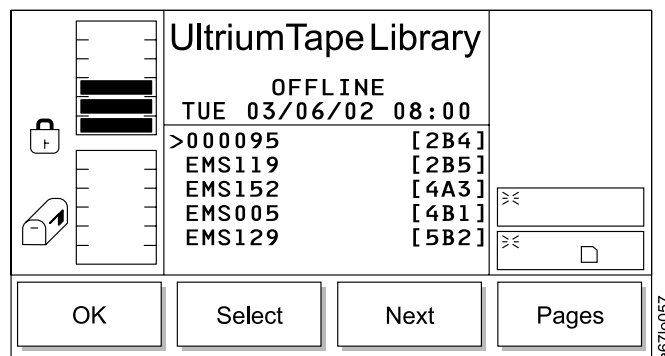


Figure 131. Export Select Dialog

To choose one of the selections from the Export Select Dialog, press the button below the desired softkey.

- If **OK** is selected and cartridges are selected, the list is accepted and the export operation begins. If no items are selected, this softkey is not enabled.
- If **Select** is selected, the current item is highlighted to indicate a valid selection.
- If **Next** is selected, the selection cursor displays beside the next item in the list.
- If **Pages** is selected, the dialog returns to the Export List Dialog (see Figure 130). You can make additional selections or cancel the export operation.

## Drives Submenu

The Drives Submenu contains functions that are performed by the drives.

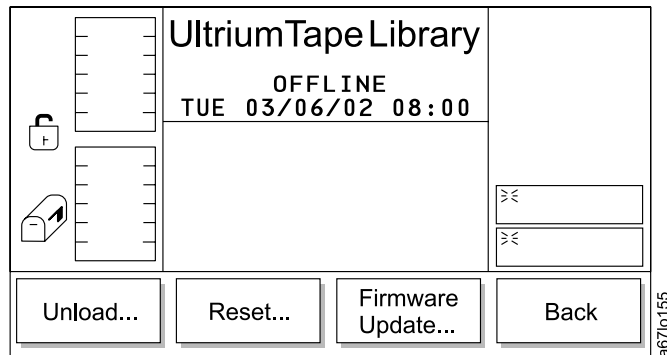


Figure 132. Drives Submenu

To choose one of the selections from the Drives Submenu, press the button below the desired softkey.

- If **Unload** is selected, the Unload Dialog displays (see Figure 133).
- If **Reset** is selected, the Reset Dialog displays (see Figure 134 on page 119).
- If **Firmware Update** is selected, the Firmware Update Dialog displays (see Figure 136 on page 120).
- If **Back** is selected, the Command Menu displays (see Figure 107 on page 105).

### Unload Dialog

The Unload Dialog causes the selected drive to unload a tape cartridge.

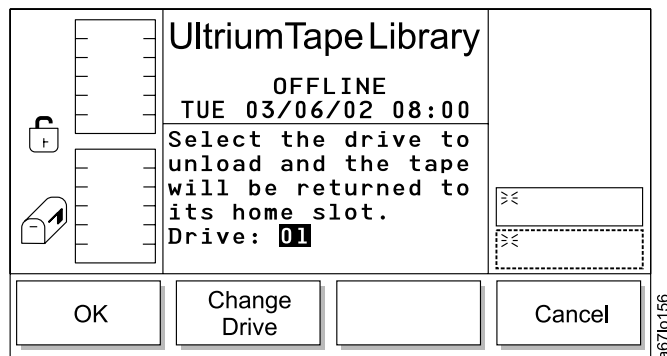


Figure 133. Unload Dialog

To choose one of the selections from the Unload Dialog, press the button below the desired softkey.

- If **OK** is selected, the unload operation begins.
- If **Change Drive** is selected, the next drive in the library is chosen. To start the unload operation select **OK**.
- If **Cancel** is selected, the Drives Submenu displays (see Figure 132).



## Reset Dialog

The Reset Dialog resets the selected drive. You can select the type of reset to perform. A soft reset causes the library to issue a drive reset command; a hard reset causes the library to remove power from the drive.

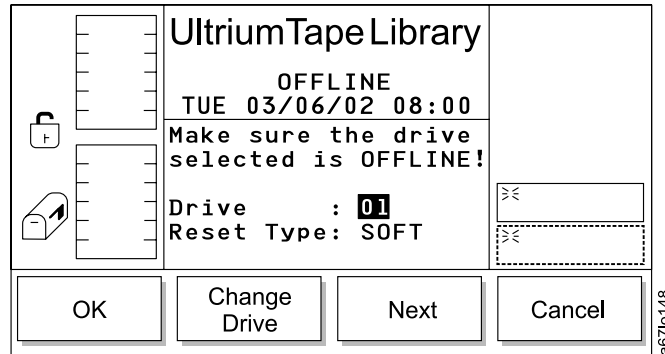


Figure 134. Reset Dialog

To choose one of the selections from the Reset Dialog, press the button below the desired softkey.

- If **OK** is selected, the reset operation begins.
- If **Change Drive** is selected, the next drive in the library is chosen. To start the reset operation select **OK**.
- If **Next** is selected, the next field becomes the active field (see Figure 135).
- If **Cancel** is selected, the Drives Submenu displays (see Figure 132 on page 118).

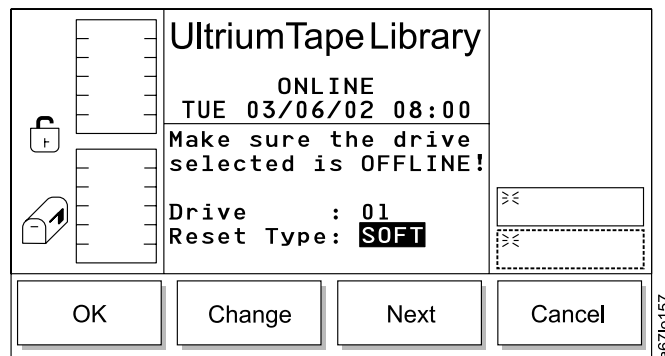


Figure 135. Reset Type Dialog

To choose one of the selections from the Reset Type Dialog, press the button below the desired softkey.

- If **OK** is selected, the reset operation begins.
- If **Change** is selected, the next field becomes the active field. To start the reset operation select **OK**.
- If **Next** is selected, the value of the current field is toggled.
- If **Cancel** is selected, the Drives Submenu displays (see Figure 132 on page 118).

## Firmware Update Dialog

The Firmware Update Dialog updates firmware on selected drives.

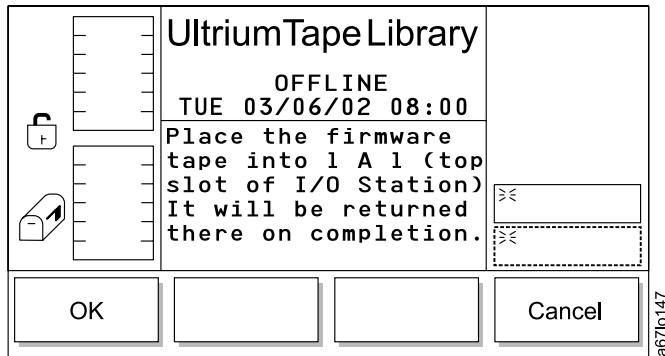


Figure 136. Firmware Update Dialog

To update the current drive's firmware, use the following steps:

1. Open the door of the I/O station.
2. Place the FMR tape into the top slot of the I/O station.
3. Close the door of the I/O station. The library executes the TEACH and INVENTORY procedures.
4. From the Firmware Update Dialog, press the button below the desired softkey.
  - If **OK** is selected, the Select Drives Dialog displays (see Figure 137).
  - If **Cancel** is selected, the Drives Submenu displays (see Figure 132 on page 118).

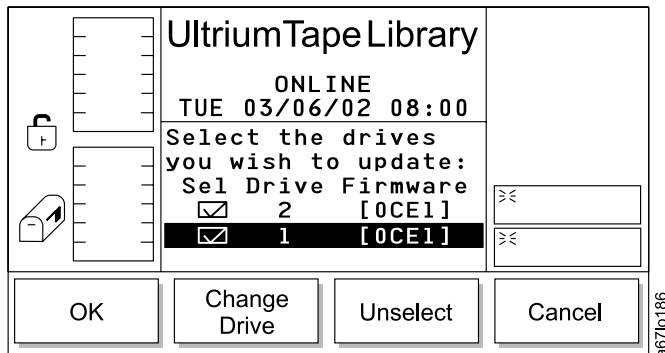


Figure 137. Select Drives Dialog

To choose one of the selections from the Select Drives Dialog, press the button below the desired softkey.

- If **OK** is selected, the Firmware Update Dialog displays (see Figure 138 on page 121).
- If **Change Drive** is selected, the next drive in the list is selected. You can continue to scroll through the list of drives by selecting **Change Drive**.
- If **Unselect** is selected, the current drive is deselected and the **Unselect** softkey changes to **Select**.
- If **Cancel** is selected, the Drives Submenu displays (see Figure 132 on page 118).

**Firmware Update Dialog:** When **OK** is selected from the Firmware Update Dialog, the firmware migration process begins (see Figure 138).

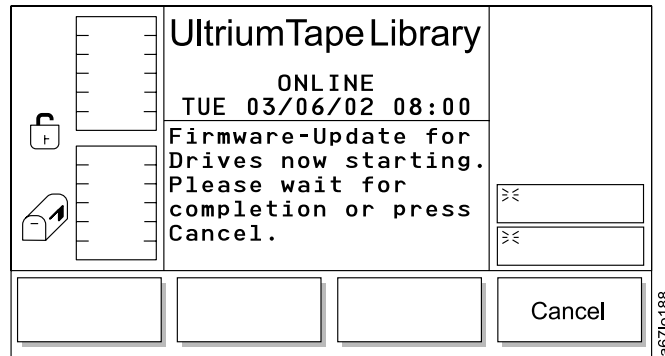


Figure 138. Firmware Update Dialog

The picker takes the FMR tape out of the I/O station and places it into the selected drive. The drive updates the firmware and unloads the FMR tape. The picker removes the FMR tape from the drive and returns it to the I/O station. If you are updating more than one drive the picker places the FMR tape into each drive that you selected. When the migration is complete, the picker returns the FMR tape to the I/O station.

## Setup Menu

Use the Setup Menu to configure the library. Select **Setup** from the Main Menu's alternate screen by pressing the button below the **Setup** softkey (see Figure 77 on page 89). The Setup Menu displays (see Figure 139).

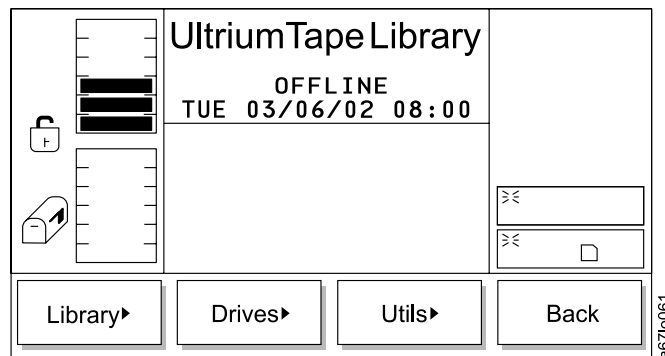


Figure 139. Setup Menu

To choose one of the selections from the Setup Menu, press the button below the desired softkey.

- If **Library** is selected, the Library Submenu displays (see Figure 140 on page 122).
- If **Drives** is selected, the Drives Submenu displays (see Figure 145 on page 124).
- If **Utils** is selected, the Utils Submenu displays (see Figure 148 on page 126).
- If **Back** is selected, the Main Menu (alternate screen) displays (see Figure 77 on page 89).

## Library Submenu

The Library Submenu contains a collection of routines to set up the library.

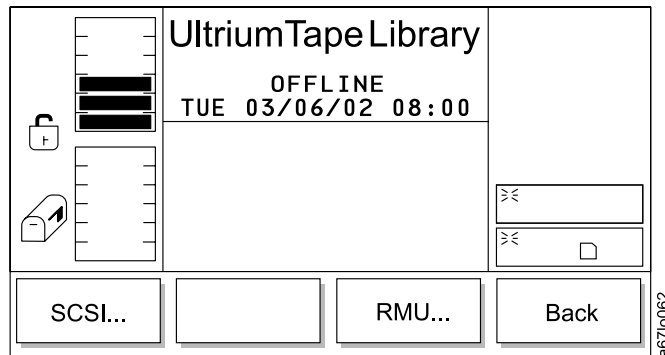


Figure 140. Library Submenu

To choose one of the selections from the Library Submenu, press the button below the desired softkey.

- If **SCSI** is selected, the SCSI Dialog displays (see Figure 141).
- If **RMU** is selected, the RMU Dialog displays (see Figure 144 on page 124).
- If **Back** is selected, the Setup Menu displays (see Figure 139 on page 121).

### SCSI Dialog

The SCSI Dialog allows you to set the SCSI ID. The 3583 Tape Library consists of up to seven SCSI devices: the library and six drives. The default settings for the SCSI IDs are 6 for the library and 0 through 5 for the drives.

#### Notes:

1. Do not select an ID that is already in use on the same SCSI bus.
2. Do not select the SCSI ID of the SCSI host adapter card. On the SCSI bus, any initiator (such as a host adapter card) that needs to communicate with the library must have its SCSI ID set from 0 to 7. The SCSI ID of the SCSI host adapter card is usually higher than any device on the SCSI bus. Generally, the SCSI ID for the host adapter is 7.

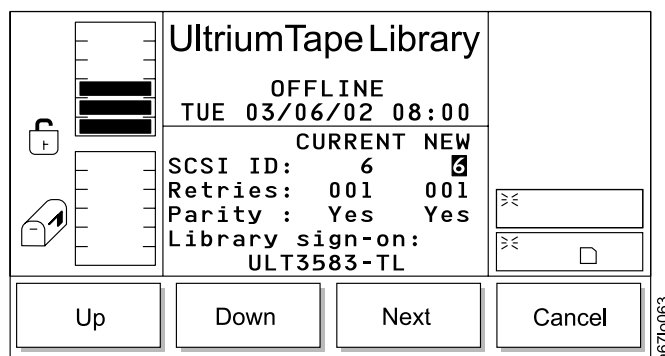


Figure 141. SCSI Dialog

To choose one of the selections from the SCSI Dialog, perform the following steps:

1. Press the button below the desired softkey.
  - If **Up** is selected, the value of the current field is increased.

- If **Down** is selected, the value of the current field is decreased.
- If **Next** is selected, the next field in the list becomes the active field. If the next field is the Parity field and you press the button below **OK**, the Parity Dialog displays (see Figure 142).
- If **Cancel** is selected, the Library Submenu displays (see Figure 140 on page 122).

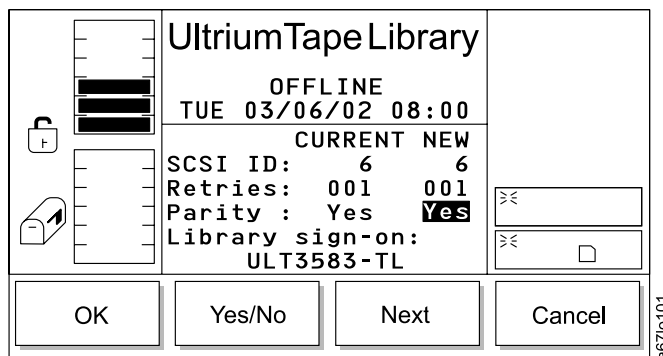


Figure 142. Parity Dialog

- From the Parity Dialog, press the button below the desired softkey.
  - If **OK** is selected, the value of the field is accepted.
  - If **Yes/No** is selected, the value of the current field is toggled.
  - If **Next** is selected, the next field in the list becomes the active field. If the next field is the Library sign-on field and you press the button below **OK**, the Library Dialog displays (see Figure 143).
  - If **Cancel** is selected, the Library Submenu displays (see Figure 140 on page 122).

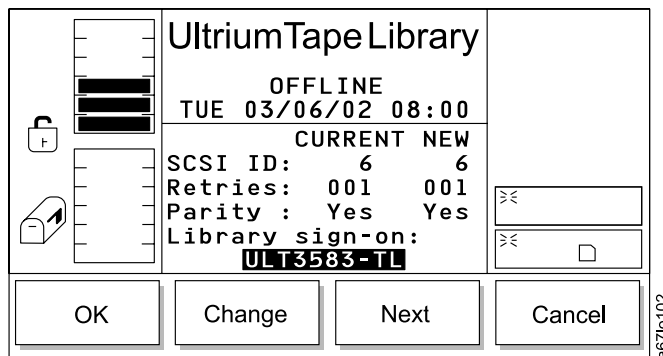


Figure 143. Library Dialog

- From the Library Dialog, press the button below the desired softkey.
  - If **OK** is selected, the value of the field is accepted.
  - If **Change** is selected, the value of the current field is toggled.
  - If **Next** is selected, the first field in the list becomes the active field.
  - If **Cancel** is selected, the Library Submenu displays (see Figure 140 on page 122).

## RMU Dialog

The RMU Dialog allows you to set up remote communication to the 3583 Tape Library.

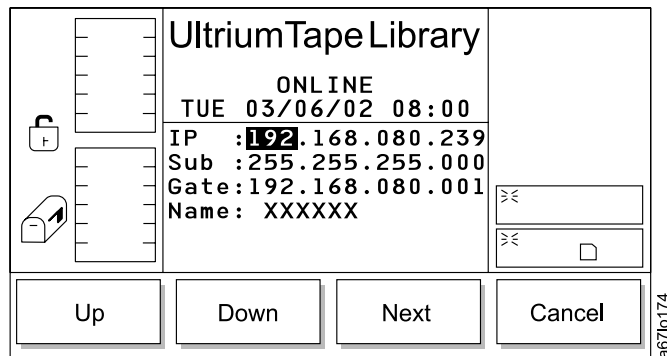


Figure 144. RMU Dialog

To choose one of the selections from the RMU Dialog, press the button below the desired softkey.

- If **Up** is selected, the value of the current field is increased.
- If **Down** is selected, the value of the current field is increased.
- If **Next** is selected, the next field in the list becomes the active field.
- If **Cancel** is selected, the Library Submenu displays (see Figure 140 on page 122).

## Drives Submenu

The Drives Submenu contains a collection of routines to set up the drives.

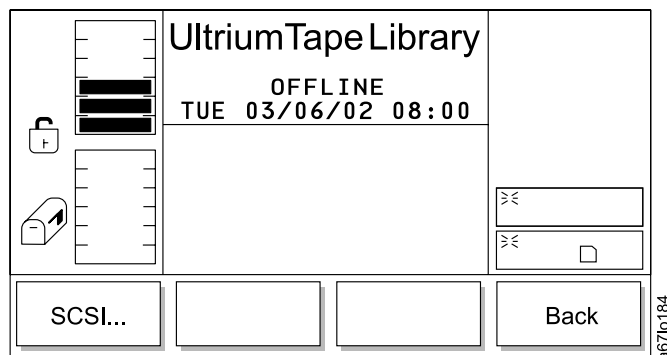


Figure 145. Drives Submenu

To choose one of the selections from the Drives Submenu, press the button below the desired softkey.

- If **SCSI** is selected, the Drive SCSI Dialog displays (see Figure 146 on page 125).
- If **Back** is selected, the Setup Menu displays (see Figure 139 on page 121).

## Drive SCSI Dialog

The Drive SCSI Dialog allows you to set the SCSI IDs of the library's SCSI devices.

The 3583 Tape Library consists of up to seven SCSI devices: the library and six drives. The default settings for the SCSI IDs are 6 for the library and 0 through 5 for the drives.

### Notes:

1. Do not select an ID that is already in use on the same SCSI bus.
2. Do not select the SCSI ID of the SCSI host adapter card. On the SCSI bus, any initiator (such as a host adapter card) that needs to communicate with the library must have its SCSI ID set from 0 to 7. The SCSI ID of the SCSI host adapter card is usually higher than any device on the SCSI bus. Generally, the SCSI ID for the host adapter is 7.

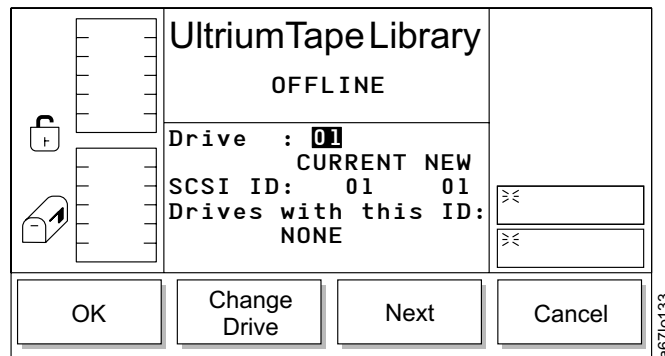


Figure 146. Drive SCSI Dialog

To choose one of the selections from the Drive SCSI Dialog, perform the following steps:

1. Press the button below the desired softkey.
  - If **OK** is selected, the value of the current field is accepted.
  - If **Change Drive** is selected, the next drive in the library is chosen.
  - If **Next** is selected, the Drive SCSI ID Dialog displays (see Figure 147).
  - If **Cancel** is selected, the Drives Submenu displays (see Figure 145 on page 124).

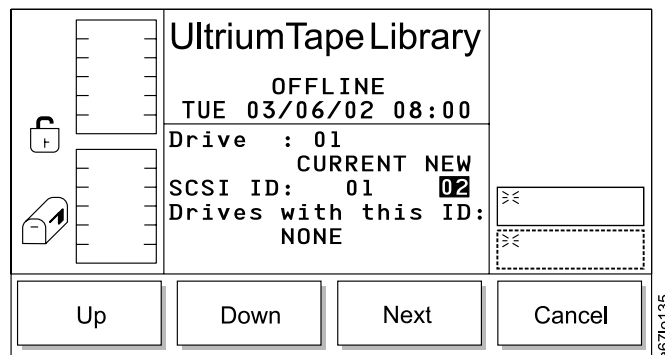


Figure 147. Drive SCSI ID Dialog

2. From the Drive SCSI ID Dialog, press the button below the desired softkey.

- If **Up** is selected, the value of the current field is increased.
- If **Down** is selected, the value of the current field is decreased.
- If **Next** is selected, the Drive SCSI ID Dialog displays (see Figure 146 on page 125).
- If **Cancel** is selected, the Drives Submenu displays (see Figure 145 on page 124).

## Utils Submenu

The Utils Submenu contains a collection of utility routines.

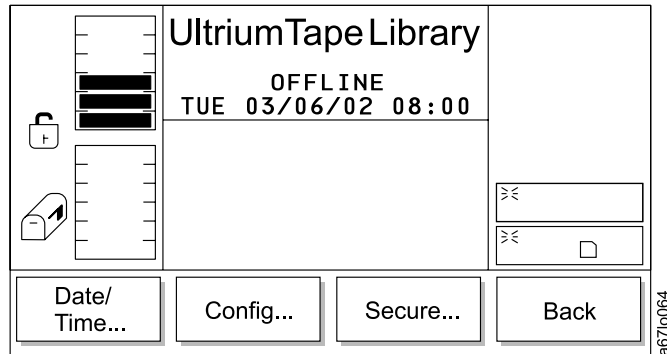


Figure 148. Utils Submenu

To choose one of the selections from the Utils Submenu, press the button below the desired softkey.

- If **Date/Time** is selected, the Date/Time Dialog displays (see Figure 149 on page 127).
- If **Config** is selected, the Config Dialog displays (see Figure 151 on page 128).
- If **Secure** is selected, the Secure Dialog displays (see Figure 152 on page 129).
- If **Back** is selected, the Setup Menu displays (see Figure 139 on page 121).



## Date/Time Dialog

The Date/Time Dialog lets you set the date and time in the library.

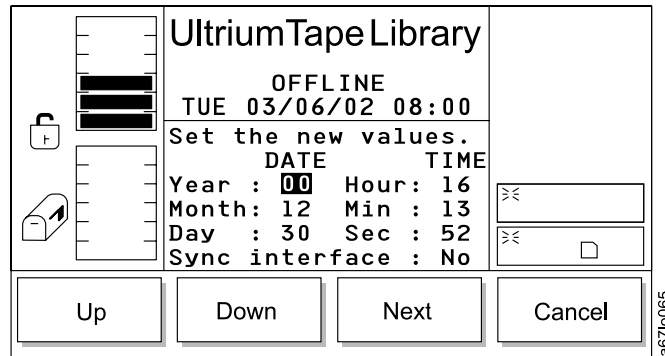


Figure 149. Date/Time Dialog

To choose one of the selections from the Date/Time Dialog, press the button below the desired softkey.

- If **Up** is selected, the value of the current field is increased.
- If **Down** is selected, the value of the current field is decreased.
- If **Next** is selected, the next field in the list becomes the active field. If the next field is the last field, the Sync Dialog displays (see Figure 150).
- If **Cancel** is selected, the Utils Submenu displays (see Figure 148 on page 126).

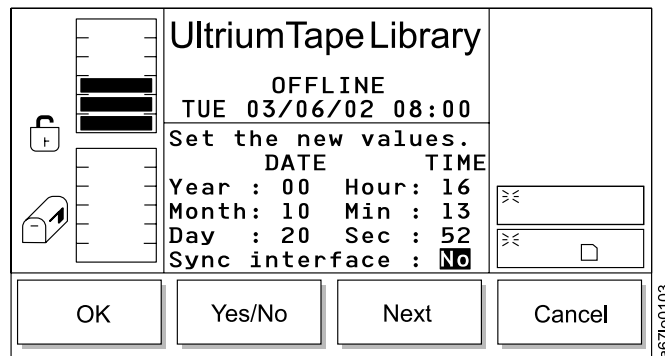


Figure 150. Sync Dialog

To choose one of the selections from the Sync Dialog, press the button below the desired softkey.

- If **OK** is selected, the value of the current field is accepted.
- If **Yes/No** is selected, the value of the current field is toggled.
- If **Next** is selected, the active field reverts to the first field in the list.
- If **Cancel** is selected, the Utils Submenu displays (see Figure 148 on page 126).

## Config Dialog

The Config Dialog allows you to change the configuration of the library. It also lets you configure the slots in the I/O station to import or export cartridges, or to store them.

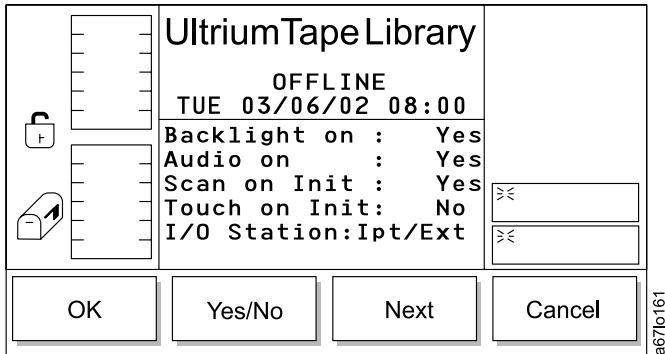


Figure 151. Config Dialog

To choose one of the selections from the Config Dialog, press the button below the desired softkey.

- If **OK** is selected, the value of the current field is applied and the operation completes.
- If **Yes/No** is selected, the value of the current field is toggled.
- If **Next** is selected, next field in the list becomes the active field.
- If **Cancel** is selected, the Utils Submenu displays (see Figure 148 on page 126).

## Secure Dialog

The Secure Dialog allows you to set the security features of the library.

**Note:** The first time that you enable security, the password is 0000. To set the password to a password of your choice select **Next** so that the Set/Change Password field is highlighted and select **OK**. The Set/Change Password Dialog displays (see Figure 157 on page 131).

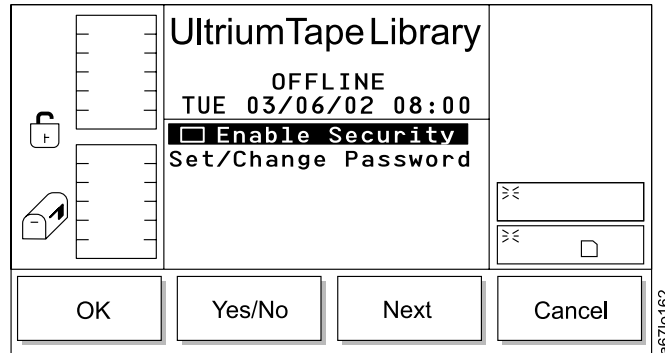


Figure 152. Secure Dialog

To choose one of the selections from the Secure Dialog, press the button below the desired softkey.

- If **OK** is selected, the Utils Submenu displays (see Figure 148 on page 126).
- If **Yes/No** is selected, the Security On Dialog displays (see Figure 153).
- If **Next** is selected, the next field in the list becomes the active field. If the next field is Set/Change Password, the Set/Change Password dialog displays (see Figure 157 on page 131).
- If **Cancel** is selected, the Utils Submenu displays (see Figure 148 on page 126).

**Enable Security:** When **Yes/No** is selected from the Secure Dialog and the Enable Security field is checked, the Security On Dialog displays (see Figure 153).

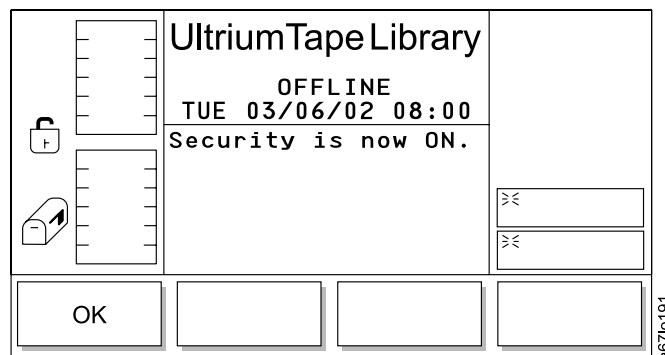


Figure 153. Security On Dialog

If **OK** is selected, security is enabled and the Security Enabled Dialog displays (see Figure 154 on page 130).

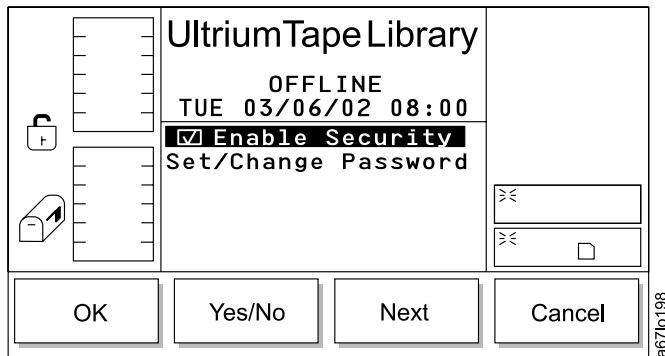


Figure 154. Security Enabled Dialog

To choose one of the selections from the Security Enabled Dialog, press the button below the desired softkey.

- If **OK** is selected, the Utils Submenu displays (see Figure 148 on page 126).
- If **Yes/No** is selected, the Enter Password Dialog displays (see Figure 155).
- If **Next** is selected, the next field in the list becomes the active field.
- If **Cancel** is selected, the Utils Submenu displays (see Figure 148 on page 126).

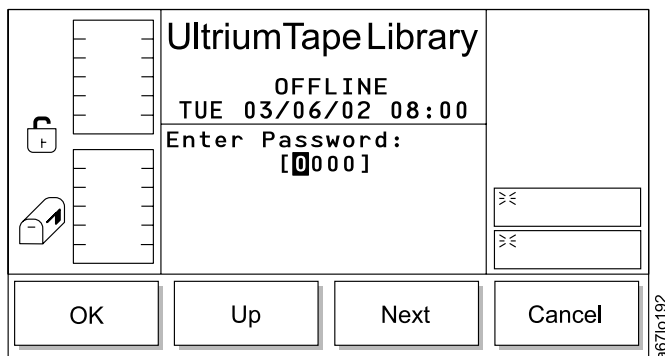


Figure 155. Enter Password Dialog

To choose one of the selections from the Enter Password Dialog, press the button below the desired softkey.

- If **OK** is selected and the correct password has been entered, the Password Changed Dialog displays (see Figure 158 on page 132). If an incorrect password is entered, the error message You did not enter a valid password displays.
- If **Up** is selected, the value of the current field is increased.
- If **Next** is selected, the value of the current field is accepted and the next field in the list becomes the active field.
- If **Cancel** is selected, the Utils Submenu displays (see Figure 148 on page 126).

**Disable Security:** When **Yes/No** is selected from the Secure Dialog and the Enable Security field is unchecked, the Security Off Dialog displays (see Figure 156).

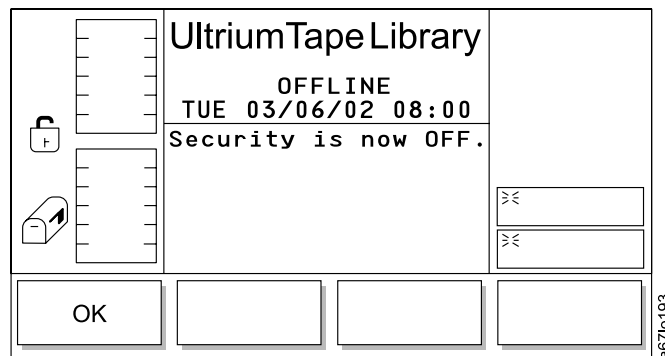


Figure 156. Security Off Dialog

**Set/Change Password:** If **Yes/No** is selected from the Secure Dialog and Set/Change Password is highlighted, the Set/Change Password Dialog displays (see Figure 157).

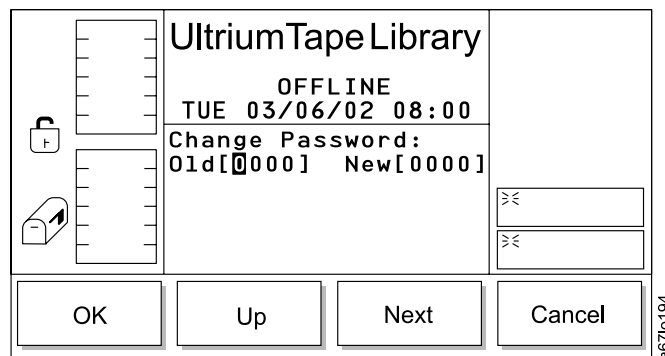


Figure 157. Set/Change Password Dialog

To choose one of the selections from the Set/Change Password Dialog, press the button below the desired softkey.

- If **OK** is selected, and the correct passwords have been entered, the Password Changed Dialog displays (see Figure 158 on page 132). If an incorrect password is entered, the error message You did not enter a valid password displays.

**Note:** The first time you set the password, do not enter anything in the 01d field. Select **Next** four times until you are able to enter a password of your choice in the New field.

- If **Up** is selected, the value of the current field is increased.
- If **Next** is selected, the value of the current field is accepted and the next field in the list becomes the active field.
- If **Cancel** is selected, the Utils Submenu displays (see Figure 152 on page 129).

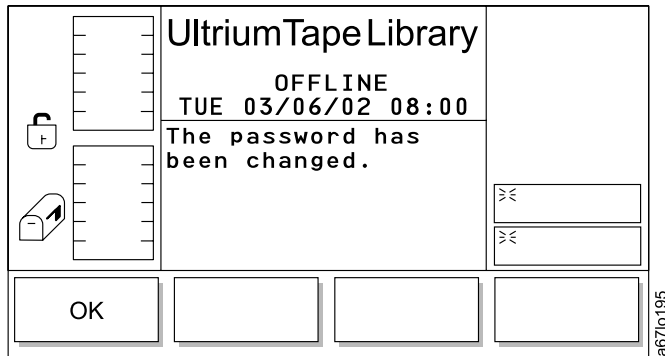


Figure 158. Password Changed Dialog

## Service Menu

Use the Service Menu for routines that are associated with maintaining the library. Select **Service** from the Main Menu's alternate screen by pressing the button below the **Service** softkey (see Figure 77 on page 89). The Service Menu displays (see Figure 159).

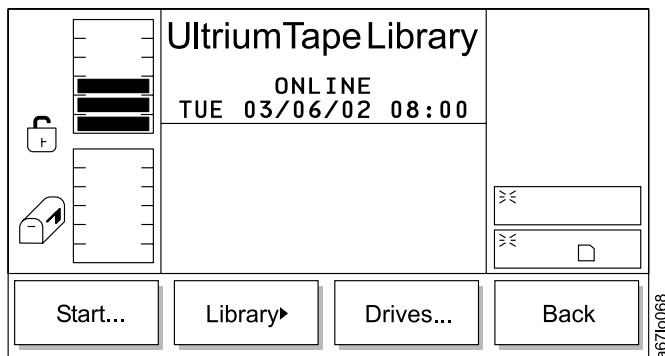


Figure 159. Service Menu

To choose one of the selections from the Service Menu, press the button below the desired softkey.

- If **Start** is selected, the Start Dialog displays (see Figure 160 on page 133).
- If **Library** is selected, the Library Submenu displays (see Figure 163 on page 134).
- If **Drives** is selected, the Drives Dialog displays (see Figure 190 on page 148).
- If **Back** is selected, the Main Menu (alternate screen) displays (see Figure 77 on page 89).

## Start Dialog

The Start Dialog allows you to choose the type of service that you want to perform.

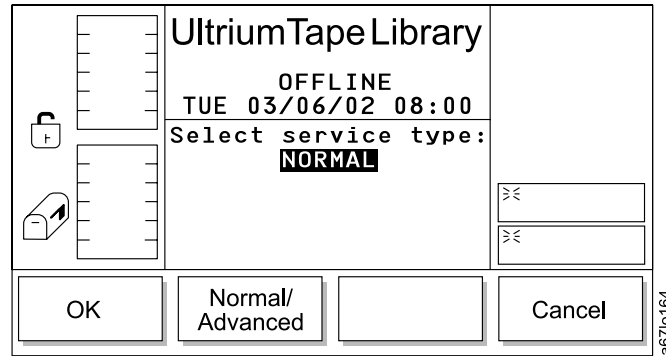


Figure 160. Start Dialog

To choose one of the selections from the Start Dialog, press the button below the desired softkey.

- If **OK** is selected, the Normal Service Dialog displays (see Figure 161).
- If **Normal/Advanced** is selected, the Advanced service type displays. Select **OK** to go to Enter Password Dialog (see Figure 162 on page 134).
- If **Cancel** is selected, the Service Menu displays (see Figure 159 on page 132).

### Normal Service Dialog

When **Normal** is selected from the Start Dialog, the Normal Service Dialog displays (see Figure 161). Go to "Service Action Codes" on page 195 for an explanation of the SACs that the Normal Service Dialog displays.

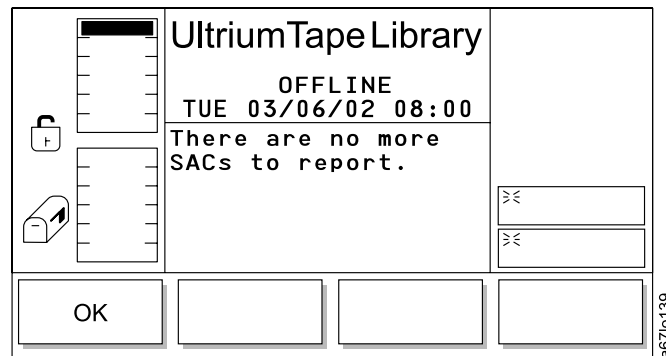


Figure 161. Normal Service Dialog

If **OK** is selected from the Normal Service Dialog, the Service Menu displays (see Figure 159 on page 132).

## Advanced Service Dialog

When **Advanced** is selected from the Start Dialog, the Enter Password Dialog displays (see Figure 162). This option is used by service personnel to reenter the library's serial number when the main controller board is replaced. To obtain the password contact your Service Representative.

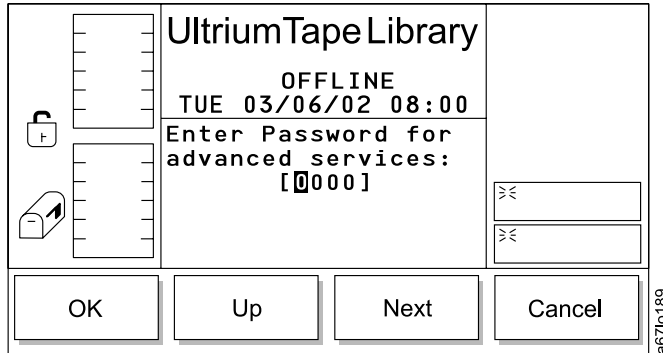


Figure 162. Enter Password Dialog

## Library Submenu

The Library Submenu displays a collection of routines to service the library.

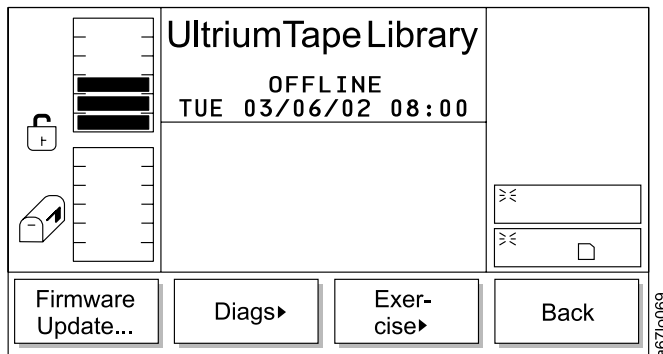


Figure 163. Library Submenu

To choose one of the selections from the Library Submenu, press the button below the desired softkey.

- If **Firmware Update** is selected, the Firmware Update Dialog displays (see Figure 164 on page 135).
- If **Diags** is selected, the Diags Submenu displays (see Figure 165 on page 135).
- If **Exercise** is selected, the Exercise Submenu displays (see Figure 180 on page 143).
- If **Back** is selected, the Service Menu displays (see Figure 159 on page 132).



## Firmware Update Dialog

The Firmware Update Dialog allows you to update the firmware of the library.

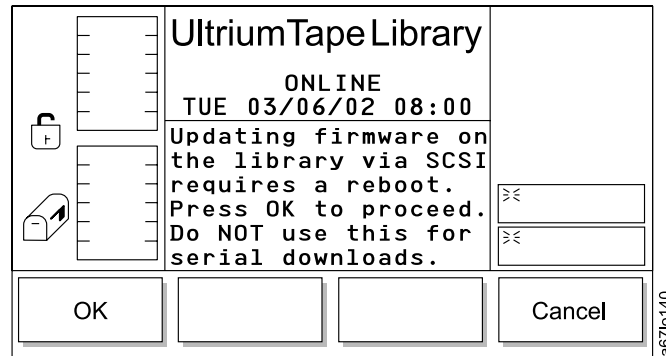


Figure 164. Firmware Update Dialog

To choose one of the selections from the Firmware Update Dialog, press the button below the desired softkey.

- If **OK** is selected, the library reboots.
- If **Cancel** is selected, the Library Submenu displays (see Figure 163 on page 134).

## Diags Submenu

The Diags Submenu is a collection of library diagnostics.

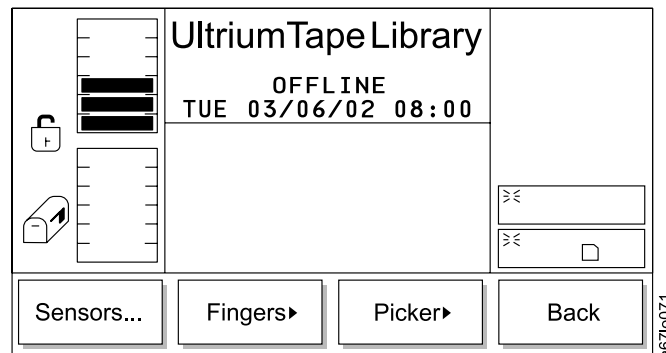


Figure 165. Diags Submenu

To choose one of the selections from the Diags Submenu, press the button below the desired softkey.

- If **Sensors** is selected, the Sensor Dialog displays (see Figure 166 on page 136).
- If **Fingers** is selected, the Fingers Submenu displays (see Figure 167 on page 136).
- If **Picker** is selected, the Picker Submenu displays (see Figure 174 on page 140).
- If **Back** is selected, the Library Submenu displays (see Figure 163 on page 134).

**Sensor Dialog:** When **Sensors** is selected, the Sensor Dialog displays (see Figure 166). This option displays the real-time state of the sensors and lets you lock or unlock the I/O station.

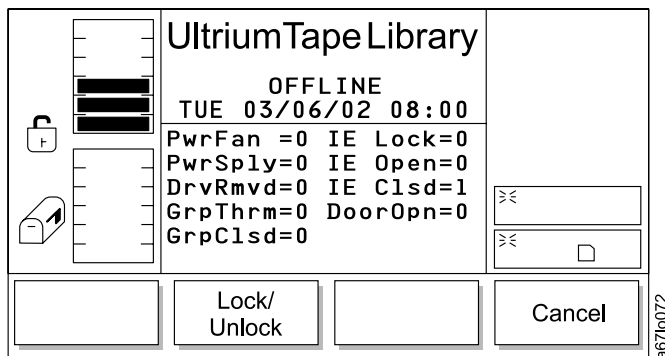


Figure 166. Sensor Dialog

To choose one of the selections from the Sensor Dialog, press the button below the desired softkey.

- If **Lock/Unlock** is selected, the I/O station is toggled between locked and unlocked.
- If **Cancel** is selected, the Diags Submenu displays (see Figure 165 on page 135).

**Fingers Submenu:** The Fingers Submenu is a collection of routines to manipulate the open/close and reach/retract operations.

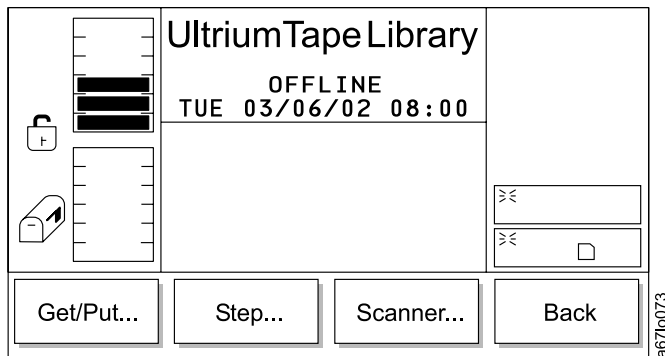


Figure 167. Fingers Submenu

To choose one of the selections from the Fingers Submenu, press the button below the desired softkey.

- If **Get/Put** is selected, the Get/Put Dialog displays (see Figure 168 on page 137).
- If **Step** is selected, the Step Dialog displays (see Figure 170 on page 138).
- If **Scanner** is selected, the Scanner Dialog displays (see Figure 172 on page 139).
- If **Back** is selected, the Diags Submenu displays (see Figure 165 on page 135).

**Get/Put Dialog:** The Get/Put Dialog initiates gets and puts of cartridges to storage slots or drives.

**Note:** This operation does not return the cartridges to their original location.

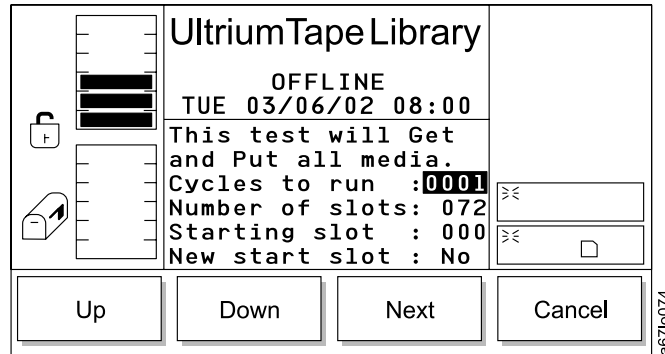


Figure 168. Get/Put Dialog

To choose one of the selections from the Get/Put Dialog, press the button below the desired softkey.

- If **Up** is selected, the value of the current field is increased.
- If **Down** is selected, the value of the current field is decreased.
- If **Next** is selected, the next field in the list becomes the active field. When the **Next** push button moves the field to New start slot, the New Start Slot Dialog displays (see Figure 169). After you reach the end of the field list, the active field reverts to the first field in the list.
- If **Cancel** is selected, the Fingers Submenu displays (see Figure 167 on page 136).

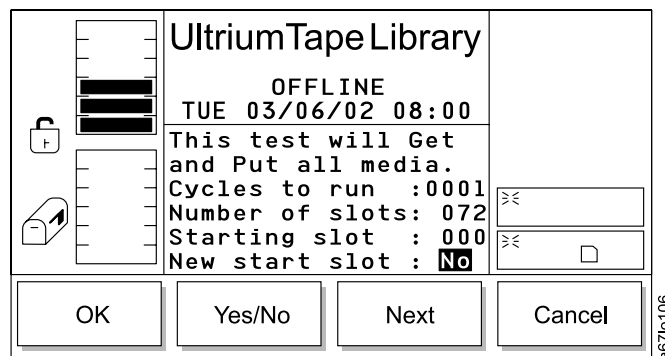


Figure 169. New Start Slot Dialog

To choose one of the selections from the New Start Slot Dialog, press the button below the desired softkey.

- If **OK** is selected, the values of the fields are accepted.
- If **Yes/No** is selected, the value of the current field is toggled.
- If **Next** is selected, the first field in the list becomes the active field.
- If **Cancel** is selected, the Fingers Submenu displays (see Figure 167 on page 136).

**Step Dialog:** The Step Dialog is a collection of routines to manipulate the open/close and reach/retract operations in incremental steps.

**Note:** This is an advanced diagnostic tool that is not intended for use during normal operation.

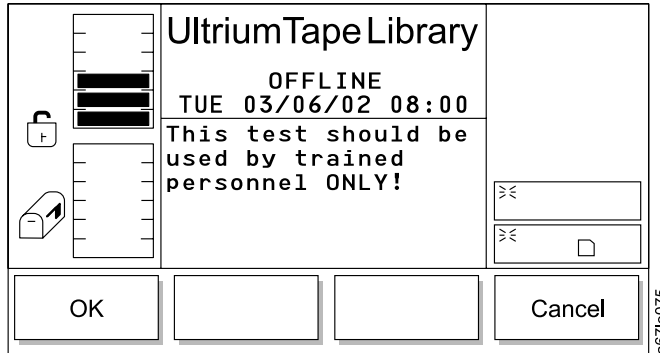


Figure 170. Step Dialog

To choose one of the selections from the Step Dialog, press the button below the desired softkey.

- If **OK** is selected, the Picker Finger Dialog displays (see Figure 171).
- If **Cancel** is selected, the Fingers Submenu displays (see Figure 167 on page 136).

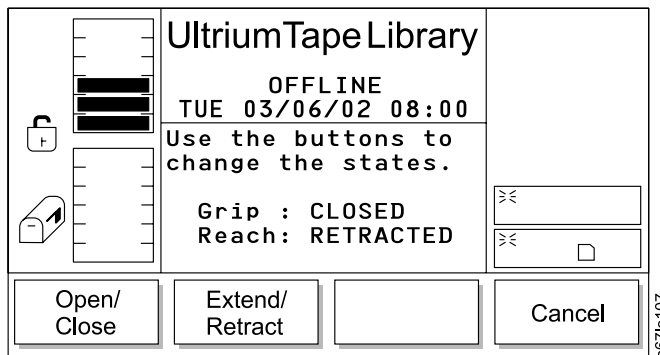


Figure 171. Picker Finger Dialog

To choose one of the selections from the Picker Finger Dialog, press the button below the desired softkey.

- If **Open/Close** is selected, the picker fingers toggle between open and close. The screen updates to reflect the state.
- If **Extend/Retract** is selected, the picker fingers toggle between extended and retracted. The screen updates to reflect the state.
- If **Cancel** is selected, the Fingers Submenu displays (see Figure 167 on page 136).

**Scanner Dialog:** The Scanner Dialog triggers the bar code scanner to read label information.

**Note:** The scanner must have been previously placed in the correct scanning position for the scanning diagnostic to work correctly. With the doors closed and the top cover in place, it is difficult to achieve the proper manual alignment to obtain a correct label reading by using this diagnostic. The following is an alternate method of performing a scanner diagnostic.

1. With the library Offline, open the door and locate a cartridge to be tested. Write down the cartridge's label number and column/slot location. Close the door. The library immediately performs an inventory of all cartridges in the library.
2. When the inventory has completed select **Command** → **Move** → **Move Media**. When asked to Select Target, enter the cartridge's column/slot location that you wrote down in step 1. The library responds with a message that the target address already contains a cartridge. It displays data such as: Target: xxx (representing the column/slot address) and the bar code label number of the cartridge in that address. If the label information is correct, the scanner is operating correctly during inventory. For more information, see "Move Media Dialog" on page 106.

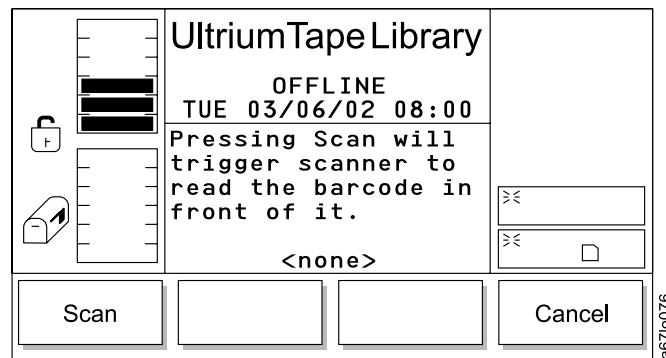


Figure 172. Scanner Dialog

To choose one of the selections from the Scanner Dialog, press the button below the desired softkey.

- If **Scan** is selected, the bar code label immediately in front of the scanner is read (see Figure 173 on page 140).
- If **Cancel** is selected, the Fingers Submenu displays (see Figure 167 on page 136).

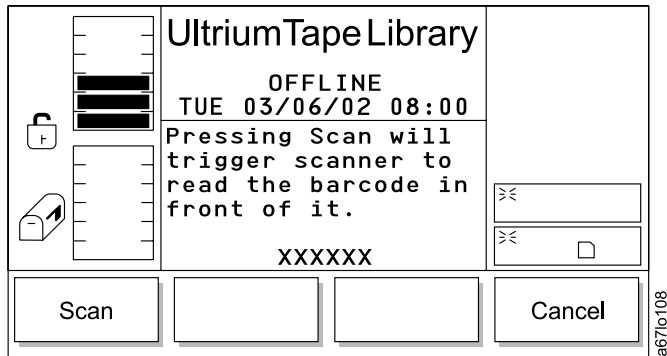


Figure 173. Bar Code Label Dialog

**Picker Submenu:** The Picker Submenu is a collection of routines to manipulate the vertical and rotary axes.

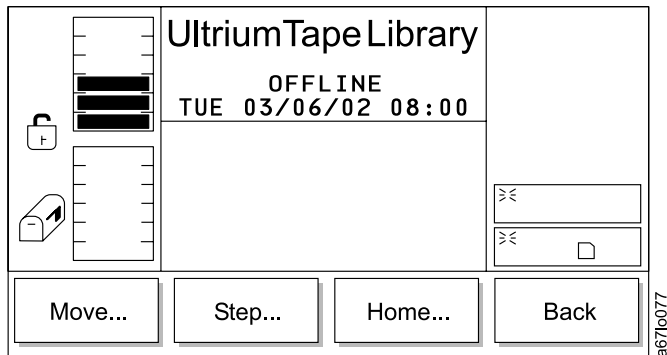


Figure 174. Picker Submenu

To choose one of the selections from the Picker Submenu, press the button below the desired softkey.

- If **Move** is selected, the Move Dialog displays (see Figure 175 on page 141).
- If **Step** is selected, the Step Dialog displays (see Figure 177 on page 142).
- If **Home** is selected, the Home Dialog displays (see Figure 179 on page 143).
- If **Back** is selected, the Diags Submenu displays (see Figure 165 on page 135).

*Move Dialog:* The Move Dialog cycles the vertical and rotary axes in a motion pattern.

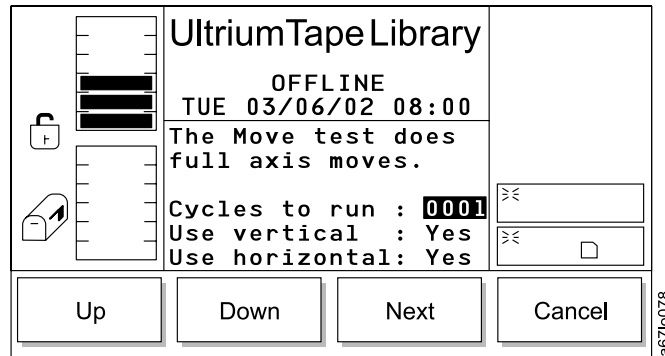


Figure 175. Move Dialog

To choose one of the selections from the Move Dialog, press the button below the desired softkey.

- If **Up** is selected, the value of the current field is increased.
- If **Down** is selected, the value of the current field is decreased.
- If **Next** is selected, the next field in the list becomes the active field (see Figure 176).
- If **Cancel** is selected, the Picker Submenu displays (see Figure 174 on page 140).

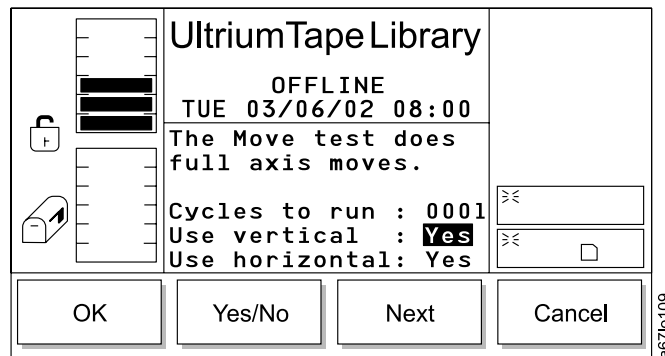


Figure 176. Use Axes Dialog

To choose one of the selections from the Use Axes Dialog, press the button below the desired softkey.

- If **OK** is selected, the values of the fields are accepted.
- If **Yes/No** is selected, the value of the current field is toggled.
- If **Next** is selected, the next field in the list becomes the active field. After you reach the end of the field list, the active field reverts to the first field in the list.
- If **Cancel** is selected, the Picker Submenu displays (see Figure 174 on page 140).

*Step Dialog:* The Step Dialog is a collection of routines to manipulate the vertical and rotary axes in incremental steps.

**Note:** This is an advanced diagnostic tool that is not intended for use during normal operation.

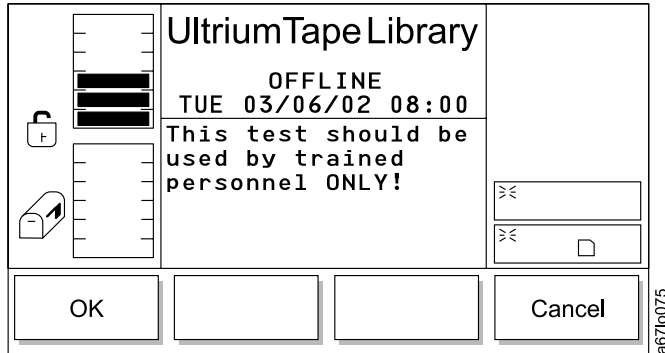


Figure 177. Step Dialog

To choose one of the selections from the Step Dialog, press the button below the desired softkey.

- If **OK** is selected, the Axes Dialog displays (see Figure 178).
- If **Cancel** is selected, the Picker Submenu displays (see Figure 174 on page 140).

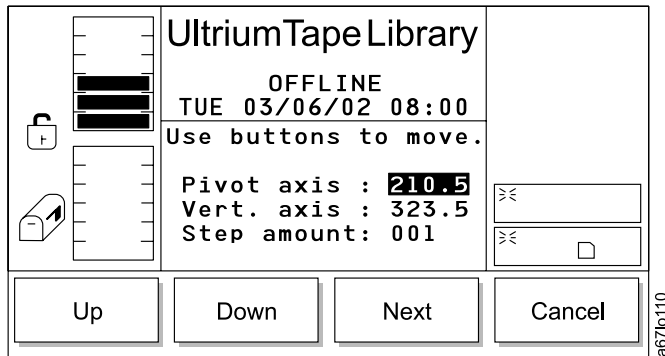


Figure 178. Axes Dialog

To choose one of the selections from the Axes Dialog, press the button below the desired softkey.

- If **Up** is selected, the value of the field is increased.
- If **Down** is selected, the value of the field is decreased.
- If **Next** is selected, the next field in the list becomes the active field. After you reach the end of the field list, the active field reverts to the first field in the list.
- If **Cancel** is selected, the Picker Submenu displays (see Figure 174 on page 140).



*Home Dialog:* The Home Dialog locates the vertical and rotary axes to the home positions.

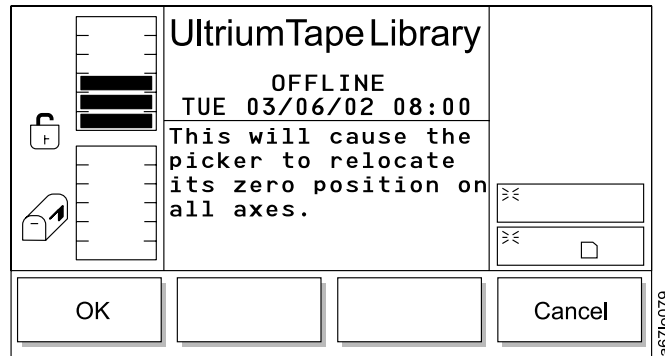


Figure 179. Home Dialog

To choose one of the selections from the Home Dialog, press the button below the desired softkey.

- If **OK** is selected, the picker returns to the home position and the operation completes.
- If **Cancel** is selected, the Picker Submenu displays (see Figure 174 on page 140).

### Exercise Submenu

The Exercise Submenu is a collection of library exercises.

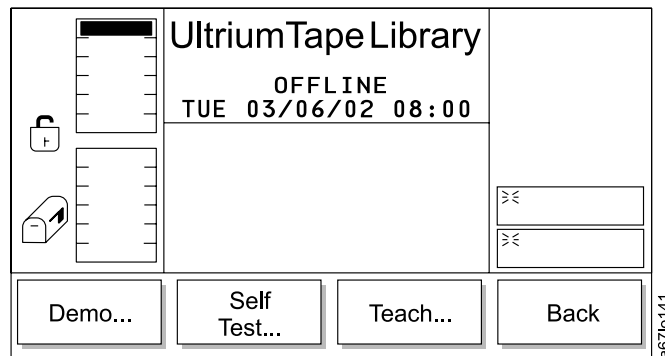


Figure 180. Exercise Submenu

To choose one of the selections from the Exercise Submenu, press the button below the desired softkey.

- If **Demo** is selected, the Demo Dialog displays (see Figure 181 on page 144).
- If **Self Test** is selected, the Self Test Dialog displays (see Figure 184 on page 145).
- If **Teach** is selected, the Teach Dialog displays (see Figure 187 on page 147).
- If **Back** is selected, the Library Submenu displays (see Figure 163 on page 134).

**Demo Dialog:** The Demo Dialog executes random cartridge movement in the library. The minimum number of cartridges recommended for this routine is two per drive, plus one additional cartridge.

**Note:** This operation does not return the cartridges to their original location.

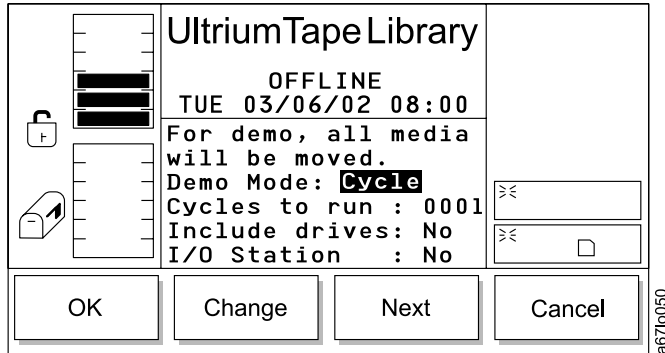


Figure 181. Demo Dialog

To choose one of the selections from the Demo Dialog, press the button below the desired softkey.

- If **Up** is selected, the currently selected field is increased.
- If **Down** is selected, the currently selected field is decreased.
- If **Next** is selected, the next field in the list becomes the active field (see Figure 182).
- If **Cancel** is selected, the Exercise Submenu displays (see Figure 180 on page 143).

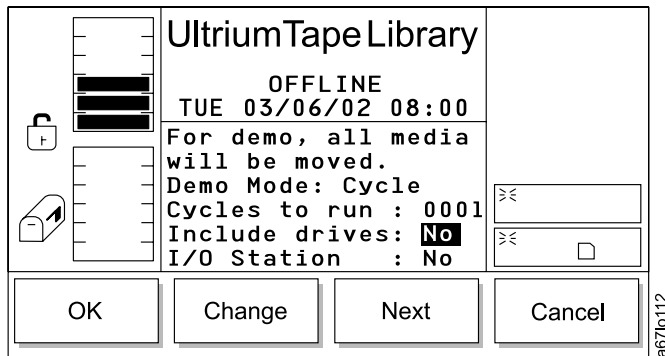


Figure 182. Include Drives Dialog

To choose one of the selections from the Include Drives Dialog, press the button below the desired softkey.

- If **OK** is selected, the field values are applied, and the Demo operation starts (see Figure 183 on page 145).
- If **Change** is selected, the drives are included or not included accordingly.
- If **Next** is selected, the next field in the list becomes the active field. After you reach the end of the field list, the active field reverts to the first field in the list (see Figure 181).
- If **Cancel** is selected, the Move Submenu displays (see Figure 108 on page 105).

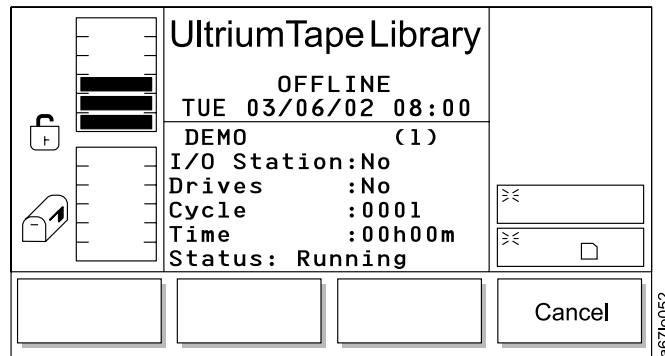


Figure 183. Demo Execution screen

**Self Test Dialog:** The Self Test Dialog runs a series of diagnostics (including tests of the sensor, lock and unlock function, and movement of all motors; when the library contains drives, the routine also sends communication messages to the drive sleds). No cartridges are moved during the self test.

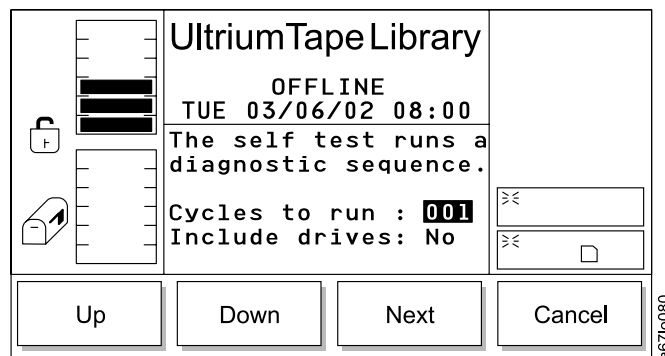


Figure 184. Self Test Dialog

To choose one of the selections from the Self Test Dialog, press the button below the desired softkey.

- If **Up** is selected, the value of the current field is increased.
- If **Down** is selected, the value of the current field is decreased.
- If **Next** is selected, the next field in the list becomes the active field (see Figure 185 on page 146).
- If **Cancel** is selected, the Exercise Submenu displays (see Figure 180 on page 143).

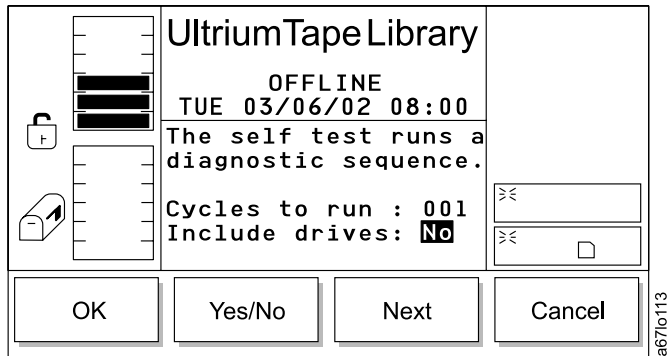


Figure 185. Include Drives Dialog

To choose one of the selections from the Include Drives Dialog, press the button below the desired softkey.

- If **OK** is selected, the field values are applied and the self test operation begins. After the cycles have run, the Self Test Execution Dialog displays the results (see Figure 186).
- If **Yes/No** is selected, the drives are included or not included accordingly.
- If **Next** is selected, the next field in the list becomes the active field. After you reach the end of the field list, the active field reverts to the first field in the list (see Figure 184 on page 145).
- If **Cancel** is selected, the Exercise Submenu displays (see Figure 180 on page 143).

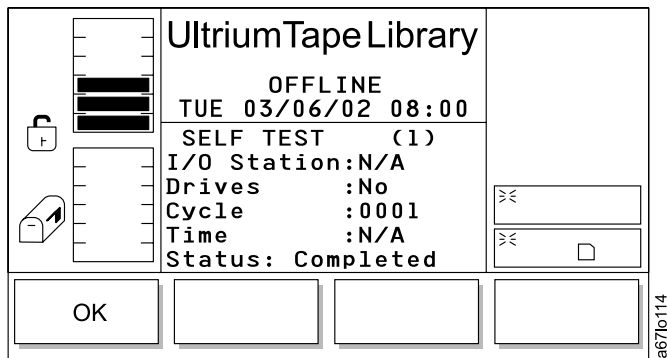


Figure 186. Self Test Execution Dialog

**Teach Dialog:** The Teach Dialog calibrates the library.

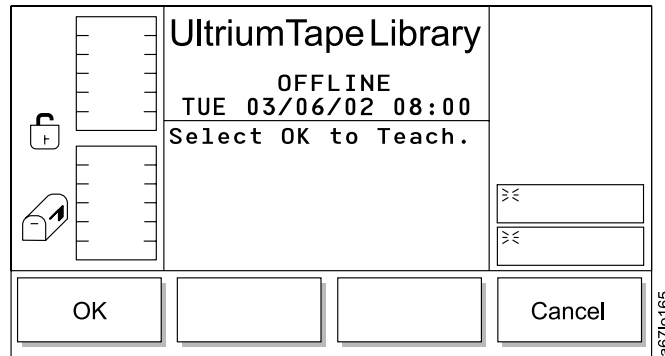


Figure 187. Teach Dialog

To choose one of the selections from the Teach Dialog, press the button below the desired softkey.

- If **OK** is selected, the Teach process begins. The Teach in Progress Dialog displays, followed by the Teach Completed Dialog (see Figure 188 and Figure 189).
- If **Cancel** is selected, the Exercise Submenu displays (see Figure 180 on page 143).

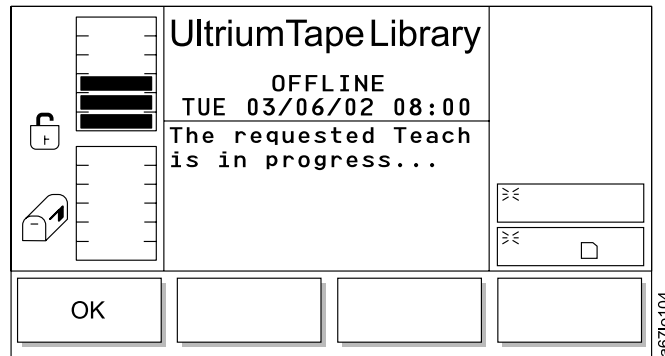


Figure 188. Teach in Progress Dialog

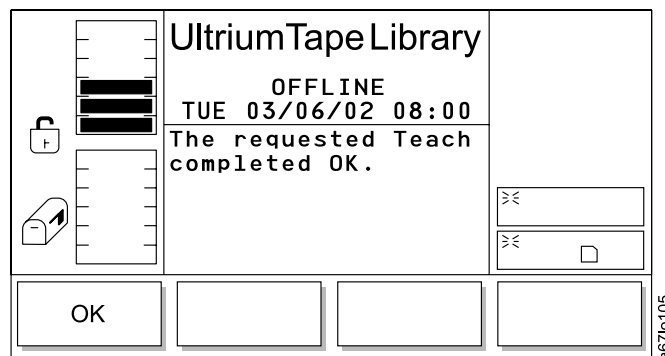


Figure 189. Teach Completed Dialog

## Drives Dialog

The Drives Dialog allows you to select a drive on which to perform a service function.

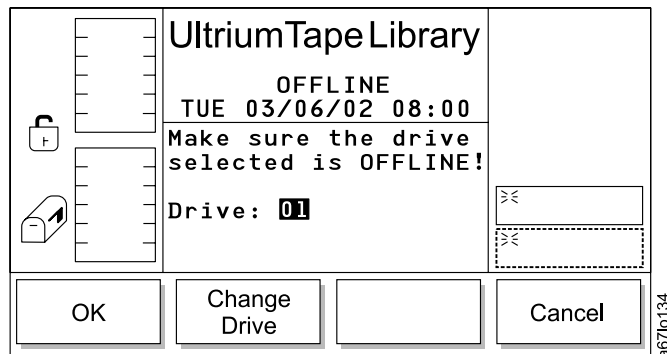


Figure 190. Drives Dialog

To choose one of the selections from the Drives Dialog, press the button below the desired softkey.

- If **OK** is selected, the Drive Service Dialog displays (see Figure 191).
- If **Change Drive** is selected, the next drive in the library is chosen.
- If **Cancel** is selected, the Service Menu displays (see Figure 159 on page 132).

## Drive Service Dialog

The Drive Service Dialog displays a collection of routines for servicing the drives.

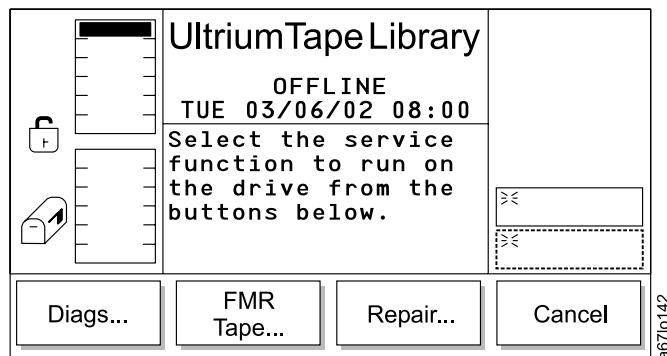


Figure 191. Drive Service Dialog

To choose one of the selections from the Drive Service Dialog, press the button below the desired softkey.

- If **Diags** is selected, the Diagnostics Dialog displays (see Figure 192 on page 149).
- If **FMR Tape** is selected, the FMR Tape Dialog displays (see Figure 193 on page 149).
- If **Repair** is selected, the Repair Dialog displays (see Figure 195 on page 150).
- If **Cancel** is selected, the Drives Dialog displays (see Figure 190).

**Diagnostics Dialog:** The Diagnostics Dialog allows you to select a diagnostic test to run on a drive.

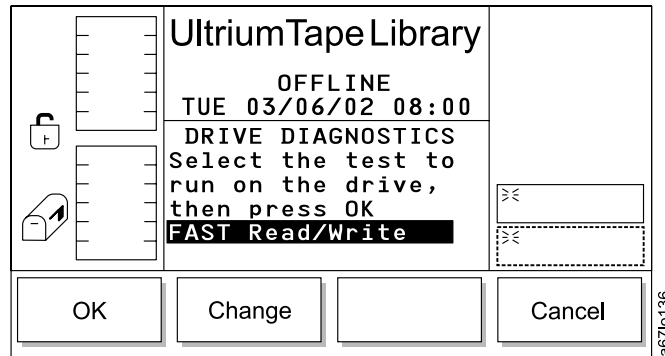


Figure 192. Diagnostics Dialog

To choose one of the selections from the Diagnostics Dialog, press the button below the desired softkey.

- If **OK** is selected, the diagnostic test shown in the active field displays.
- If **Change** is selected, the next diagnostic test displays in the active field. The following drive diagnostic tests are available:
  - FAST Read/Write
  - Normal Read/Write
  - Media Read/Write
  - Head Read/Write
  - Power On Self Test
  - SCSI Wrap Test
- If **Cancel** is selected, the Drive Service Dialog displays (see Figure 191 on page 148).

**FMR Tape Dialog:** The FMR Tape Dialog allows you to create or erase an FMR tape.

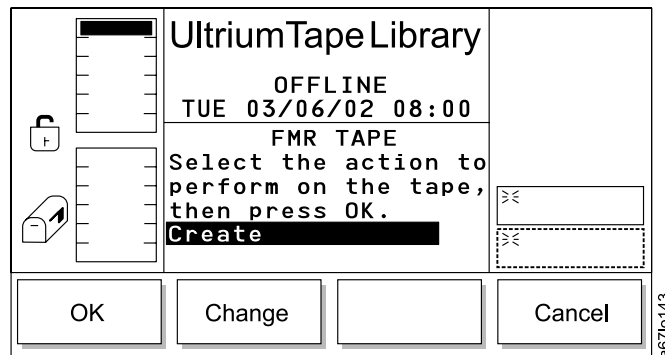


Figure 193. FMR Tape Dialog

To choose one of the selections from the FMR Tape Dialog, press the button below the desired softkey.

- If **OK** is selected, the Scratch Tape Dialog displays (see Figure 194 on page 150).
- If **Change** is selected, the value in the active field toggles.

- If **Cancel** is selected, the Drive Service Dialog displays (see Figure 191 on page 148 ).

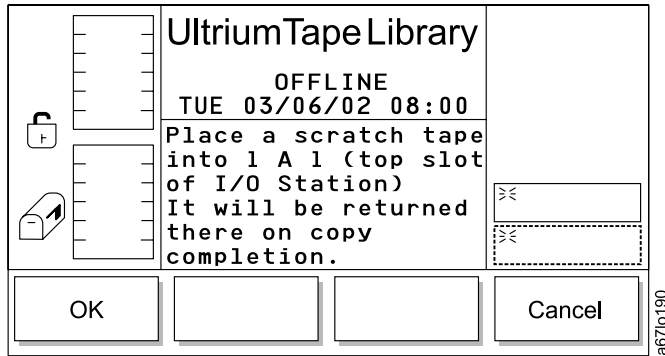


Figure 194. Scratch Tape Dialog

To choose one of the selections from the Scratch Tape Dialog, press the button below the desired softkey.

- If **OK** is selected, the process of creating or erasing the FMR tape begins.
- If **Cancel** is selected, the Drive Service Dialog displays (see Figure 191 on page 148).

**Repair Dialog:** The Repair Dialog allows you to remove or replace a drive.

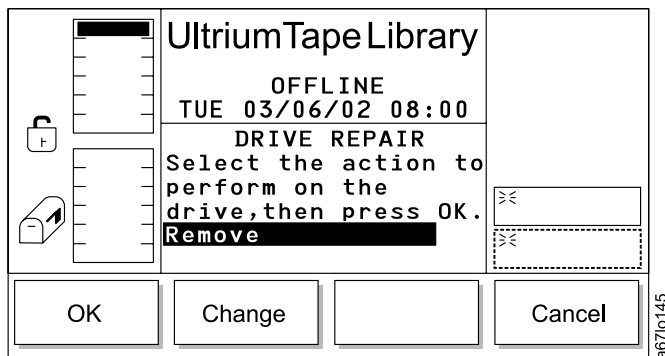


Figure 195. Repair Dialog

To choose one of the selections from the Repair Dialog, press the button below the desired softkey.

- If **OK** is selected, the repair process begins.
- If **Change** is selected, the value in the active field toggles (see Figure 196 on page 151).
- If **Cancel** is selected, the Drive Service Dialog displays (see Figure 191 on page 148).



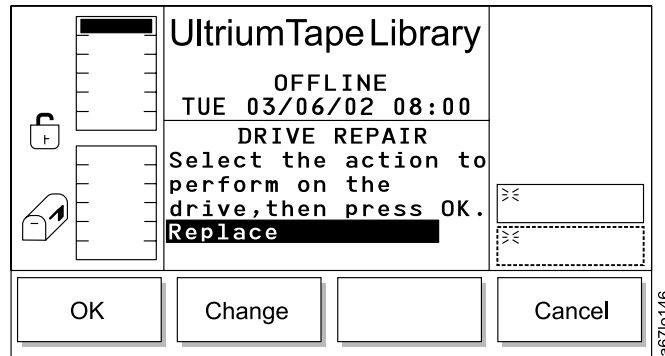


Figure 196. Repair Dialog (Replace)

## About Menu

Use the About Menu to display the library's serial number, firmware version, and application and boot code for the picker, drive sleds, main board, and display. Select **About** from the Main Menu's alternate screen by pressing the button below the **About** softkey (see Figure 77 on page 89). The About Menu displays (see Figure 197).

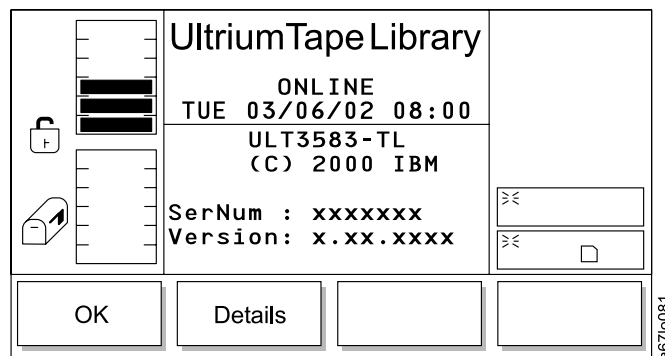


Figure 197. About Menu

To choose one of the selections from the About Menu, press the button below the desired softkey.

- If **OK** is selected, the Main Menu (alternate screen) displays (see Figure 77 on page 89).
- If **Details** is selected, the Detail Dialog (initial screen) displays (see Figure 198 on page 152).

## Details Dialog

When **Details** is selected, the Details Dialog displays (see Figure 198). Use this option to view the library's current application and boot code for the picker, drive sleds, main board, and display. All code levels must be the same. However, if the boot code is at 02.01.0001 or above it does not have to have to match the other code levels.

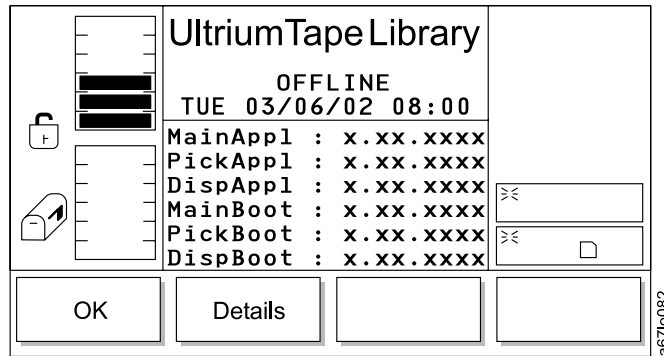


Figure 198. Detail Dialog (initial screen)

To choose one of the selections from the Detail Dialog (initial screen), press the button below the desired softkey.

- If **OK** is selected, the Main Menu (alternate screen) displays (see Figure 77 on page 89).
- If **Details** is selected, the Detail Dialog (secondary screen) displays (see Figure 199).

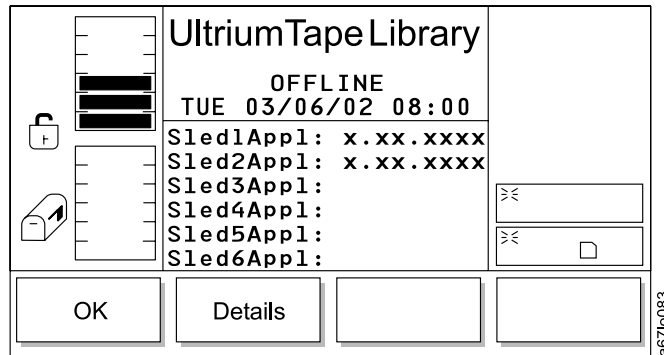


Figure 199. Detail Dialog (secondary screen)

To choose one of the selections from the Detail Dialog (secondary screen), press the button below the desired softkey.

- If **OK** is selected, the Main Menu (alternate screen) displays (see Figure 77 on page 89).
- If **Details** is selected, the Detail Dialog (tertiary screen) displays (see Figure 200 on page 153).

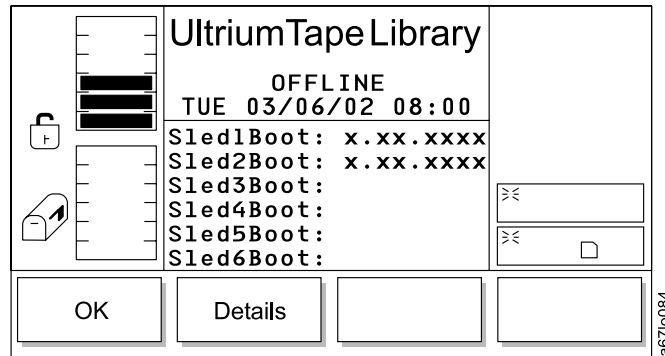


Figure 200. Detail Dialog (tertiary screen)

To choose one of the selections from the Detail Dialog (tertiary screen), press the button below the desired softkey.

- If **OK** is selected, the Main Menu (alternate screen) displays (see Figure 77 on page 89).
- If **Details** is selected, the display toggles back to the About Menu (see Figure 197 on page 151).



## Chapter 5. Using the Media

The 3583 Tape Library uses the following cartridge types:

- IBM LTO Ultrium Data Cartridge
- IBM LTO Ultrium Cleaning Cartridge

To ensure that your tape library conforms to IBM's specifications for reliability, use only the preceding cartridges. You may use other LTO-certified data cartridges, but they may not meet the standards of reliability established by IBM. The IBM LTO Ultrium Data Cartridge cannot be interchanged with the media used in other IBM non-LTO Ultrium tape products.

Each IBM Ultrium Tape Cartridge must bear a machine-readable, external bar code label that identifies the cartridge's volume serial number (VOLSER) to the library. If a cartridge in a storage or I/O station slot does not contain a label, the bar code scanner will treat that slot as empty. For more information, see "Bar Code Label" on page 157.

Figure 201 shows the IBM LTO Ultrium Data Cartridge and its components.

- |          |                      |          |                 |
|----------|----------------------|----------|-----------------|
| <b>1</b> | Cartridge door       | <b>4</b> | Label area      |
| <b>2</b> | Leader pin           | <b>5</b> | Insertion guide |
| <b>3</b> | Write-protect switch |          |                 |

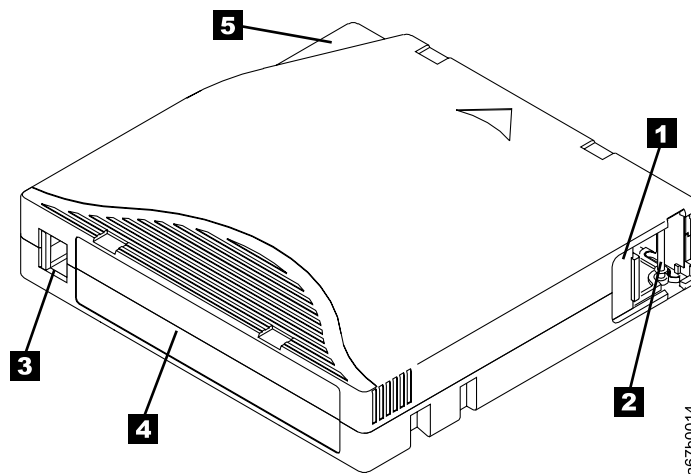


Figure 201. The IBM LTO Ultrium Data Cartridge



**Attention:** The IBM LTO Ultrium Tape Cartridge is a delicate component and requires care in handling. For more information, see "Handling the Cartridges" on page 160.

---

## Data Cartridge

The IBM LTO Ultrium Data Cartridge contains 1/2-inch, metal-particle tape that has a native data capacity of 100 GB, and a compressed capacity of 200 GB (assuming 2:1 compression). When processing the tape, the Ultrium Tape Drive uses a linear, serpentine recording format, and reads and writes data on 384 tracks, 8 tracks at a time. The first set of 8 tracks is written from near the beginning of the tape to near the end of the tape. The head then repositions to the next set of 8 tracks for the return pass. This process continues until all tracks are written and the tape is full, or until all data is written.

The IBM LTO Ultrium Data Cartridge includes a Linear Tape-Open Cartridge Memory (LTO-CM) chip, which contains information about the cartridge and the tape (such as the name of the manufacturer that created the tape), as well as statistical information about the cartridge's use. Whenever you unload a tape cartridge, the 3583 Tape Library writes any pertinent information to the cartridge memory.

The cartridge door ( **1** in Figure 201 on page 155) protects the tape from contamination when the cartridge is out of the drive. Behind the door, the tape is attached to a leader pin **2**. When you insert the cartridge into the drive, a threading mechanism pulls the pin (and tape) out of the cartridge, across the drive head, and onto a non-removable takeup reel. The head can then read or write data from or to the tape.

The write-protect switch **3** prevents data from being written to the tape cartridge. On the IBM LTO Ultrium Data Cartridge, the switch is red; on the IBM LTO Ultrium Cleaning Cartridge, the switch is gray. The label area **4** provides a location for you to place a label. Affix only a bar code label or a human-writable label. When affixing a label, place it only in the recessed label area. A label that extends outside of the recessed area can cause loading problems in the internal drive or in the 3583 Tape Library. The insertion guide **5** is a large, notched area that prevents you from inserting the cartridge incorrectly.

You can order tape cartridges with the bar code labels included, or you can order custom labels. To obtain tape cartridges and bar code labels, see "Ordering Media Supplies" on page 170. The bar code and bar code label must meet predefined specifications. To determine the specifications, visit the web at <http://ssddom02.storage.ibm.com/tape/lto/documentation/labelspec> or contact your IBM Marketing Representative.

The IBM LTO Ultrium Data Cartridge has a nominal cartridge life of 5000 load and unload cycles.

---

## Cleaning Cartridge

Each drive determines when it needs to be cleaned and alerts the library and the server's application software. Depending on which cleaning method you choose, the drive uses the cleaning cartridge to automatically clean the drive, or you are required to select menus to initiate cleaning (for information about cleaning methods, see "Cleaning Drives" on page 86).

**Note:** The VOLSER on the cartridge's bar code label must begin with **CLNI** or the library treats the cleaning cartridge as a data cartridge during an inventory.

The IBM LTO Ultrium Cleaning Cartridge is valid for 50 uses. The cartridge's LTO-CM chip tracks the number of times that the cartridge is used.

---

## Bar Code Label

Each data and cleaning cartridge that is processed by the 3583 Tape Library must bear a bar code label. The label contains:

- A volume serial number (VOLSER) that you can read
- A bar code that the library can read

When read by the library's bar code scanner, the bar code identifies the cartridge's VOLSER to the library. The bar code also tells the library whether the cartridge is a data, cleaning, or diagnostic cartridge. In addition, the bar code includes the two-character media-type identifier, L1. L identifies the cartridge as an LTO cartridge; 1 indicates that the cartridge is the first generation of its type. Figure 202 shows a sample bar code label for the LTO Ultrium Tape Cartridge.

You can order tape cartridges with the labels included, or you can order custom labels. To order tape cartridges and bar code labels, see "Ordering Media Supplies" on page 170. The bar code must meet predefined specifications. To determine the specifications of the bar code and the bar code label, visit the web at <http://ssddom02.storage.ibm.com/tape/lto/documentation/labelspec> or contact your IBM Marketing Representative.

When attaching a bar code label to a tape cartridge, place the label only in the recessed label area (see **4** in Figure 201 on page 155). A label that extends outside of the recessed area can cause loading problems in the drive or the library.

**Attention:** Do not place any type of mark on the white space at either end of the bar code. A mark in this area may prevent the 3583 Tape Library from reading the label.

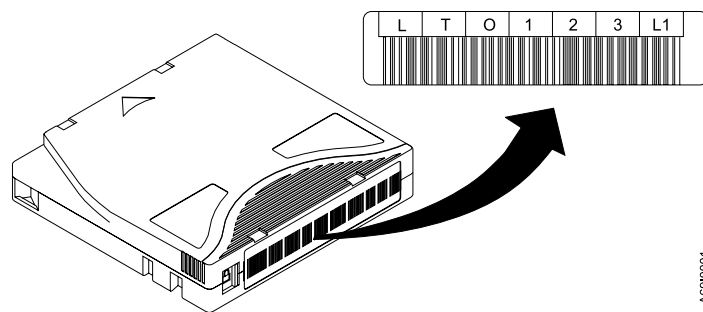


Figure 202. Sample bar code label on the LTO Ultrium Tape Cartridge. The volume serial number (LTO123) and bar code are printed on the label.

## Guidelines for Using Bar Code Labels

Apply the following guidelines whenever you use bar code labels:


- Use only IBM-approved bar code labels.
- Do not reuse a label or reapply a used label over an existing label.
- Before you apply a new label, remove the old label by slowly pulling it at a right angle to the cartridge case.
- Use peel-clean labels that do not leave a residue after they are removed. If there is glue residue on the cartridge, remove it by gently rubbing it with your finger; do not use a sharp object, water, or other chemical to clean the label area.
- Examine the label before you apply it to the cartridge. Do not use the label if it has voids or smears in the printed characters or bar code (an application software's inventory operation will take much longer if the bar code label is not readable).
- Remove the label from the label sheet carefully. Do not stretch the label or cause the edges to curl.
- Position the label within the recessed label area (see **4** in Figure 201 on page 155).
- With light finger pressure, smooth the label so that no wrinkles or bubbles exist on its surface.
- Verify that the label is smooth and parallel, and has no roll-up or roll-over. The label must be flat to within 0.5 mm (0.02 in.) over the length of the label and have no folds, missing pieces, or smudges.
- Do not place other machine-readable labels on other surfaces of the cartridge. They may interfere with the ability of the bar code scanner to read the bar code.



---

## Setting the Write-Protect Switch

The position of the write-protect switch on the tape cartridge (see **1** in Figure 203) determines whether you can write to the tape:

- If the switch is set to  (solid red), data cannot be written to the tape.
- If the switch is set to unlocked (black void), data can be written to the tape.

If possible, use your server's application software to write-protect your cartridges (rather than manually setting the write-protect switch). This allows the server's software to identify a cartridge that no longer contains current data and is eligible to become a scratch cartridge. Do not write-protect scratch (blank) cartridges; the tape drive will not be able to write new data to them.

If you must manually set the switch, slide it left or right to the desired position.

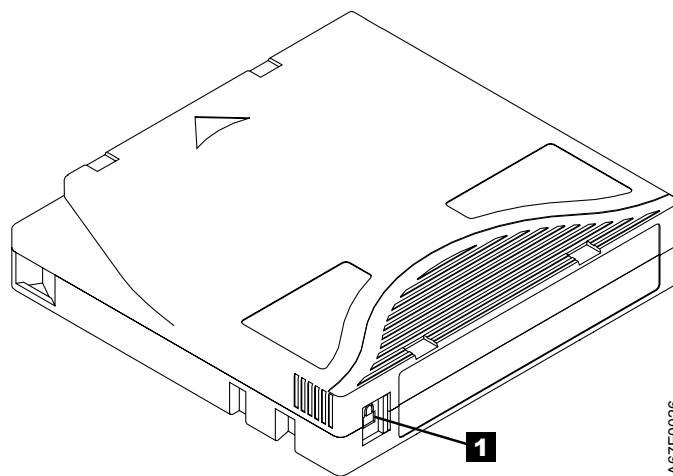


Figure 203. Setting the write-protect switch

---

## Handling the Cartridges



**Attention:** Do not insert a damaged tape cartridge into your 3583 Tape Library. A damaged cartridge can interfere with the reliability of the drive and may void the warranties of the drive and the cartridge. Before inserting a tape cartridge, inspect the cartridge case, cartridge door, and write-protect switch for breaks.

Incorrect handling or an incorrect environment can damage the LTO Ultrium Tape Cartridge or its magnetic tape. To avoid damage to your tape cartridges and to ensure the continued high reliability of your 3583 Tape Library, use the following guidelines:

- Do not drop the cartridge. If the cartridge drops, slide the cartridge door back and ensure that the leader pin is properly seated in the pin-retaining spring clips (see Figure 205 on page 163). Inspect the rear of the cartridge (the part that you load first into the tape load compartment) and ensure that there are no gaps in the seam of the cartridge case (see **4** in Figure 206 on page 164). If the leader pin has become dislodged or if there are gaps in the seam of the cartridge case, go to “Repositioning or Reattaching a Leader Pin” on page 163.
- Open only the cartridge door. Do not open any other part of the cartridge case. The upper and lower parts of the case are held together with screws; separating them destroys the usefulness of the cartridge.
- Do not handle tape that is outside the cartridge. Handling the tape can damage the tape’s surface or edges, which may interfere with read or write reliability. Pulling on tape that is outside the cartridge can damage the tape and the brake mechanism in the cartridge.
- Before you use a cartridge, let it acclimate for at least 24 hours to the normal operating environment.
- Ensure that all surfaces of a cartridge are dry before inserting it.
- Do not stack more than six cartridges.
- Do not expose the tape cartridge to moisture or direct sunlight.
- Do not degauss a tape cartridge that you intend to reuse. Degaussing makes the tape unusable.
- Do not expose recorded or blank tape cartridges to stray magnetic fields of greater than 100 oersteds (for example, terminals, motors, video equipment, X-ray equipment, or fields that exist near high-current cables or power supplies). Such exposure can cause the loss of recorded data or make the blank cartridge unusable.
- Maintain the conditions that are described in “Environmental and Shipping Specifications for Tape Cartridges” on page 161.

## Environmental and Shipping Specifications for Tape Cartridges

Before you use a tape cartridge, acclimate it to the operating environment for 24 hours or the time necessary to prevent condensation in the drive (the time will vary, depending on the environmental extremes to which the drive was exposed).

The best storage container for the cartridges (until they are opened) is the original shipping container. The plastic wrapping prevents dirt from accumulating on the cartridges and partially protects them from humidity changes.

When you ship a cartridge, place it in a sealed, moisture-proof bag to protect it from moisture, contaminants, and physical damage. Ship the cartridge in a shipping container that has enough packing material to cushion the cartridge and prevent it from moving within the container.

Table 11 gives the environment for operating, storing, and shipping LTO Ultrium Tape Cartridges.

Table 11. Environment for operating, storing, and shipping the LTO Ultrium Tape Cartridge

Environmental Specifications				
Environmental Factor	Operating	Operational Storage	Archival Storage	Shipping
Temperature	10 to 45°C (50 to 113°F)	16 to 32°C (61 to 90°F)	16 to 25°C (61 to 77°F)	-23 to 49°C (-9 to 120°F)
Relative humidity (noncondensing)	10 to 80%	20 to 80%	20 to 50%	5 to 80%
Wet bulb temperature	26°C (79°F)	26°C (79°F)	26°C (79°F)	26°C (79°F)
<b>Notes:</b>				
1. Operational storage equals less than 1 year.				
2. Archival storage equals 1 to 10 years.				

---

## Cleaning the Bar Code Scanner

If the bar code scanner is unable to read a bar code label, the window on the scanner may need to be cleaned.

1. Open the front door of the library.
2. Wipe the bar code scanner window ( **1** in Figure 204) with a lint-free cloth.
3. Close the front door of the library and retry any operation that was interrupted.

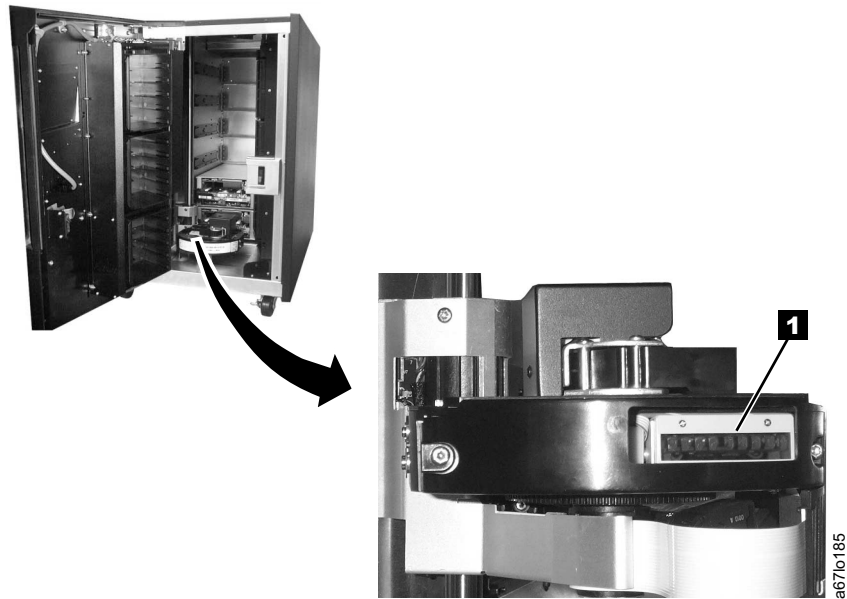


Figure 204. Cleaning the bar code scanner

---

## Repositioning or Reattaching a Leader Pin



**Attention:** Use a repaired tape cartridge only to recover data and move it to another cartridge. Continued use of a repaired cartridge may void the warranties of the drive and the cartridge.

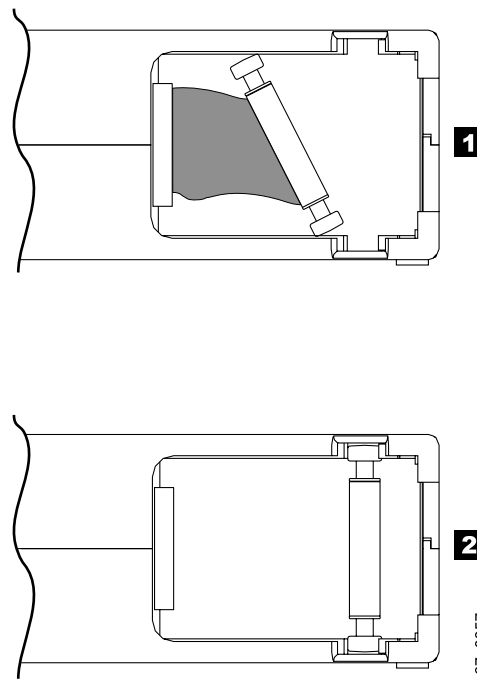
If the leader pin in your cartridge becomes dislodged from its pin-retaining spring clips or detaches from the tape, you must use the IBM Leader Pin Reattachment Kit (part number 08L9129) to reposition or reattach it. (Do not reattach the pin if you must remove more than 3 meters (10 feet) of leader tape.) The sections that follow describe each procedure.

### Repositioning a Leader Pin

A leader pin that is improperly seated inside a cartridge can interfere with the operation of the library. Figure 205 shows a leader pin in the incorrect **1** and correct **2** positions.

To place the leader pin in its proper position, you will need the following tools:

- Plastic or blunt-end tweezers
- Cartridge manual rewind tool (from Leader Pin Reattachment Kit, part number 08L9129)



*Figure 205. Leader pin in the incorrect and correct positions. The cartridge door is open and the leader pin is visible inside the cartridge.*

To reposition the leader pin, perform the following steps.

1. Slide open the cartridge door ( **1** in Figure 206) and locate the leader pin **2** (you may need to shake the cartridge gently to roll the pin toward the door).
2. With plastic or blunt-end tweezers, grasp the leader pin and position it in the pin-retaining spring clips **3** .
3. Press the leader pin gently into the clips until it snaps into place and is firmly seated. Ensure that there are no gaps in the seam of the cartridge **4** .  
**Attention:** If gaps exist, do not continue with this procedure and do not use the cartridge.
4. Close the cartridge door.

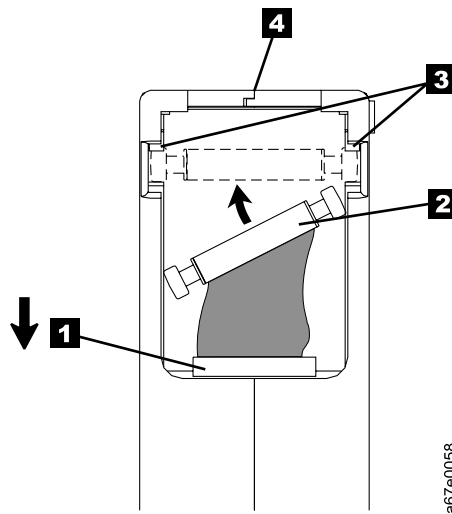


Figure 206. Placing the dislodged leader pin into the correct position. The cartridge door is open to show the leader pin.

5. To rewind the tape, insert the cartridge manual rewind tool ( **1** in Figure 207) into the cartridge's hub **2** and turn it clockwise until the tape becomes taut.

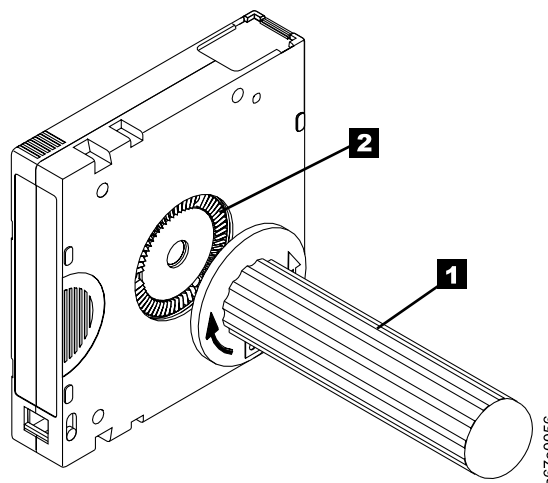


Figure 207. Rewinding the tape into the cartridge

6. Remove the rewind tool by pulling it away from the cartridge.

## Reattaching a Leader Pin

If the leader pin detaches from the tape in your cartridge, you must use the IBM Leader Pin Reattachment Kit (part number 08L9129) to reattach it. See Table 12 on page 170 for information on how to order IBM Media supplies.

**Note:** Do not reattach the pin if you must remove more than 3 meters (10 feet) of leader tape; instead, contact your Service Representative.

The Leader Pin Reattachment Kit contains three parts:

- **Leader pin attach tool** - A plastic brace that holds the cartridge door open.
- **Cartridge manual rewind tool** - A device that fits into the cartridge's hub and lets you wind the tape into and out of the cartridge.
- **Pin supplies** - Leader pins and C-clips.

### **Attention:**

- Use only the IBM Leader Pin Reattachment Kit to reattach the leader pin to the tape. Other methods of reattaching the pin will damage the tape, the drive, or both.
- Use this procedure on your tape cartridge only when the leader pin detaches from the magnetic tape and you must copy the cartridge's data onto another cartridge. Destroy the damaged cartridge after you copy the data. This procedure may affect the performance of the leader pin during threading and unloading operations.
- Touch only the end of the tape. Touching the tape in an area other than the end can damage the tape's surface or edges, which may interfere with read or write reliability.

The following procedure describes how to reattach a leader pin.

To reattach a leader pin by using the IBM Leader Pin Reattachment Kit:

1. Attach the leader pin attach tool ( **1** in Figure 208) to the cartridge ( **2** ) so that the tool's hook ( **3** ) latches into the cartridge's door ( **4** ). Pull the tool back to hold the door open, then slide the tool onto the cartridge. Open the tool's pivot arm ( **5** ).

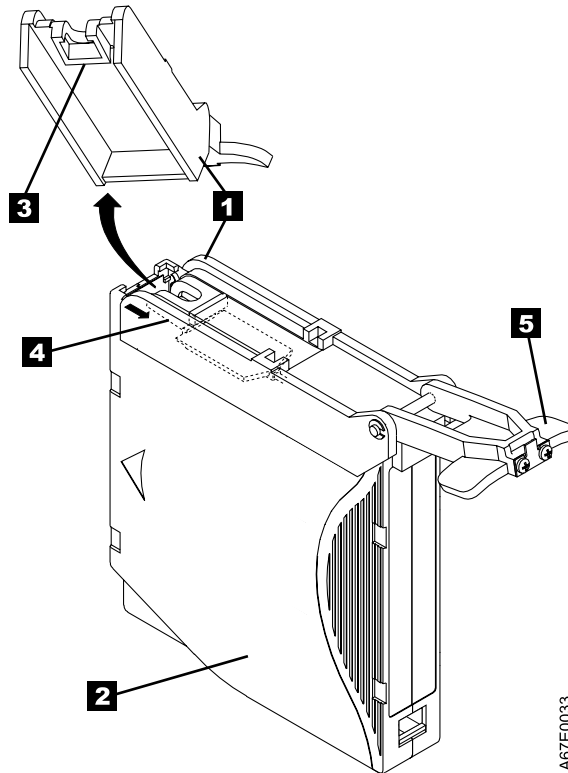
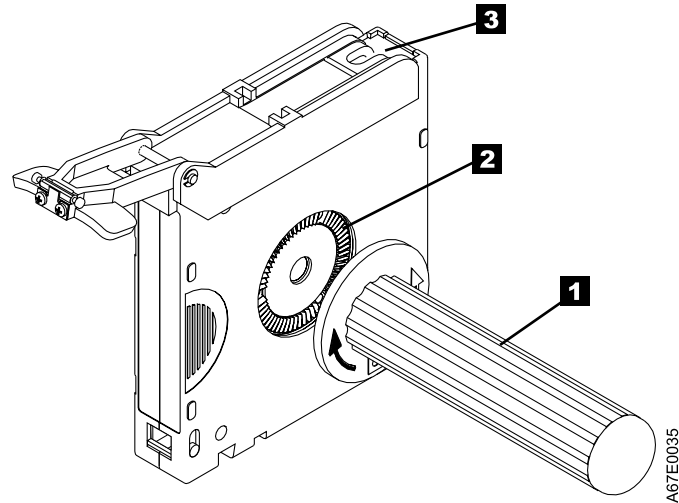


Figure 208. Attaching the leader pin attach tool to the cartridge. To hold the cartridge door open, hook the tool into the door and pull the tool back.



2. To find the end of the tape inside the cartridge, attach the cartridge manual rewind tool ( **1** in Figure 209) to the cartridge's hub ( **2** ) by fitting the tool's teeth between the teeth of the hub. Turn the tool clockwise until you can see the end of the tape inside the cartridge. Then, slowly turn the rewind tool counterclockwise to bring the tape edge toward the cartridge door.
3. Continue to turn the rewind tool counterclockwise until approximately 12.7 cm (5 in.) of tape hangs from the cartridge door. If necessary, grasp the tape and pull gently to unwind it from the cartridge.
4. Remove the rewind tool by pulling it away from the cartridge. Set the tool and the cartridge aside.



*Figure 209. Winding the tape out of the cartridge. Turn the cartridge manual rewind tool clockwise to see the end of the tape, then turn it counterclockwise to bring the tape to the door.*

5. On the leader pin ( **1** in Figure 210), locate the open side of the C-clip **2** . The C-clip is a small black part that will secure the tape **3** to the pin.
6. Remove the C-clip from the leader pin by using your fingers to push the clip away from the pin. Set the pin aside and discard the clip.

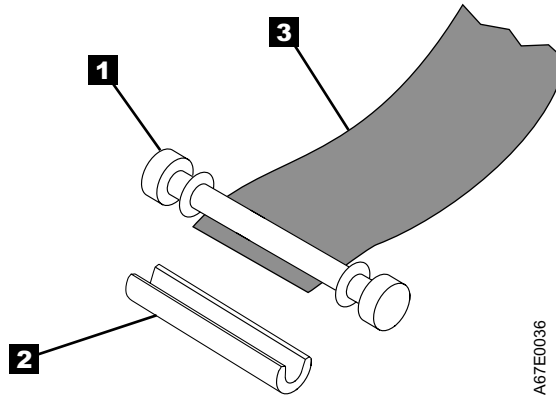


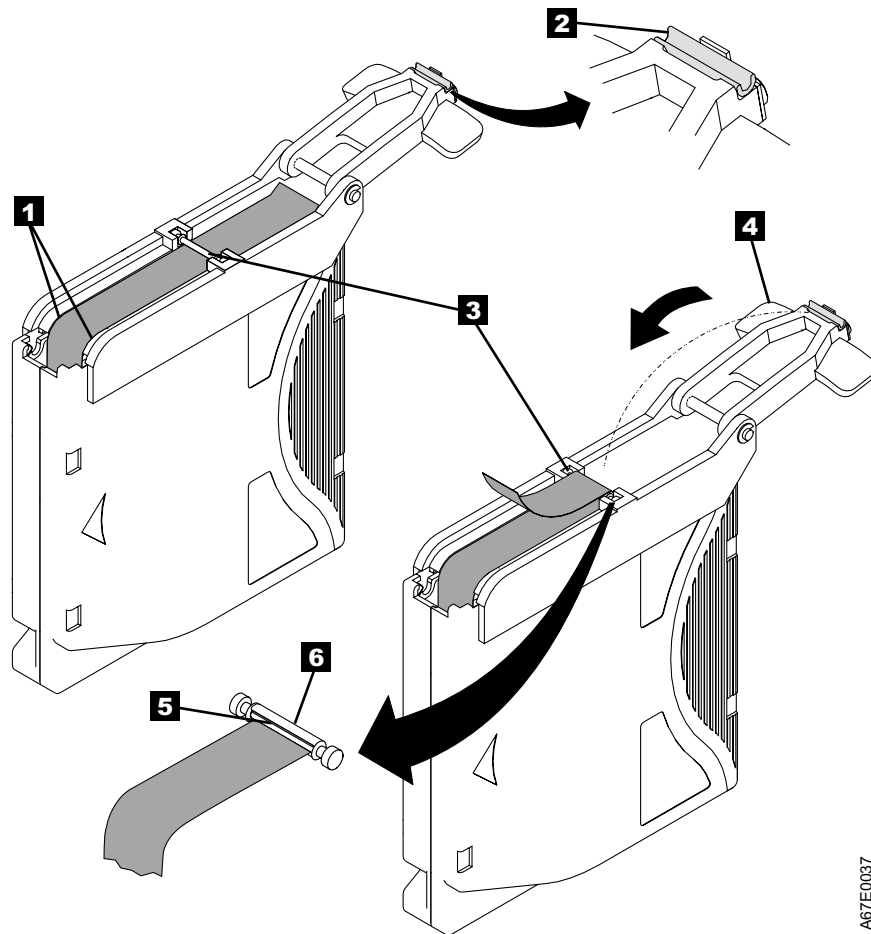
Figure 210. Removing the C-clip from the leader pin. Use your fingers to push the C-clip from the leader pin.

7. Position the tape in the alignment groove of the leader pin attach tool (see **1** in Figure 211 on page 169).
8. Place a new C-clip into the retention groove **2** on the leader pin attachment tool and make sure that the clip's open side faces up.
9. Place the leader pin (from step 6) into the cavity **3** of the leader pin attach tool.

**Attention:** To prevent the leader pin from rolling into the cartridge, in the following step use care when folding the tape over the pin.

10. Fold the tape over the leader pin and hold it with your fingers.

**Note:** Use care to ensure that the tape is centered over the leader pin. Failure to properly center the tape on the leader pin will cause the repaired cartridge to fail. When the tape is properly centered, a 1.9 mm (0.075 in.) gap exists on both sides of the pin.



A67E0037

Figure 211. Attaching the leader pin to the tape

11. Close the pivot arm **4** of the leader pin attach tool by swinging it over the leader pin so that the C-clip snaps onto the pin and the tape.
12. Swing the pivot arm open and trim the excess tape **5** so that it is flush with the reattached leader pin **6**.
13. Use your fingers to remove the leader pin from the cavity **3** in the leader pin attach tool.
14. Use the cartridge manual rewind tool to wind the tape back into the cartridge (wind the tape clockwise). Ensure that the leader pin is latched by the pin-retaining spring clips on each end of the leader pin.
15. Remove the rewind tool.
16. Remove the leader pin attach tool by lifting its end up and away from the cartridge.

Use a repaired tape cartridge only to recover data and move it to another cartridge. Continued use of a repaired cartridge may void the warranties of the drive and the cartridge.

---

## Disposing of Tape Cartridges

Under the current rules of the U.S. Environmental Protection Agency (EPA), regulation 40CFR261, the LTO Ultrium Tape Cartridge is classified as non-hazardous waste. As such, it may be disposed of in the same way as normal office trash. These regulations are amended from time to time, and you should review them at the time of disposal.

If your local, state, country (non-U.S.A.) or regional regulations are more restrictive than EPA 40CFR261, you must review them before you dispose of a cartridge. Contact your account representative for information about the materials that are in the cartridge.

If a tape cartridge must be disposed of in a secure manner, you can erase the data on the cartridge by using a high-energy ac degausser (use a minimum of 1200 oersted peak field over the entire space that the cartridge occupies). Degaussing makes the cartridge unusable.

If you burn the cartridge and tape, ensure that the incineration complies with all applicable regulations.

---

## Ordering Media Supplies

Table 12 lists the data cartridges and media supplies that you can order for the 3583 Tape Library.

Table 12. Ordering media supplies for the 3583 Tape Library

Supply Item	Method of Ordering
<b>Standard LTO Ultrium Data Cartridge</b> Includes human-writable labels.	Order as part number 08L9120 through an IBM-authorized distributor (for the closest distributor, visit the web at <a href="http://www.ibm.com/storage/media">http://www.ibm.com/storage/media</a> ). If you do not have Internet access, order the cartridge from any authorized IBM Business Partner or your IBM Marketing Representative by specifying Machine Type 3589 Model 003.
<b>Labeled IBM LTO Ultrium Data Cartridge</b> Includes bar code labels that are pre-applied by the manufacturer.	Order through an IBM-authorized distributor (for the closest distributor, visit the web at <a href="http://www.ibm.com/storage/media">http://www.ibm.com/storage/media</a> ). If you do not have Internet access, order the cartridge from any authorized IBM Business Partner or your IBM Marketing Representative by specifying Machine Type 3589 Model 002.
<b>Standard IBM LTO Ultrium Cleaning Cartridge</b> Includes human-writable labels.	Order as part number 08L9124 through an IBM-authorized distributor (for the closest distributor, visit the web at <a href="http://www.ibm.com/storage/media">http://www.ibm.com/storage/media</a> ). If you do not have Internet access, order the cartridge from any authorized IBM Business Partner or your IBM Marketing Representative by specifying Machine Type 3589 Model 004.
<b>Leader Pin Reattachment Kit</b>	Order as part number 08L9129 through an IBM-authorized distributor (for the closest distributor, visit the web at <a href="http://www.ibm.com/storage/media">http://www.ibm.com/storage/media</a> ). If you do not have Internet access, order as IBM part number 08L9129 from your IBM Business Partner or IBM Marketing Representative.

## Ordering Bar Code Labels

A sheet of IBM-approved data cartridge bar code labels is included with every 3583 Tape Library. These can be used to label any data cartridges ordered in the initial purchase. Cleaning cartridges ordered during the initial purchase will come with bar code labels already applied.

If you need additional labels for your data or cleaning cartridges, or if you need specific label ranges, contact the following authorized label supplier:

### **In America and Asia**

Colorflex  
697 South Pierce Street  
Louisville, CO 80027  
U. S. A.  
Telephone: 1-888-438-8362  
Fax: 303-266-2166  
<http://www.colorflex.com/tri-optic>

### **In Europe**

EDP Europe, Ltd.  
43 Redhills Road  
South Woodham Ferrers  
Chelmsford, Essex CM3 5UL  
U. K.  
Telephone: +44-1245-322380  
Fax: +44-1245-323484  
<http://www.colorflex.com/tri-optic>



## Appendix A. Removing a Tape Cartridge

If a tape cartridge fails to eject from an Ultrium Tape Drive in the 3583 Tape Library, there are two methods to remove the cartridge. The following sections describe the two methods: resetting the drive and ejecting the cartridge, and manually removing the cartridge.

### Resetting a Drive and Ejecting a Cartridge

If a tape cartridge fails to eject from an Ultrium Tape Drive, perform the following steps to reset the drive and eject the cartridge.

1. Use the server to set the library and drives Offline for all attached servers.
2. Open the front door of the library.
3. Locate the drive that contains the stuck tape cartridge. If the picker ( **1** in Figure 212) is in front of the drive **2** , gently lift and hold the picker out of the way.
4. Press and release the unload button **5** on the front of the drive and wait for approximately 2 minutes. If the cartridge ejects, the procedure was successful. If the cartridge does not eject, continue with the next step.
5. Press and hold the unload button **5** until the single-character display **3** changes as the drive performs a power-on self test (POST). If the drive does not perform a POST within 15 seconds, cycle power to the library (turn it off, then on again).

**Note:** If you raised the picker to access the tape drive, lower the picker before cycling power to the library.

6. After a reset or power cycle, the drive starts a slow rewind. During the slow rewind, the Activity light **4** flashes. Wait for the light to stop flashing (indicating that the slow rewind is complete). **This process may take up to 20 minutes.**
7. Press and release the unload button **5** and wait for approximately 2 minutes. If the cartridge ejects, the procedure was successful. If the cartridge does not eject, continue with the following procedure.

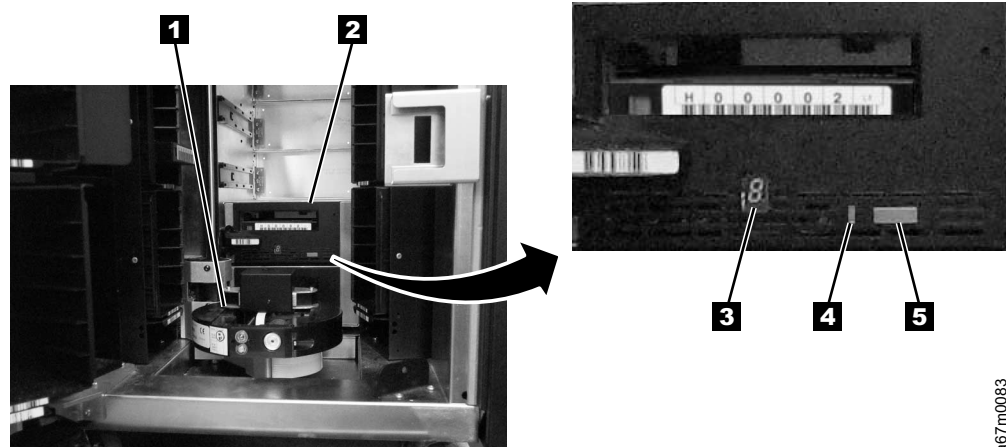


Figure 212. Resetting the tape drive

## Manually Removing the Cartridge

If a tape cartridge fails to eject from an Ultrium Tape Drive, you can manually remove the cartridge. The following tools are required for the procedure:

- 2.5-mm allen wrench
- #3 Phillips screwdriver
- Small-blade screwdriver or potentiometer-setting tool
- Flashlight (optional)



**Attention:** Before performing this procedure, note the following:

- This procedure may damage the tape cartridge. If you use this procedure, you must replace the stuck tape cartridge after removing it and copying its data to another cartridge. If you choose to return the drive and the stuck tape cartridge to IBM for maintenance (the recommended solution), the tape cartridge will be scrapped.
- The use of a power screwdriver to perform this procedure can destroy the tape.
- Never touch the head or electronic components within the drive. Touching may cause contamination or damage by electrostatic discharge.

To manually remove a tape cartridge, perform the following steps:

1. Use the server to set the library and drives Offline for all attached servers.
2. From the operator panel, prepare the library for drive sled removal by selecting **More** → **Service** → **Drives** → **Repair** → **Remove**.
3. Power-off the library by pushing O on the power switch.
4. Disconnect all SCSI cables to the drive sled that contains the stuck cartridge.
5. Loosen the two captive thumbscrews (see **1** in Figure 213) on the drive sled **2** and slide the drive sled out by using the handle **3**.

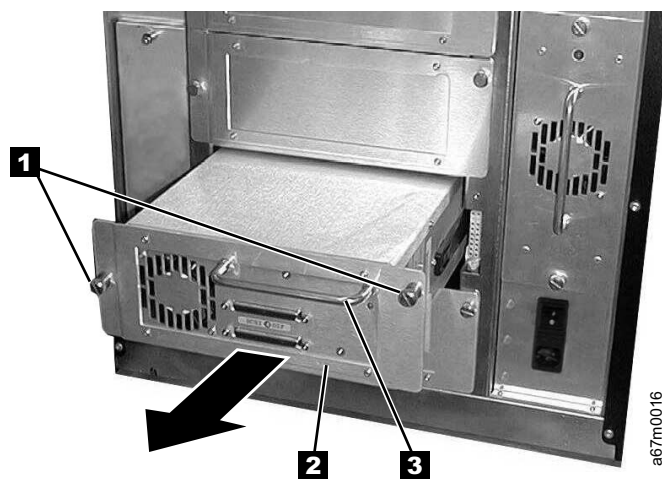


Figure 213. Removing the drive sled



6. Place the drive sled on its side and locate the access hole at the bottom of the unit (see **1** in Figure 214).
7. Insert a 2.5-mm allen wrench into the access hole and position the wrench so that it is seated in the screw of the supply reel motor (not visible).
8. Push open the door of the tape load compartment **2** and locate the flag **3** on the cartridge's takeup reel.

**Attention:** In the following step, rotate the allen wrench clockwise, not counterclockwise. A counterclockwise motion may damage the tape.

9. To ensure that the tape is not broken, watch the flag **3** on the takeup reel while you rotate the allen wrench clockwise (do not let the allen wrench move counterclockwise):
  - If the takeup reel is turning and the allen wrench does not rotate freely, the tape is not broken. Go to step 10.
  - If the takeup reel is not turning, and the allen wrench rotates freely, the tape is broken or the tape (along with the leader pin) is completely contained in the cartridge. Insert a small-blade screwdriver or potentiometer-setting tool into the access hole for the loader motor gear (see **1** in Figure 215 on page 176). While guarding against excessive revolutions or force that may strip the gears and cause permanent damage to the drive, rotate the screwdriver counterclockwise:
    - If the cartridge immediately moves up, this means the tape is completely in the cartridge and the leader pin is in home position. Continue rotating the screwdriver until the cartridge ejects. Go to step 14 on page 176.
    - If you feel resistance and the cartridge does not move, the tape is broken. Contact IBM Technical Support
10. Continue to rotate the allen wrench until you feel resistance. The tape has been rewound as far as it can go without unthreading.

**Note:** The number of required rotations depends on where the beginning of the tape is on the takeup reel. You may have to rotate the allen wrench for a lengthy period.

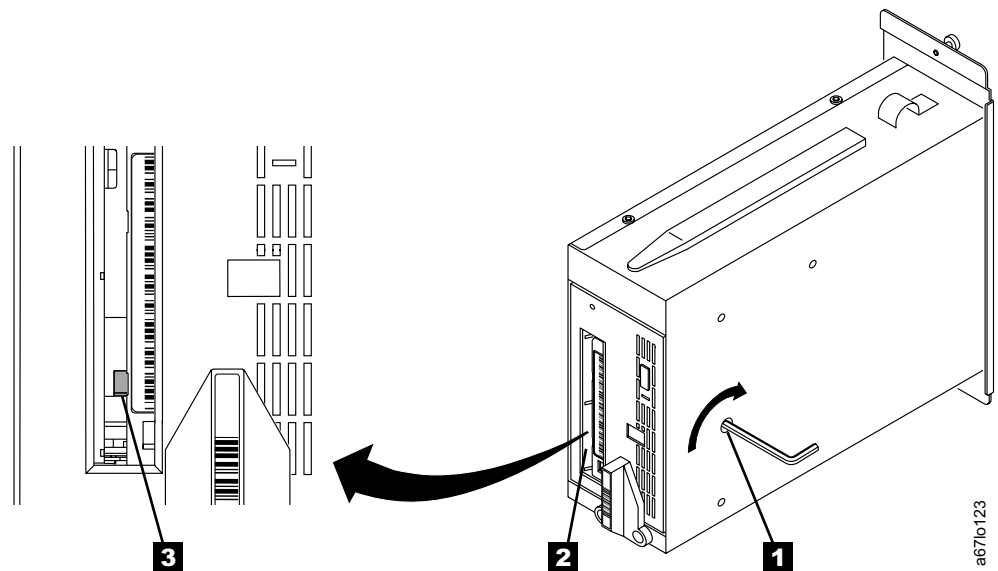


Figure 214. Determining whether the tape is broken

11. With the allen wrench still inserted into the bottom access hole, insert a small-blade screwdriver or potentiometer-setting tool into the access hole for the loader motor gear (see **1** in Figure 215).
12. While keeping torque on the supply reel motor screw and rotating the allen wrench **2** clockwise, rotate the loader motor gear with the small-blade screwdriver **1** counterclockwise (see arrow). As you rotate the screwdriver, the allen wrench moves slightly.

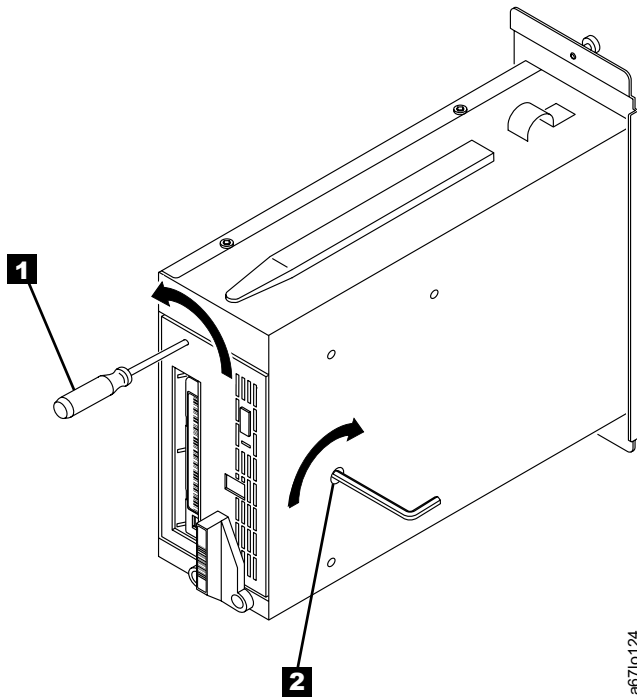


Figure 215. Unloading the tape cartridge.

13. With the small-blade screwdriver continue to rotate the loader motor gear in the unload direction (counterclockwise).
  - If you feel no resistance to the allen wrench and the cartridge slowly moves up and out of the tape load compartment, the procedure was successful. Go to step 14.
  - If you feel resistance to the allen wrench and the cartridge does not move, the loader mechanism is jammed. Contact your Service Representative.
14. Remove the tape cartridge.

After you remove the stuck tape cartridge, copy the data on the tape to another tape. Then, if appropriate, return the stuck tape cartridge in its original packaging or in the packaging from its replacement to your IBM-authorized distributor. If the leader pin detached from the tape in the cartridge during this procedure, go to “Repositioning or Reattaching a Leader Pin” on page 163.

# Appendix B. Element Addressing

## All Operating Systems and Windows 2000 with RSM Disabled

Element addressing in this section applies to all operating systems and Windows 2000 that has the Remote Storage Manager (RSM) disabled.

Figure 216 shows the element addressing for the 3583 Tape Library with a single-slot I/O station.

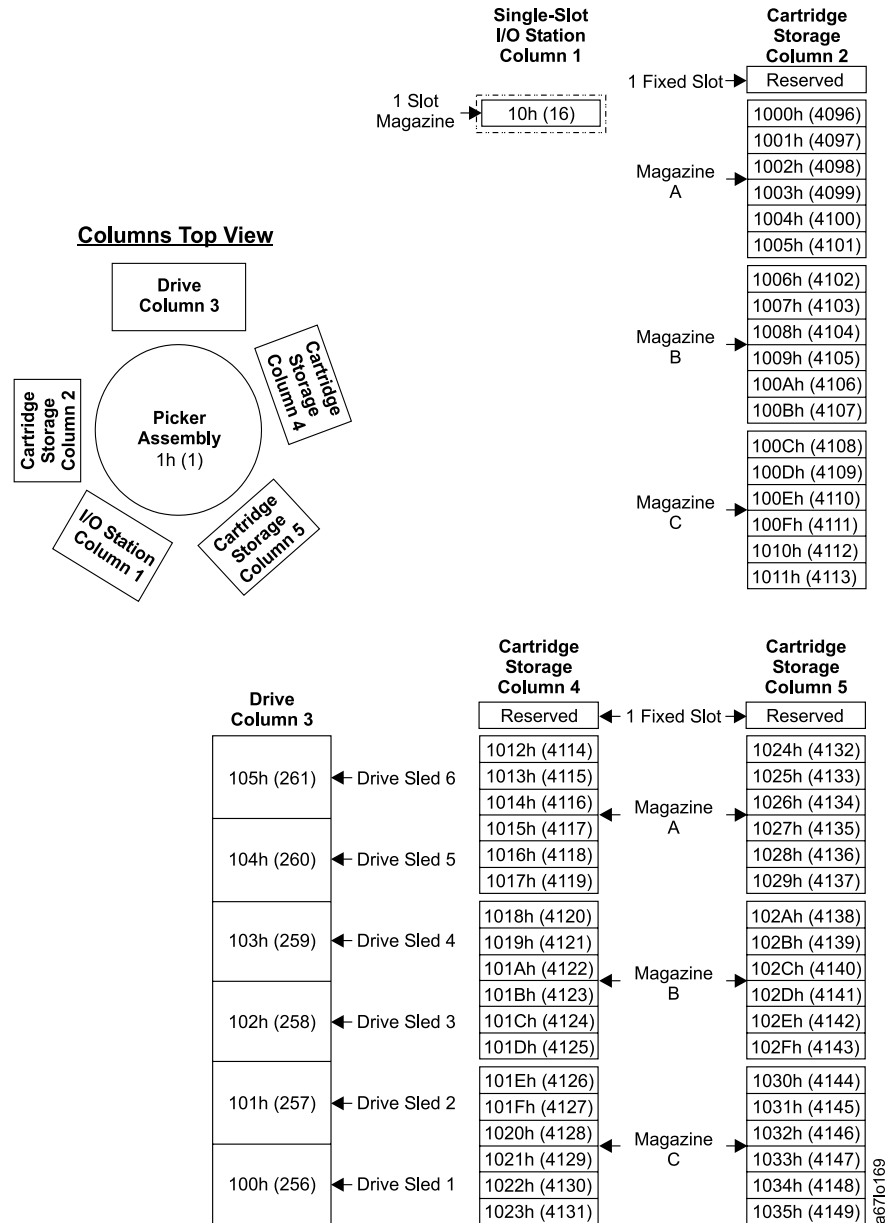


Figure 216. Element addresses for a 3583 Tape Library with a single-slot I/O station. RSM (in Windows 2000) is disabled.



Figure 218 shows the element addressing for the - with a multiple-slot I/O station configured as storage slots.

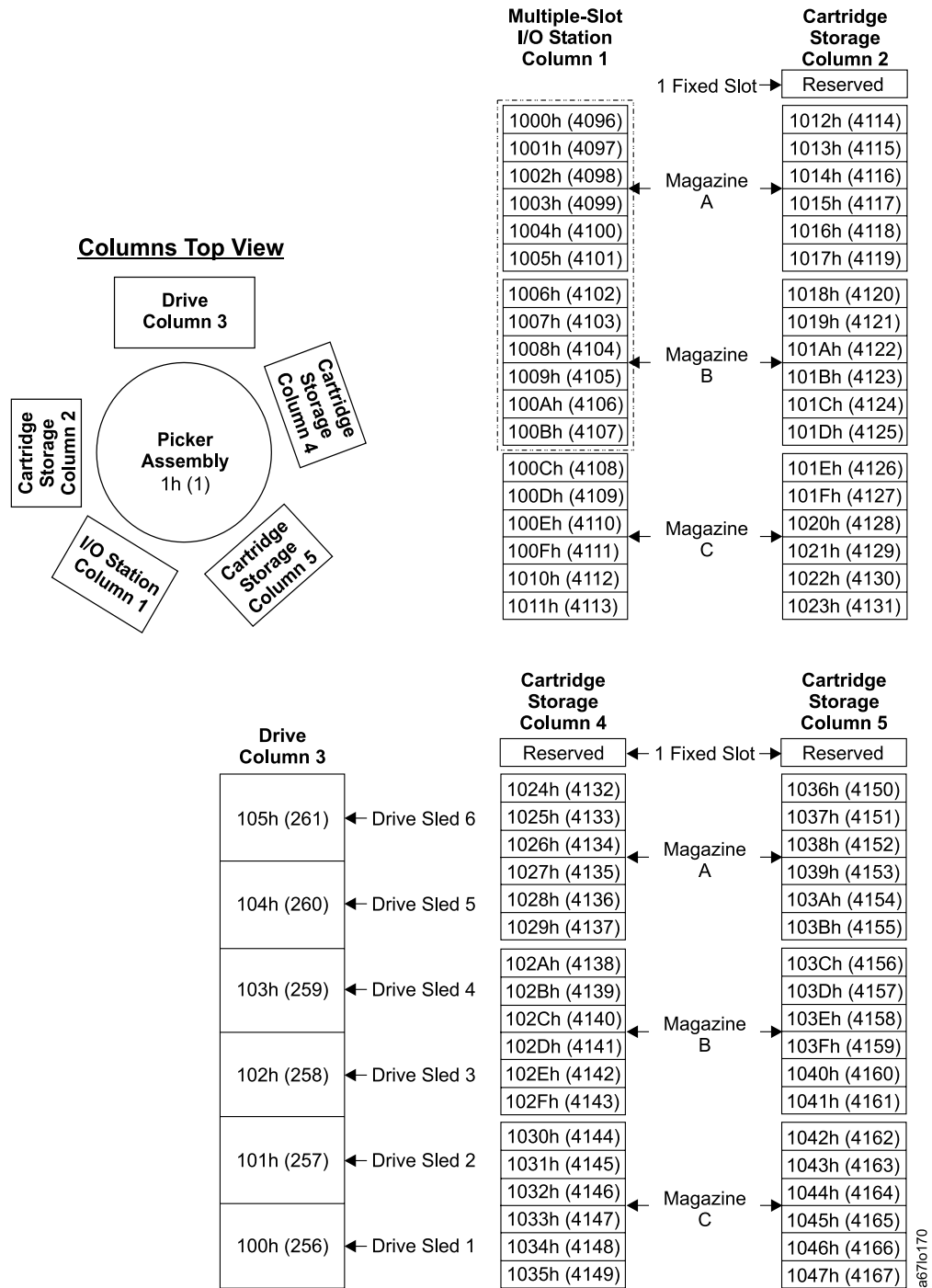


Figure 218. Element addresses for a 3583 Tape Library with a multiple-slot I/O station configured as storage slots. RSM (in Windows 2000) is disabled.

# Windows 2000 with RSM Enabled

Element addressing in this section applies to the Windows 2000 operating system that has the Remote Storage Manager (RSM) enabled.

Figure 219 shows the element addressing for the 3583 Tape Library with a single-slot I/O station.

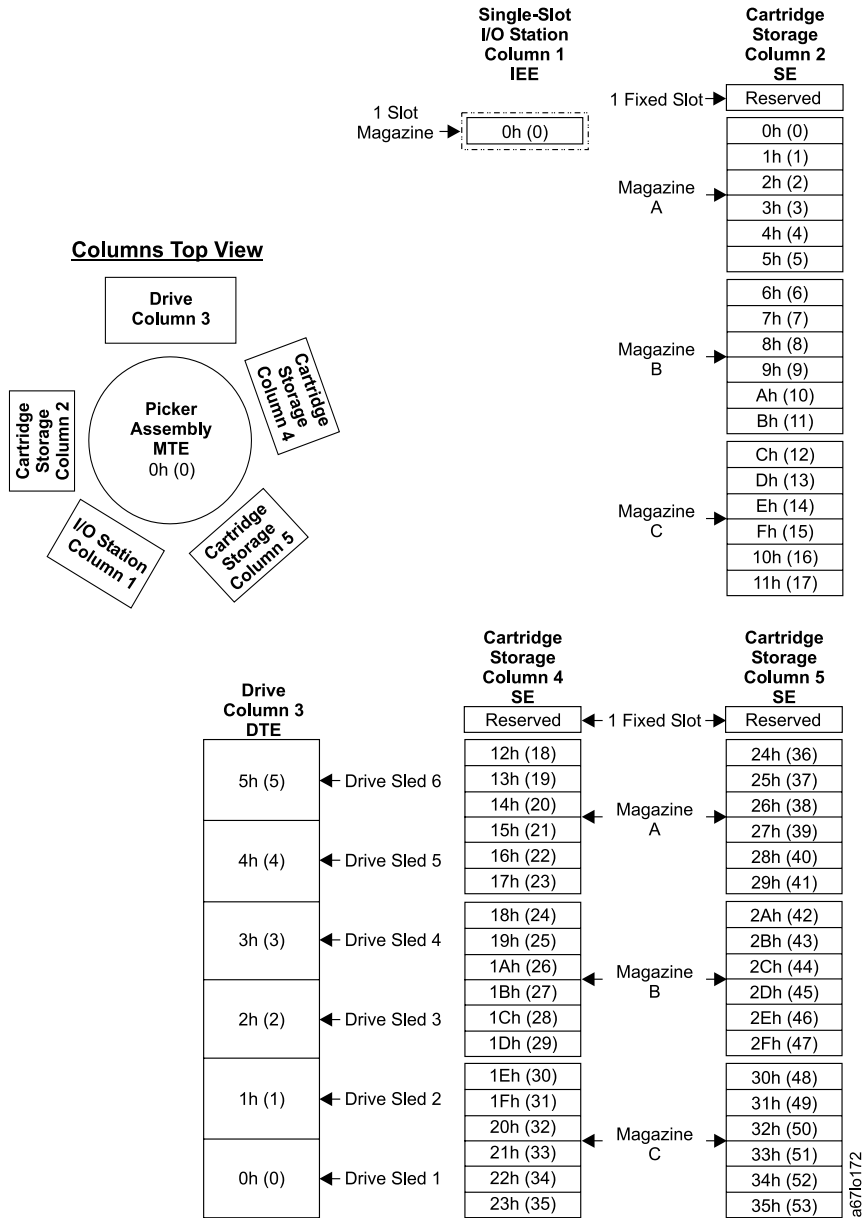


Figure 219. Element addresses for a 3583 Tape Library with a single-slot I/O station. RSM (in Windows 2000) is enabled.

Figure 220 shows the element addressing for the 3583 Tape Library with a multiple-slot I/O station configured as I/O slots.

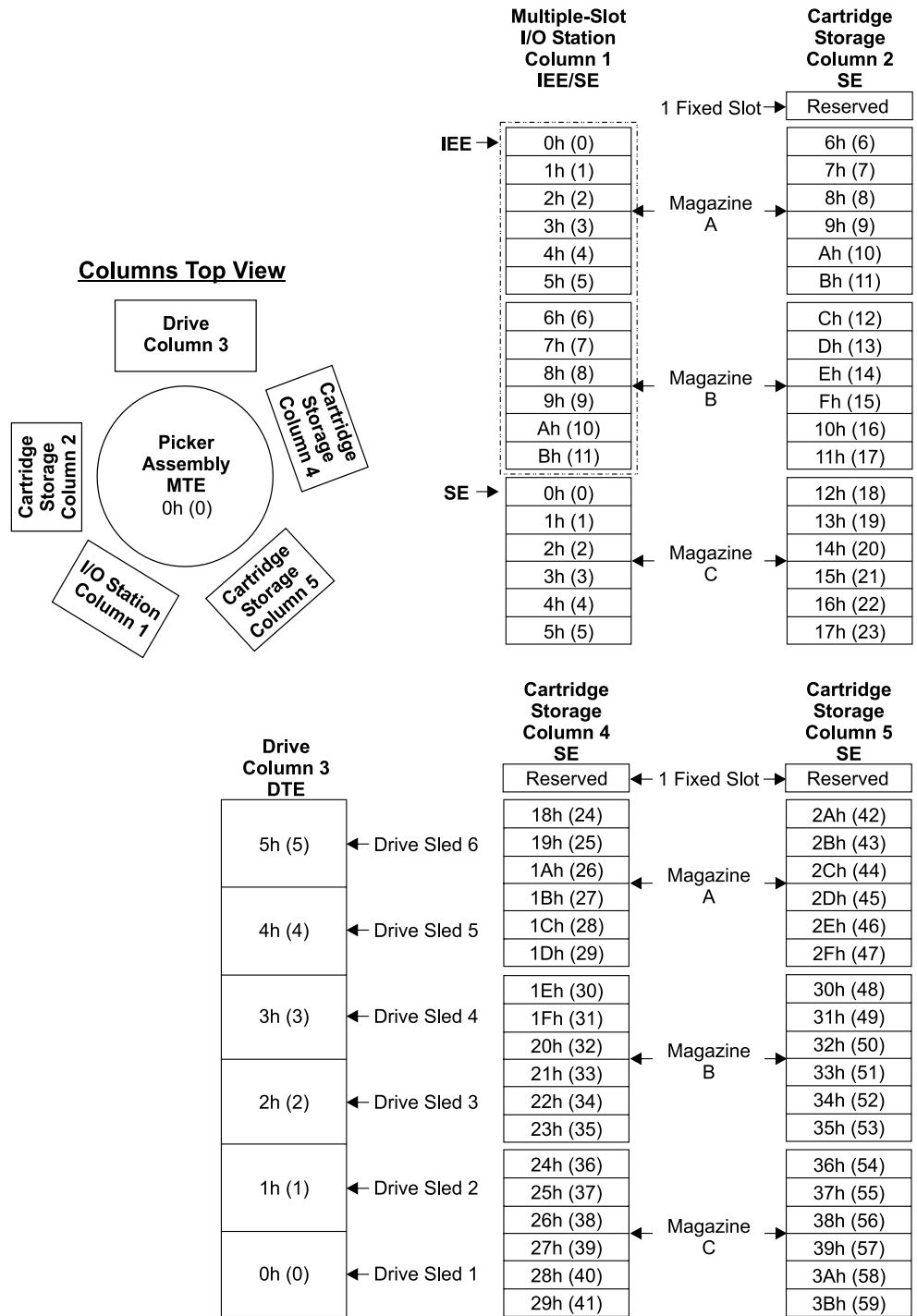


Figure 220. Element addresses for a 3583 Tape Library with a multiple-slot I/O station. RSM (in Windows 2000) is enabled.

Figure 221 shows the element addressing for the 3583 Tape Library with a multiple-slot I/O station configured as storage slots.

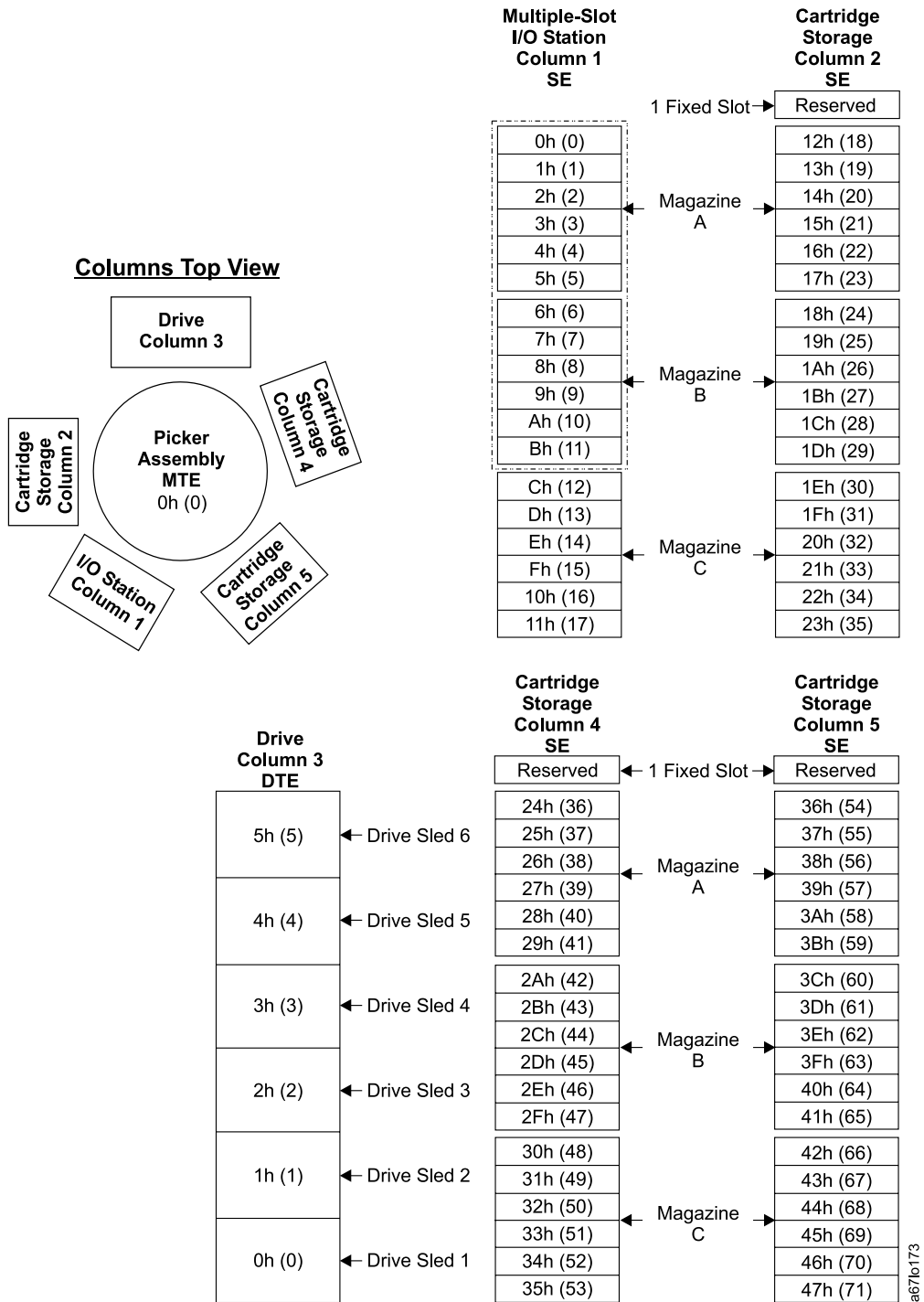


Figure 221. Element addresses for a 3583 Tape Library with a multiple-slot I/O station configured as storage slots. RSM (in Windows 2000) is enabled.



---

## Appendix C. SCSI Commands

This appendix lists SCSI commands that are supported by the 3583 Tape Library and the Ultrium Tape Drive. For more information about SCSI commands, see the *IBM 3583 Ultrium Scalable Tape Library SCSI Reference* available on the web at <http://www.ibm.com/storage/1to>.

---

### Library SCSI Commands

The 3583 Tape Library supports the following list of SCSI medium changer commands.

Command Name	Operation Code
INITIALIZE ELEMENT STATUS	07h
INITIALIZE ELEMENT STATUS WITH RANGE	E7h
INQUIRY	12h
LOG SENSE	4Dh
MODE SENSE	1Ah
MOVE MEDIUM	A5h
POSITION TO ELEMENT	2Bh
PREVENT/ALLOW MEDIUM REMOVAL	1Eh
READ BUFFER	3Ch
READ ELEMENT STATUS	B8h
RELEASE	17h
REQUEST SENSE	03h
RESERVE	16h
TEST UNIT READY	00h
WRITE BUFFER	3Bh

---

### Tape Drive SCSI Commands

The Ultrium Tape Drive supports the following list of SCSI commands.

Command Name	Operation Code
ERASE	19h
INQUIRY	12h
LOAD/UNLOAD	1Bh
LOCATE	2Bh
LOG SELECT	4Ch
LOG SENSE	4Dh
MODE SELECT (6)	15h
MODE SELECT (10)	55h
MODE SENSE (6)	1Ah
MODE SENSE (10)	5Ah
PERSISTENT RESERVE IN	5Eh
PERSISTENT RESERVE OUT	5Fh
PREVENT ALLOW MEDIUM REMOVAL	1Eh
READ	08h

<b>Command Name</b>	<b>Operation Code</b>
READ ATTRIBUTE	8Ch
READ BLOCK LIMITS	05h
READ BUFFER	3Ch
READ POSITION	34h
RECEIVE DIAGNOSTIC RESULTS	1Ch
RELEASE UNIT (6)	17h
RELEASE UNIT (10)	57h
REPORT DENSITY SUPPORT	44h
REPORT LUNs	A0h
REQUEST SENSE	03h
RESERVE UNIT (6)	16h
RESERVE UNIT (10)	56h
REWIND	01h
SEND DIAGNOSTIC	1Dh
SPACE	11h
TEST UNIT READY	00h
VERIFY	13h
WRITE	0Ah
WRITE ATTRIBUTE	8Dh
WRITE BUFFER	3Bh
WRITE FILEMARKS	10h

## Appendix D. TapeAlert Flags

TapeAlert is a patented technology and standard of the American National Standards Institute (ANSI) that defines conditions and problems that are experienced by tape drives. The technology enables a server to read TapeAlert flags from a tape drive through the SCSI, Fibre Channel, or RS-422 interface. The server reads the flags from Log Sense Page 0x2E. This appendix lists the TapeAlert flags that are supported by the Ultrium Tape Drive and the 3583 Ultrium Scalable Tape Library.

### TapeAlert Flags Supported by the Drive

TapeAlert Flags Supported by the Ultrium Tape Drive			
Flag Number	Flag	Description	Action Required
3	Hard error	Set for any unrecoverable read, write, or positioning error. (This flag is set in conjunction with flags 4, 5, or 6.)	See the Action Required column for Flag Number 4, 5, or 6 in this table.
4	Media	Set for any unrecoverable read, write, or positioning error that is due to a faulty tape cartridge.	Replace the tape cartridge.
5	Read failure	Set for any unrecoverable read error where isolation is uncertain and failure could be due to a faulty tape cartridge or to faulty drive hardware.	If Flag Number 4 is also set, the cartridge is defective. Replace the tape cartridge. If Flag Number 4 is not set, see error code 6 in Table 18 on page 205.
6	Write failure	Set for any unrecoverable write or positioning error where isolation is uncertain and failure could be due to a faulty tape cartridge or to faulty drive hardware.	If Flag Number 9 is also set, make sure that the write-protect switch is set so that data can be written to the tape (see "Setting the Write-Protect Switch" on page 159). If Flag Number 4 is also set, the cartridge is defective. Replace the tape cartridge. If Flag Number 4 is not set, see error code 6 in Table 18 on page 205.
8	Not data grade	Set when severe servo errors occur while loading a tape cartridge.	Replace the tape cartridge. If this error occurs with multiple tapes, see error code 6 in Table 18 on page 205.
9	Write protect	Set when the tape drive detects that the tape cartridge is write-protected.	Make sure that the cartridge's write-protect switch is set so that the tape drive can write data to the tape (see "Setting the Write-Protect Switch" on page 159).
10	No removal	Set when the tape drive receives an UNLOAD command after the server prevented the tape cartridge from being removed.	Refer to the documentation for your server's operating system.
11	Cleaning media	Set when you load a cleaning cartridge into the drive.	No action required.

<b>TapeAlert Flags Supported by the Ultrium Tape Drive</b>			
<b>Flag Number</b>	<b>Flag</b>	<b>Description</b>	<b>Action Required</b>
12	Unsupported format	Set when you load an unsupported cartridge type into the drive or when the cartridge format has been corrupted.	Use a supported tape cartridge.
14	Unrecoverable snapped tape	Set when the tape split apart.	Manually remove the tape cartridge (see “Manually Removing the Cartridge” on page 174).
15	Cartridge memory chip failure	Set when a cartridge memory (CM) failure is detected on the loaded tape cartridge.	Replace the tape cartridge. If this error occurs on multiple cartridges, see error code 6 in Table 18 on page 205.
16	Forced eject	Set when you manually unload the tape cartridge while the drive was reading or writing.	No action required.
18	Tape directory corrupted in the cartridge memory	Set when the drive detects that the tape directory in the cartridge memory has been corrupted.	Re-read all data from the tape to rebuild the tape directory.
20	Clean now	Set when the tape drive detects that it needs cleaning.	Clean the tape drive (see “Cleaning Drives” on page 86).
21	Clean periodic	Set when the drive detects that it needs routine cleaning.	Clean the tape drive as soon as possible. The drive can continue to operate, but you should clean the drive soon. See “Cleaning Drives” on page 86.
22	Expired clean	Set when the tape drive detects a cleaning cartridge that has expired.	Replace the cleaning cartridge.
23	Invalid cleaning tape	Set when the drive expects a cleaning cartridge and the loaded cartridge is not a cleaning cartridge.	Use a valid cleaning cartridge.
30	Hardware A	Set when a hardware failure occurs that requires that you reset the tape drive to recover.	If resetting the drive does not recover the error, note the error code on the single-character display and see Table 18 on page 205 for the appropriate instructions.
31	Hardware B	Set when the tape drive fails its internal self tests.	Note the error code on the single-character display and see Table 18 on page 205 for the appropriate instructions.
32	Interface	Set when the tape drive detects a problem with the SCSI, Fibre Channel, or RS-422 interface.	Locate error code 8 or 9 in Table 18 on page 205.
33	Eject media	Set when a failure occurs that requires you to unload the cartridge from the drive.	Unload the tape cartridge, then reinsert it and restart the operation.
34	Download fail	Set when an FMR image is unsuccessfully downloaded to the tape drive through the SCSI or Fibre Channel interface.	Ensure that it is the correct FMR image. Download the FMR image again.

<b>TapeAlert Flags Supported by the Ultrium Tape Drive</b>			
<b>Flag Number</b>	<b>Flag</b>	<b>Description</b>	<b>Action Required</b>
36	Drive temperature	Set when the drive's temperature sensor indicates that the drive's temperature is exceeding the recommended temperature of the enclosure.	See error code 1 in Table 18 on page 205.
37	Drive voltage	Set when the drive detects that the externally supplied voltages are either approaching the specified voltage limits or are outside the voltage limits (see Table 3 on page 17).	See error code 2 in Table 18 on page 205.
39	Diagnostics required	Set when the drive detects a failure that requires diagnostics for isolation.	See error code 6 in Table 18 on page 205.
51	Tape directory invalid at unload	For the tape that was unloaded, set when the tape directory on the cartridge memory is corrupted.	If the problem continues after successive loads, replace the cartridge. If the problem persists, replace the drive.
52	Tape system area write failure	Set when the tape that was unloaded could not write its system area (FID) successfully.	<ol style="list-style-type: none"> <li>1. Copy the data to another tape cartridge.</li> <li>2. Discard the old cartridge.</li> </ol>

## **TapeAlert Flags Supported by the Library**

<b>TapeAlert Flags Supported by the 3583 Ultrium Scalable Tape Library</b>			
<b>Flag Number</b>	<b>Flag</b>	<b>Description</b>	<b>Action Required</b>
1	Library hardware A	The library has trouble communicating with the drive.	Restart the operation.
2	Library hardware B	The library has a hardware failure.	Restart the operation.
3	Library hardware C	The library has a hardware fault that requires a reset to recover.	<ol style="list-style-type: none"> <li>1. Reset the library.</li> <li>2. Restart the operation.</li> </ol>
4	Library hardware D	The library has a hardware fault that is not mechanically related.	Restart the operation.
7	Predictive failure	Predictive failure of library hardware.	Contact your Service Representative.
8	Library maintenance	Library Preventive Maintenance required.	Contact your Service Representative.
13	Library pick retry	The operation to pick a cartridge had to perform an excessive number of retries before succeeding.	No action needs to be taken at this time.
14	Library place retry	The operation to place a cartridge had to perform an excessive number of retries before succeeding.	No action needs to be taken at this time.
15	Library load retry	The operation to load a cartridge into a drive had to perform an excessive number of retries before succeeding.	No action needs to be taken at this time.
16	Library door	A library door is open and prevents the library from functioning.	Close the library door.

**TapeAlert Flags Supported by the 3583 Ultrium Scalable Tape Library**

<b>Flag Number</b>	<b>Flag</b>	<b>Description</b>	<b>Action Required</b>
17	Library I/O station	A problem with the I/O station exists.	<ol style="list-style-type: none"> <li>1. Ensure that there is no obstruction in the I/O station.</li> <li>2. Restart the operation.</li> </ol>
19	Library security	Library door opened then closed during operation.	Library security has been compromised.
20	Library security mode	Library security mode changed.	The security mode of the library has been changed. For information purposes only. No action required.
21	Library offline	Library manually turned offline.	The library has been manually turned offline and is unavailable for use.
23	Library scan retry	The operation to scan the bar code on a cartridge had to perform an excessive number of retries before succeeding. A potential problem exists with the bar code label or the scanner hardware in the library mechanism.	Check for damaged, misaligned, or peeling bar code labels on cartridges.
24	Library inventory	An inventory of the media was inconsistent.	<ol style="list-style-type: none"> <li>1. Run a library inventory to correct the inconsistency.</li> <li>2. Restart the operation.</li> </ol>
28	Power supply	A redundant power supply failure exists inside the library.	To replace the failed power supply, see "Installing a Redundant DC Power Supply (optional FC8008)" on page 42.
32	Unreadable bar code label	During an inventory or scan, the library was unable to read a bar code label on a cartridge.	Check for damaged, misaligned, or peeling bar code labels on the cartridge.

## Appendix E. Parts List

Table 13 lists features you can order for the 3583 Ultrium Scalable Tape Library.

**Note:** Power cords are listed separately in Appendix F, “Power Cords” on page 191.

Table 13. Parts list for the 3583 Ultrium Scalable Tape Library

Feature Code	Description	Plant/Field Install
1660	Remote Management Unit (RMU)	Field
2010	Optical short-wave 2-Gigabit GBIC	Both
2895	Interposer, AS/400 and iSeries feature 6501	Both
5096	Interposer SC-to-LC Fibre Channel	Both
5098	Inline HVD SCSI terminator	Both
5099	VHDCI-to-HD68 cable interposer	Both
5302	HD68-to-HD68 SCSI cable, 2.5 m (8 ft)	Both
5303	HD68-to-HD68 SCSI cable, 0.7 m (2 ft)	Field
5305	HD68-to-HD68 SCSI cable, 5 m (17 ft)	Both
5310	HD68-to-HD68 SCSI cable, 10 m (33 ft)	Both
5318	HD68-to-HD68 SCSI cable, 18 m (59 ft)	Both
5325	HD68-to-HD68 SCSI cable, 25 m (82 ft)	Both
5602	VHDCI-to-HD68 SCSI cable, 2.5 m (8 ft)	Both
5604	VHDCI-to-HD68 SCSI cable, 4.5 m (14 ft)	Both
5610	VHDCI-to-HD68 SCSI cable, 10 m (33 ft)	Both
5620	VHDCI-to-HD68 SCSI cable, 20 m (65 ft)	Both
5625	VHDCI-to-HD68 SCSI cable, 25 m (82 ft)	Both
5805	SC-to-SC Fibre Channel cable, 5 m (17 ft)	Both
5813	SC-to-SC Fibre Channel cable, 13 m (43 ft)	Both
5825	SC-to-SC Fibre Channel cable, 25 m (82 ft)	Both
5861	SC-to-SC Fibre Channel cable, 61 m (200 ft)	Both
5907	SC-to-LC Fibre Channel cable, 7 m (23 ft)	Both
5913	SC-to-LC Fibre Channel cable, 13 m (43 ft)	Both
5922	SC-to-LC Fibre Channel cable, 22 m (72 ft)	Both
5961	SC-to-LC Fibre Channel cable, 61 m (200 ft)	Both
8001	IBM LTO Ultrium Data Cartridge	Plant
8002	IBM LTO Ultrium Cleaning Cartridge	Plant
8003	LTO Ultrium Low Voltage Differential (LVD) drive sled	Both
8004	LTO Ultrium High Voltage Differential (HVD/DIFF) drive sled	Both
8005	SAN Data Gateway Module, LVD	Both
8006	Rackmount kit	Both
8007	18-slot tape storage column	Both
8008	Redundant dc power supply	Both
8010	IBM LTO Ultrium Data Cartridge, 20-pack	Plant

Table 13. Parts list for the 3583 Ultrium Scalable Tape Library (continued)

<b>Feature Code</b>	<b>Description</b>	<b>Plant/Field Install</b>
8012	12-slot I/O station	Both
8013	6-cartridge magazine with cover	Plant
9210	Attached to HP-UX system	Both
9211	Attached to Sun system	Both
9212	Attached to Windows system	Both
9213	Attached to other non-IBM system	Both
9400	Attached to AS/400 and iSeries system	Both
9600	Attached to RS/6000 and pSeries system	Both
9704	VHDCI-to-HD68 SCSI cable, 4.5 m (14 ft)	Both
9705	HD68-to-HD68 SCSI cable, 5 m (17 ft)	Both
9706	SC-to-SC Fibre Channel cable, 5 m (17 ft)	Plant
9707	SC-to-LC Fibre Channel cable, 7 m (23 ft)	Plant



## Appendix F. Power Cords



To avoid electrical shock, a power cord with a grounded attachment plug has been provided. Use only properly grounded outlets.

Table 14 lists the power cord part number, feature code, the country or region where the power cord can be used, and the plug's standard reference. The last column in the table contains an index number that you can match to a specific receptacle type in Figure 222 on page 193. These power cords are only available at the time of initial purchase or as a field replaceable unit (FRU) part from your IBM Service Representative.

All power cords use an appliance coupler that complies with the International Electrotechnical Commission (IEC) Standard 320, Sheet C13.

If the power cord that you receive does not match your receptacle, contact your local dealer.

Power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL), are certified by the Canadian Standards Association (CSA), and comply with the plug standards of the National Electrical Manufacturers Association (NEMA). For other worldwide geographies, plug standards are listed in Table 14.

### Power Cable Information

Table 14. Power cable information

Description, Feature Code (FC), and Part Number (PN)	Plug Standard Reference	Country or Region	Index Number in Figure 222 on page 193
<b>US/Canada</b> 2.8 m, 125V FC 9800 PN 6952300 (See Note)	NEMA 5-15P	Bolivia, Brazil, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Japan, Mexico, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Taiwan, Thailand, Venezuela, US	1
<b>Chicago</b> 1.8 m, 125 V FC 9986 PN 6952301	NEMA 5-15P	Chicago, U.S.A.	1
<b>US/Canada</b> 2.8 m, 250 V FC 9833 PN 1838574	NEMA 6-15P	Bolivia, Brazil, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Japan, Mexico, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Taiwan, Thailand, Venezuela, US	2
<b>Australia</b> 2.8 m, 250V FC 9831 PN 13F9940	AS/NZSC112	Australia, New Zealand	3

Table 14. Power cable information (continued)

Description, Feature Code (FC), and Part Number (PN)	Plug Standard Reference	Country or Region	Index Number in Figure 222 on page 193
<b>France</b> 2.8 m, 250V FC 9820 PN 13F9979	CEE 7 - VII	Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbadjian, Belarus, Belgium, Benin, Bosnia, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Republic of), Congo (Democratic Republic of), Croatia, Czech Republic, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Gabon, Georgia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Kazakhstan, Korea, Kyrgyzstan, Latvia, Lebanon, Lithuania, Luxembourg, Macedonia, Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldavia, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russia, Rwanda, Sao Tome, Senegal, Serbia, Slovakia, Slovenia, Somalia, Spain, Sweden, Syria, Tajikistan, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Vanuatu, Wallis and Futana, Vietnam	4
<b>Denmark</b> 2.8 m, 250V FC 9821 PN 13F9997	DK2-5a	Denmark	5
<b>South Africa</b> 2.8 m, 250V FC 9829 PN 14F0015	SABS 164	India, Lesotho, Nambia, Pakistan, South Africa, Sri Lanka, Swaziland, Uganda	6
<b>United Kingdom</b> 2.8 m, 250V FC 9825 PN 14F0033	BS 1363/A	Bahrain, Botswana, Cyprus, Gambia, Ghana, China (Hong Kong S.A.R.), Ireland, Jordan, Kenya, Kuwait, Liberia, Malaysia, Malawi, Malta, Nigeria, Oman, Quatar, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania, UK, United Arab Emirate (Dubai), Yemen, Zambia, Zimbabwe	7
<b>Switzerland</b> 2.8 m, 250V FC 9828 PN 14F0051	1011-S24507	Liechtenstein, Switzerland	8
<b>Italy</b> 2.8 m, 250V FC 9830 PN 14F0069	CEI 23- 16	Chile, Italy	9

Table 14. Power cable information (continued)

Description, Feature Code (FC), and Part Number (PN)	Plug Standard Reference	Country or Region	Index Number in Figure 222
<b>Israel</b> 2.8 m, 250V FC 9827 PN 14F0087	SI 32	Israel	10
<b>Uruguay</b> 2.8 m, 250V FC 9834 PN 36L8880	IRSM 2073	Argentina, Paraguay, Uruguay	11
<b>China</b> 2.8 m, 250V FC 9840 PN 02K0546	GB 2099.1	People's Republic of China	12

**Note:** Part number 6952300 is the default power cord for the countries or regions listed. If you do not specify a power cord when you place your order, IBM provides this power cord.

## Types of Receptacles

Figure 222 shows the receptacles that are used by the power cables in Table 14 on page 191. Match the index number that is beside each receptacle to the index number in the table.

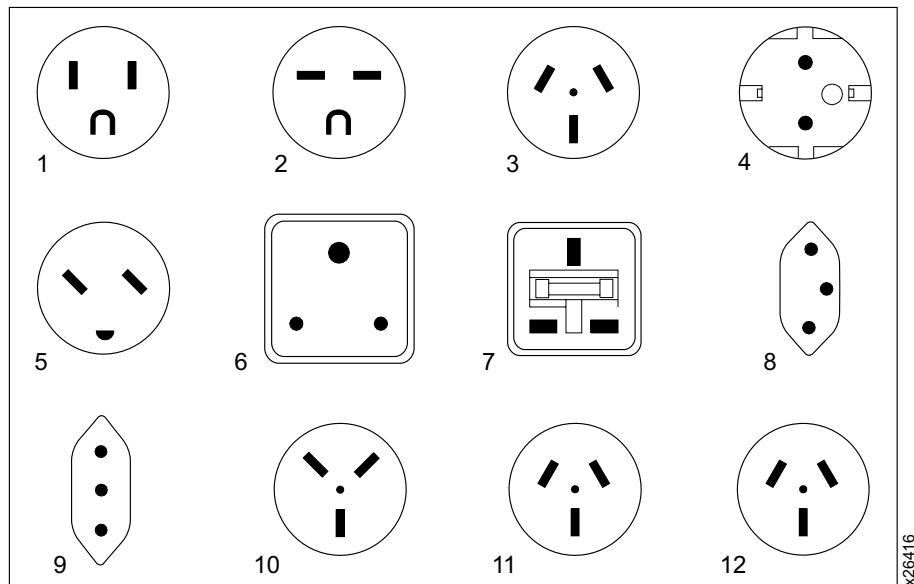


Figure 222. Types of receptacles



## Appendix G. Error Messages

When a failure occurs, the 3583 Tape Library firmware performs error recovery and posts codes and messages to the operator panel. If the failure requires service, the library posts Service Action Codes (SACs) (see Table 15). If the failure requires operator intervention, the library posts a message (see Table 16 on page 202 ). The library also posts information messages that relate to the current operation (see “Operator Information Messages” on page 204).

### Service Action Codes

Table 15 lists the SACs and the corresponding actions that can be performed by an operator. Each SAC consists of 2 bytes, nn xx, where:

nn = SAC

xx = SAC modifier. This byte is normally 00 and can be ignored, except where the action listed specifies that the modifier is to be used to select a particular procedure.

Table 15. Service Action Codes (SAC)

Reported SAC	Type of Error	Perform These Actions
01 xx	Type 1 Software errors, including microcode and operating system errors.	To recover from the error, power the tape library off, wait several seconds, then power it on again. Use the main switch to perform this action.
02 xx	Type 2 Software errors, including microcode logic and operating system errors.	To recover from the error, power the tape library off, wait several seconds, then power it on again. Use the main switch to perform this action.
03 xx	Type 3 Software errors, including microcode logic and operating system errors.	To recover from the error, power the tape library off, wait several seconds, then power it on again. Use the main switch to perform this action.
04 xx	Type 4 Software errors (Inter Processor), including microcode and operating system errors.	To recover from the error, power the tape library off, wait several seconds, then power it on again. Use the main switch to perform this action.
05 xx	Permanent operating system error.	To recover from the error, power the tape library off, wait several seconds, then power it on again. Use the main switch to perform this action.
10 xx	Bar code scanner communications failed.	<ol style="list-style-type: none"> <li>1. Clean the bar code scanner (see “Cleaning the Bar Code Scanner” on page 162).</li> <li>2. Retry the failing operation.</li> <li>3. To recover from the error, power the tape library off, wait several seconds, then power it on again. Use the main switch to perform this action.</li> </ol>
11 xx	Bar code scanner communication is OK. Data received from the bar code scanner is bad.	<ol style="list-style-type: none"> <li>1. Clean the bar code scanner (see “Cleaning the Bar Code Scanner” on page 162).</li> <li>2. Ensure that the bar code label meets specifications (see “Bar Code Label” on page 157).</li> </ol>
12 00	Bar code scanner communication is OK. Bar code scanner reports that data is bad.	Clean the bar code scanner (see “Cleaning the Bar Code Scanner” on page 162).

Table 15. Service Action Codes (SAC) (continued)

Reported SAC	Type of Error	Perform These Actions
13 xx	Cannot read bar code label or the label is bad.	<ol style="list-style-type: none"> <li>1. Ensure that the bar code label meets specifications (see "Bar Code Label" on page 157). The cartridge slots in question are displayed with the Service Action Code.</li> <li>2. Ensure that scan beam is not obstructed.</li> <li>3. Clean the bar code scanner (see "Cleaning the Bar Code Scanner" on page 162).</li> <li>4. Retry the failing operation.</li> <li>5. To recover from the error, power the tape library off, wait several seconds, then power it on again. Use the main switch to perform this action.</li> </ol>
14 xx	The system detects that the serial number is missing from its Non-Volatile Random Access Memory (NVRAM).	Record and reenter the system serial number (by using the serial cable and Hyperterminal). Enter the <code>setser</code> command from the Hyperterminal prompt.
15 00	The bar code scanner is not capable of fully supporting all of the different labels in the library.	Ensure that the bar code label meets specifications (see "Bar Code Label" on page 157). The cartridge slots in question are displayed with the Service Action Code.
20 00	Serial port connection failures.	See "Updating Library Firmware by Using the Library's Serial Port" on page 85. The problem could be in the host system.
21 xx	NVRAM failures.	Service is required. Contact your Service Representative.
22 00	Operator panel communication failure.	Service is required. Contact your Service Representative.
23 00	Unexpected interrupt.	Service is required. Contact your Service Representative.
30 00 31 00	Fatal error in SCSI port.	<ol style="list-style-type: none"> <li>1. Verify that the SCSI-bus-to-library connection is properly terminated and powered.</li> <li>2. Verify that the library's SCSI port is properly configured (see "Library Submenu" on page 122).</li> </ol>
32 00 33 00	Wrong SCSI bus connection. A single-ended SCSI bus is connected to the library port differential adapter.	Verify that the host's (server's) SCSI bus is the same type as the library's SCSI host interface board.
34 00	General SCSI failure.	Verify that the SCSI host (server) is working properly.
35 00	Fatal SCSI error.	<ol style="list-style-type: none"> <li>1. Verify that the SCSI bus connection is properly terminated and powered.</li> <li>2. Verify that the library's SCSI is properly configured. Refer to "Library Submenu" on page 122.</li> </ol>
38 xx	RMU cannot communicate with the DHCP server.	<ol style="list-style-type: none"> <li>1. Ensure that the network cable is properly connected to the RMU and verify that the RMU is set up to work in DHCP mode (Main Menu → Setup → Library → RMU).</li> <li>2. Verify that the DHCP server is properly set up and configured. Test whether the DHCP server can ping the RMU (see "Step 6. Configuring the RMU" on page 56).</li> </ol>
39 xx	External network error detected by the RMU.	<ol style="list-style-type: none"> <li>1. Ensure that the network cable is properly connected to the RMU (see "Step 6. Configuring the RMU" on page 56).</li> <li>2. Verify that the network the RMU is connected to is working properly.</li> </ol>

Table 15. Service Action Codes (SAC) (continued)

Reported SAC	Type of Error	Perform These Actions
40 xx	Servo power missing.	Service is required. Contact your Service Representative.
42 xx	Wrong library configuration (the I/O station column is missing or the drive sleds are not installed in the allowable configurations).	<ol style="list-style-type: none"> <li>1. Ensure that the I/O station is installed. Ensure that the fiducial label is properly installed and not damaged. The fiducial label is present on both the single-slot I/O station and the multiple-slot I/O station.</li> <li>2. Ensure that the drive sleds are installed properly (see "Installing a Drive Sled (optional FC8003 or FC8004)" on page 40). Drive sled 1 must be installed in the bottom slot of the drive column. Additional drive sleds must be installed consecutively, one above the other, with no gaps.</li> </ol>
43 00	Unknown library configuration detected. The bar code scanner reads a fiducial label where none is expected.	<ol style="list-style-type: none"> <li>1. Ensure that the firmware level in the library supports the hardware installed (see "About Menu" on page 151).</li> <li>2. Check for a dirty, damaged, missing, or wrong fiducial label located at the storage columns, magazines, or drive sleds in the library.</li> </ol>
44 00	Unknown fiducial label detected during a Teach operation.	<ol style="list-style-type: none"> <li>1. Ensure that the firmware level in the library supports the hardware installed (see "About Menu" on page 151).</li> <li>2. Check for a dirty, damaged, missing, or wrong fiducial label where the picker is positioned.</li> </ol>
46 xx	Failure detected during the scanning of fiducial or cartridge labels. This failure can have a variety of causes.	<ol style="list-style-type: none"> <li>1. Clean the bar code scanner (see "Cleaning the Bar Code Scanner" on page 162).</li> <li>2. Check for a dirty, damaged, missing, or wrong fiducial label on the magazine. To isolate the problem magazine, perform one of the following procedures: <ul style="list-style-type: none"> <li>• Note the number of magazines that are installed in the library (at least one cartridge should be in each magazine) and use the operator panel to compare this information with the number of magazines reported by the library. If the library is equipped with a 12-slot I/O station, the icons that represent the magazines in the I/O station column are displayed in the I/O station area.</li> <li>• Remove one magazine at a time and retry the operation until the problem is resolved (Main Menu →Status →Library → System or Slot).</li> </ul> <p>Replace the failing magazine, if found.</p> </li> <li>3. Check for a dirty, damaged, or incorrect cartridge bar code label. To isolate the problem label, perform one of the following procedures: <ul style="list-style-type: none"> <li>• Note the number of cartridges that are installed in the library and use the operator panel to compare this information with the number of cartridges reported by the library.</li> <li>• Remove a few cartridges at a time and retry the operation until the problem is resolved. (Main Menu →Status →Library → System or Slot).</li> </ul> <p>Replace the faulty bar code label on the cartridge.</p> </li> </ol>

Table 15. Service Action Codes (SAC) (continued)

Reported SAC	Type of Error	Perform These Actions
50 00	A cartridge is not properly seated in the storage slot.	<ol style="list-style-type: none"> <li>1. Ensure that the cartridge in question is properly installed in its storage slot. The slots in question are displayed with the Service Action Code.</li> <li>2. Check the cartridge label to ensure that it meets specifications, is installed properly, and is not damaged or dirty.</li> <li>3. Reteach the library (see "Teach Dialog" on page 147).</li> </ol>
60 xx	Cannot complete the Lock/Unlock I/O station commands.	Run Lock Diagnostics from the operator panel to see if there are any mechanical bindings (see "Sensor Dialog" on page 136).
61 00	I/O station's closed sensor error threshold is exceeded.	Service is required. Contact your Service Representative.
70 xx	Failures in picker assembly grip finger open operation.	Run grip finger diagnostics (see "Picker Submenu" on page 140).
71 xx	Failures detected in picker assembly grip finger close operation.	Run grip finger diagnostics (see "Picker Submenu" on page 140).
72 xx	A Get command was issued, but the sensor indicated that a cartridge is already present in the picker assembly.	Look into the picker assembly and see if a cartridge is present. If a cartridge is found in the picker, recover the cartridge and place it in any empty slot, close the door, and retry the failing operation.
73 xx	Failures in picker assembly finger open/close operations.	Service is required. Contact your Service Representative.
74 00	A Get command was issued but the sensor indicated that the source location is empty.	<ol style="list-style-type: none"> <li>1. This error can be caused by a cartridge that is not fully inserted in the storage slot above the failing slot. If this condition exists, push the cartridge into its slot and close the library door.</li> <li>2. Reteach the library (see "Teach Dialog" on page 147).</li> </ol>
75 00	Failure in picker assembly.	Service is required. Contact your Service Representative.
76 00	Teach failure caused by picker out of alignment.	Service is required. Contact your Service Representative.
77 xx	Failures in picker assembly during a retract operation.	Service is required. Contact your Service Representative.
78 xx	A Put command was issued but the sensor indicated that the cartridge is not present in the picker assembly.	Service is required. Contact your Service Representative.
79 xx	Failures detected in putting a cartridge into a tape drive.	Ensure that the tape drive sled is properly seated, powered on, and working properly.
7A xx	Failures detected in the picker assembly Reach/Retract operations.	Tape and magazine problems can cause this error. Check for obstructions in the picker path, such as a cartridge not fully inserted in a storage slot or drive. If the slot wall in the magazine is too tight, replace the magazine.
7C xx	Failures detected in the picker assembly Reach operation.	<p>Check for obstruction in the slot. Obstruction can be in the form of:</p> <ul style="list-style-type: none"> <li>• An unlabeled cartridge</li> <li>• A cartridge in the slot during a Put operation</li> <li>• The slot wall in the magazine is too tight</li> </ul> <p>Remove the obstruction or replace the magazine, close the door, and retry the failing operation.</p>



Table 15. Service Action Codes (SAC) (continued)

Reported SAC	Type of Error	Perform These Actions
7D xx	Failure detected while getting a cartridge from a tape drive.	Check the tape drive and see if a cartridge is present. If a cartridge is found in the tape drive, remove the cartridge from the tape drive, power-on the drive, and retry the operation.
7E xx	Failure detected while pushing a cartridge into a tape drive feed slot.	<ol style="list-style-type: none"> <li>1. Check the cartridge for any physical damage.</li> <li>2. Replace the failing drive sled.</li> </ol>
80 xx	Failures detected in the rotary-axis servo system.	Service is required. Contact your Service Representative.
81 xx	Failures detected in the Y-axis servo system.	Tape and magazine problems can cause this error. Check for obstructions in the picker's path, such as a tape not fully inserted in a storage slot. If the slot wall in the magazine is too tight, replace the magazine.
82 xx	Unexpected motion control condition received.	Service is required. Contact your Service Representative.
83 xx	The Locate Fiducial command failed with no target found. This failure is most likely to occur during an initial installation of the library.	<ol style="list-style-type: none"> <li>1. Ensure that all fiducial labels are present and meet specifications.</li> <li>2. Clean all teach fiducial labels.</li> </ol>
84 xx	Y-axis failed to reach target.	Check for mechanical binding in Y-axis.
85 xx	Rotary axis failed to reach target.	Check for mechanical binding in rotary-axis.
86 00	The first full-speed move command issued when the picker is at home position failed.	Check for mechanical binding in both rotary and Y-axis.
87 00	Picker cannot move away from rotary axis home position.	Service is required. Contact your Service Representative.
88 00	Picker cannot move away from Y-axis home position.	Service is required. Contact your Service Representative.
89 xx	Failure while communicating with motion controllers.	Service is required. Contact your Service Representative.
8A xx	Returned sense indicated that a motion command completed sooner than expected.	Check the Y-axis for binding. Binding can be caused by an object that prevents the Y-axis from homing and reaching its target correctly.
8B xx	Servo failures in rotary or reach axes, or both.	Service is required. Contact your Service Representative.
90 00	Down-level main controller board detected by library firmware when a new board is required for this library configuration to operate.	Service is required. Contact your Service Representative.
91 00	Down-level picker control board detected by library firmware when a new board is required for this library configuration to operate.	Service is required. Contact your Service Representative.
92 xx	Down-level board detected by library firmware when a new board is required for this library configuration to operate.	Service is required. Contact your Service Representative.

Table 15. Service Action Codes (SAC) (continued)

Reported SAC	Type of Error	Perform These Actions
93 xx	Failure detected in drive communication hardware within the library; the library cannot communicate with one or more drives (check the SAC message for the physical location of the failing drive).	Observe the message that accompanies the SAC. If it indicates that the library cannot communicate with one specific tape drive: <ul style="list-style-type: none"> <li>• Ensure that the drive sled is properly installed in the drive slot.</li> <li>• Replace the failing drive sled.</li> </ul>
94 xx	Communication previously established but no longer present between library and the tape drive, or drive status is not as expected.	Ensure that the failing drive sled is properly installed and powered on. Check for a cartridge in the failing tape drive that prevents the drive from becoming ready. If a cartridge is present, eject the cartridge and retry the operation. If the operation continues to fail, replace the drive sled.
95 xx	Picker assembly delivered cartridge to drive but drive does not confirm tape loading status. The xx part of the SAC identifies the drive.	Retry the operation by manually loading a cartridge into the tape drive. Replace the failing drive sled if this operation failed.
98 xx	Firmware on drive is not supported by the library. The xx part of the SAC identifies the drive.	Update the drive firmware with the latest level (see “Updating Firmware” on page 80).
A0 xx	Communication not established between main controller board and RMU.	Ensure that the RMU is properly installed and configured (see “Step 6. Configuring the RMU” on page 56).
A1 xx	Communication between main controller board and one of the auxiliary controller boards in the library was initially established but has been lost.	Service is required. Contact your Service Representative.
A2 xx	Communication between main controller board and picker control board was initially established but has been lost.	Service is required. Contact your Service Representative.
A3 xx	Communication between main controller board and display control board was initially established but has been lost.	Service is required. Contact your Service Representative.
D0 xx	One of the dc power supplies failed. This condition only occurs in libraries equipped with the redundant dc power supply feature.	Observe the LEDs located on each dc power supply. The LED should be green or red. Red LED indicates the power supply has failed. Replace the failing power supply.
D1 xx	ac input to one bank of the dc power supplies is missing. This condition only occurs in libraries equipped with the redundant dc power supply feature.	Observe the LEDs located on each dc power supply. The LED should be green or red. Red LED indicates the power supply has failed. Replace the failing power supply.
D2 xx	Fan failed in one of the dc power supplies, or the power supplies are not at the same power architecture level.	<ul style="list-style-type: none"> <li>• If the library has only one dc power supply, replace the dc power supply.</li> <li>• If the library has two dc power supplies, the failing supply will display a red LED. Replace the power supply that has the red LED (see “Installing a Redundant DC Power Supply (optional FC8008)” on page 42).</li> </ul>

Table 15. Service Action Codes (SAC) (continued)

Reported SAC	Type of Error	Perform These Actions
E0 xx	Cartridge stuck in picker assembly.	Remove the cartridge from the grip fingers.
E1 00	I/O station door not fully closed.	Close the door of the I/O station.
E2 xx	Front door not fully closed.	Close the front door.
E3 00 E4 00	Wrong SCSI bus connection. A single-ended SCSI device is connected to the library, which is configured in differential mode.	Check the library configuration to ensure that all devices on the library-s SCSI port have the same SCSI type.
E5 00 E6 00	SCSI bus connected to library port is not properly terminated.	Ensure that both ends of the SCSI bus connected to the library port are properly terminated. A terminator is shipped with each SCSI host interface board.
E7 xx	Picker assembly detected that a cartridge is not present in the grip fingers. The cartridge may not be seated properly in the grip fingers or the Get operation is not successful.	<ol style="list-style-type: none"> <li>1. Locate the cartridge in question.</li> <li>2. If the cartridge is not properly seated in the grip fingers, remove the cartridge, insert it in any empty slot, and retry the operation.</li> <li>3. If the cartridge is not in the picker but located in its original slot, the cartridge may be seated too tightly in the slot. Replace the magazine, perform an inventory, and retry the operation.</li> </ol>
E8 xx	During a put cartridge after a successful Get command, the picker assembly detected that the cartridge is no longer present in the grip fingers.	<ol style="list-style-type: none"> <li>1. Locate the missing cartridge.</li> <li>2. If a cartridge is found, recover the cartridge, re-inventory the library and retry the operation.</li> </ol>
EA 00	Failures while running diagnostic loop test from main controller board to all sensors on the I/O Station.	Service is required. Contact your Service Representative.
F0 00	Failures while running diagnostic loop test from main controller board to picker control board.	Service is required. Contact your Service Representative.
F1 00	Failures while running diagnostic loop test from main controller board to display control board.	Service is required. Contact your Service Representative.
F7 00	Failures in main controller board during Power-On Self Test.	Service is required. Contact your Service Representative.
F8 00	Failures in picker control board during Power-On Self Test.	Service is required. Contact your Service Representative.
F9 00	Failures in display control board during Power-On Self Test.	Service is required. Contact your Service Representative.
FA 00	Failures in SCSI host interface board during Power-On Self Test.	Service is required. Contact your Service Representative.
FB 00	Preventive maintenance.	<ol style="list-style-type: none"> <li>1. Press OK on the operator panel to clear the SAC.</li> <li>2. Ensure that the library firmware is at the latest level (see "Updating Firmware" on page 80).</li> </ol>

## Operator Intervention Messages

Table 16 describes the operator intervention messages. Each intervention message is composed of four lines. The third or fourth, or both, lines may contain variable information specific to the message. To determine the meaning of the SAC (in the Message Lines column), see Table 15 on page 195. Codes that contain error modifiers (in the Variables column) are for Engineering use only.

Table 16. Operator intervention messages

Message Lines	Variables
Alert not found. Press OK.	None
-=>ERROR!<=- Initialization Error Code: 0x%Y	%Y = 4-digit error modifier
-=>PERM ERROR!<=- CALL FOR SERVICE SAC :%X Code:0x%Y	%X = 2-digit hex %Y = 4-digit error modifier
-=>PERM ERROR!<=- SYSTEM WILL REBOOT SAC :%X Code:0x%Y	%X = 2-digit hex %Y = 4-digit error modifier
->SYSTEM REBOOTED<- NEW CODE LOADED Version %X.%YY.%ZZZ	current version %X = 1-digit major rev %Y = 2-digit minor rev %Z = 4-digit minor rev
->SYSTEM REBOOTED<- RECOVERED FROM ERROR SAC :%X Code:0x%Y	%X = 2-digit hex %Y = 4-digit error modifier
->SYSTEM REBOOTED<- CALL FOR SERVICE SAC :%X Code:0x%Y	%X = 2-digit hex %Y = 4-digit error modifier
->TOO MANY ERRORS!<- CALL FOR SERVICE SAC :%X Code:0x%Y	%X = 2-digit hex %Y = 4-digit error modifier
INTERVENTION NEEDED! Close the I/O station to complete the action.	None
INTERVENTION NEEDED! Unexpected door open detected. Make sure the door is closed.	None
INTERVENTION NEEDED! Single-ended device detected on this Differential bus.	None
INTERVENTION NEEDED! Check SCSI bus port 0 connector and/or termination.	None
INTERVENTION NEEDED! Remove cartridge in picker and return to storage.	None

Table 16. Operator intervention messages (continued)

Message Lines	Variables
BAD MEDIA Cannot get type. Please label media. Slot [%X %Y %Z]	%X = column number %Y = magazine number %Z = slot number
INTERVENTION NEEDED! Remove cartridge from slot. Slot [%X %Y %Z]	%X = column number %Y = magazine number %Z = slot number
UPSIDE DOWN MEDIA Ensure cartridge is in slot properly. Slot [%X %Y %Z]	%X = column number %Y = magazine number %Z = slot number
SLOT IS OBSTRUCTED Please check to see if slot is empty. Slot [%X %Y %Z]	%X = column number %Y = magazine number %Z = slot number
SLOT IS EMPTY Please check to see if slot is full. Slot [%X %Y %Z]	%X = column number %Y = magazine number %Z = slot number
DRIVE COMM FAILED Please verify drive communication path. Drive %N [%X %Y %Z]	%N = drive number %X = column number %Y = magazine number %Z = slot number
DRIVE SCSI ID FAILED Please verify drive SCSI id setting for Drive %N [%X %Y %Z]	%N = drive number %X = column number %Y = magazine number %Z = slot number
TAPE PUSH FAILED Please remove tape from drive. Drive %N [%X %Y %Z]	%N = drive number %X = column number %Y = magazine number %Z = slot number
DRIVE INIT FAILED Please correct drive initialization for Drive %N [%X %Y %Z]	%N = drive number %X = column number %Y = magazine number %Z = slot number
DRIVE CLEAN FAILED A cleaning operation failed to clean Drive %N [%X %Y %Z]	%N = drive number %X = column number %Y = magazine number %Z = slot number
INVALID LABEL Please check media for valid label Slot [%X %Y %Z]	%X = column number %Y = magazine number %Z = slot number
DUPLICATE LABEL Please check volsers at element address %X and %Y	%X = element address %Y = element address
SER NUMBER MISSING Please enter the system serial number via the monitor.	None

---

## Operator Information Messages

Table 17 lists the operator information messages.

Table 17. Operator information messages

Message Lines	Variables
INITIALIZING	None
OFFLINE	None
ONLINE	None
HOMING PICKER	None
TEACHING COLUMN [%X]	%X = column number
SCANNING COLUMN [%X]	%X = column number
INITIALIZING DRIVES	None
GOING READY	None
DOOR IS OPEN	None
PICKER HOME FAIL	None
PICKER NOT HOME	None
GOING ONLINE	None
GOING OFFLINE	None
-=>ERROR!<=-	None
REBOOTING	None
CARTRIDGE RECOVERY	None
CARTRIDGE IN PICKER	None
SELF TEST FAILED	None

## Drive Error Codes

Errors and informational messages that pertain to the Ultrium Tape Drive are shown in the drive status area of the library's operator panel. Table 18 describes the codes that display.

Table 18. Drive error codes.

Code	Cause and Action
0	<p>No error occurred and no action is required. This code displays:</p> <ul style="list-style-type: none"> <li>• When power is cycled (turned off, then on) to the tape drive.</li> <li>• When diagnostics have finished running and no error occurred.</li> </ul> <p><b>Note:</b> The single-character display is blank during normal operation of the tape drive.</p>
1	<p>Cooling problem. The tape drive detected that the recommended operating temperature was exceeded. Perform one or more of the following actions:</p> <ul style="list-style-type: none"> <li>• Ensure that the cooling fan is rotating and is quiet. If not, replace the 3583 Tape Library.</li> <li>• Remove any blockage that prevents air from flowing freely through the tape drive.</li> <li>• Ensure that the operating temperature and airflow is within the specified range (see Table 3 on page 17).</li> <li>• If the operating temperature is within the specified range and the problem persists, replace the 3583 Tape Library.</li> </ul> <p>The error code clears when you power-off the library.</p>
2	<p>Power problem. The tape drive detected that the externally supplied power is either approaching the specified voltage limits (the library is still operating) or is outside the specified voltage limits (the library is not operating). Perform the following action:</p> <ol style="list-style-type: none"> <li>1. Ensure that the power connector is properly seated.</li> <li>2. Ensure that the proper dc voltages are being applied within the tolerances allowed (see Table 3 on page 17).</li> <li>3. If the proper voltages are being applied but the problem persists, replace the 3583 Tape Library.</li> </ol> <p>The error code clears when you power-off the library.</p>
3	<p>Firmware problem. The tape drive determined that a firmware error occurred. Perform the following action:</p> <ol style="list-style-type: none"> <li>1. Collect a drive dump from one of the following: <ul style="list-style-type: none"> <li>• <b>Note:</b> Do not force a new dump; the library has already created one. <ul style="list-style-type: none"> <li>• Server's SCSI interface by using a device driver utility or system tool (for instructions about reading a drive dump from tape, visit the Web at <a href="http://ssddom02.storage.ibm.com/tape/1to/">http://ssddom02.storage.ibm.com/tape/1to/</a>)</li> <li>• Ultrium Tape Drive (to copy a drive dump to a scratch tape, use the menus on the operator panel of the library; select <b>Main Menu</b> → <b>Status</b> → <b>Logs</b> → <b>Drive Log</b> → <b>Copy Dump</b>)</li> </ul> </li> </ul> </li> <li>2. Power the library off and on, then retry the operation that produced the error.</li> <li>3. If the problem persists, download new firmware and retry the operation.</li> <li>4. If the problem persists, send the drive dump that you collected in step 1 to your IBM Support Center.</li> </ol> <p>The error code clears when you power-off the library.</p>

Table 18. Drive error codes (continued).

Code	Cause and Action
4	<p>Firmware or tape drive problem. The tape drive determined that a firmware or tape drive hardware failure occurred. Perform the following action:</p> <ol style="list-style-type: none"> <li>1. Collect a drive dump from one of the following:           <p><b>Note:</b> Do not force a new dump; the library has already created one.</p> <ul style="list-style-type: none"> <li>• Server's SCSI interface by using a device driver utility or system tool (for instructions about reading a drive dump from tape, visit the Web at <a href="http://ssddom02.storage.ibm.com/tape/1to/">http://ssddom02.storage.ibm.com/tape/1to/</a>)</li> <li>• Ultrium Tape Drive (to copy a drive dump to a scratch tape, use the menus on the operator panel of the library; select <b>Main Menu</b> → <b>Status</b> → <b>Logs</b> → <b>Drive Log</b> → <b>Copy Dump</b>)</li> </ul> </li> <li>2. Power the library off and on, then retry the operation that produced the error. The error code clears when you power-off the library.</li> <li>3. If the problem persists, download new firmware and retry the operation; if new firmware is not available, replace the 3583 Tape Library.</li> </ol>
5	<p>Tape drive hardware problem. The drive determined that a tape path or read/write error occurred. To prevent damage to the drive or tape, the library will not allow you to insert a cartridge if the current cartridge was successfully ejected. If the problem persists, replace the 3583 Tape Library. The error code may clear when you cycle power to the library.</p>



Table 18. Drive error codes (continued).

Code	Cause and Action
6	<p>Tape drive or media error. The tape drive determined that an error occurred, but it cannot isolate the error to faulty hardware or to the tape cartridge. Perform the following action:</p> <p><b><u>For Problems with Writing Data:</u></b></p> <p>If the problem occurred while the library was writing data to the tape, and if you know the volume serial number (located on the cartridge label) of the tape cartridge loaded in the drive when the problem occurred, retry the operation with a different cartridge:</p> <ul style="list-style-type: none"> <li>• If the operation succeeds, the original cartridge was defective. Copy data from the defective cartridge and discard it.</li> <li>• If the operation fails and another library is available, insert the cartridge into the other unit and retry the operation. <ul style="list-style-type: none"> <li>– If the operation fails, discard the defective cartridge.</li> <li>– If the operation succeeds, insert a scratch cartridge into the first unit and run the tape drive diagnostics (refer to the Drives Dialog in “Service Menu” on page 132). <ul style="list-style-type: none"> <li>- If the diagnostics fail, replace the 3583 Tape Library.</li> <li>- If the diagnostics succeed, the error was temporary.</li> </ul> </li> </ul> </li> <li>• If the operation fails and another library is not available, insert a scratch cartridge into the unit and run the tape drive diagnostics (refer to the Drives Dialog in “Service Menu” on page 132). <ul style="list-style-type: none"> <li>– If the diagnostics fail, replace the 3583 Tape Library.</li> <li>– If the diagnostics succeed, discard the cartridge.</li> </ul> </li> </ul> <p>If the problem occurs with multiple tape cartridges or if you do not know the tape cartridge’s volume serial number, run the tape drive diagnostics (refer to the Drives Dialog in “Service Menu” on page 132):</p> <ul style="list-style-type: none"> <li>• If the diagnostics fail, replace the 3583 Tape Library.</li> <li>• If the diagnostics succeed, run the Test Head diagnostic (refer to the Drives Dialog in “Service Menu” on page 132). <ul style="list-style-type: none"> <li>– If the Test Head diagnostic fails, replace the 3583 Tape Library.</li> <li>– If the Test Head diagnostic succeeds, replace the cartridges that caused the problem.</li> </ul> </li> </ul> <p>The error code clears when you remove the tape cartridge.</p> <p><b><u>For Problems with Reading Data:</u></b></p> <p>If the problem occurred while the library was reading data from the tape, and if you know the volume serial number of the tape cartridge, perform one of the following procedures:</p> <ul style="list-style-type: none"> <li>• If another library is available, insert the cartridge into the other unit and retry the operation: <ul style="list-style-type: none"> <li>– If the operation fails, discard the defective cartridge.</li> <li>– If the operation succeeds, insert a scratch cartridge into the first unit and run the tape drive diagnostics (refer to the Drives Dialog in “Service Menu” on page 132): <ul style="list-style-type: none"> <li>- If the diagnostics fail, replace the 3583 Tape Library.</li> <li>- If the diagnostics succeed, the error was temporary.</li> </ul> </li> </ul> </li> <li>• If another library is not available, insert a scratch cartridge into the unit and run the tape drive diagnostics (refer to the Drives Dialog in “Service Menu” on page 132): <ul style="list-style-type: none"> <li>– If the diagnostics fail, replace the 3583 Tape Library.</li> <li>– If the diagnostics succeed, discard the cartridge.</li> </ul> </li> </ul> <p>If the problem occurs with multiple tape cartridges or if you do not know the tape cartridge’s volume serial number, run the tape drive diagnostics (refer to the Drives Dialog in “Service Menu” on page 132):</p> <ul style="list-style-type: none"> <li>• If the diagnostics fail, replace the 3583 Tape Library.</li> <li>• If the diagnostics succeed, run the Test Head diagnostic (refer to the Drives Dialog in “Service Menu” on page 132). <ul style="list-style-type: none"> <li>– If the Test Head diagnostic fails, replace the 3583 Tape Library.</li> <li>– If the Test Head diagnostic succeeds, replace the cartridges that caused the problem.</li> </ul> </li> </ul> <p>The error code clears when you remove the tape cartridge.</p>

Table 18. Drive error codes (continued).

Code	Cause and Action
7	<p>A high probability of media error. The tape drive determined that an error occurred because of a faulty tape cartridge. Try another tape cartridge. If the problem occurs with multiple tape cartridges, use the following procedure:</p> <p><b>Attention:</b> When you run the Test Cartridge &amp; Media diagnostic, data on the suspect tape is overwritten. Use only a scratch data cartridge to run the test.</p> <ol style="list-style-type: none"> <li>1. If possible, run the tape cartridge in a different library. If the operation in the other unit fails and <b>6</b> or <b>7</b> displays, replace the media. If the operation succeeds, run the Test Cartridge &amp; Media diagnostic (refer to the Drives Dialog in “Service Menu” on page 132).</li> <li>2. If the Test Cartridge &amp; Media diagnostic fails, replace the media. If it runs successfully, clean the drive head and run the tape drive diagnostics (refer to the Drives Dialog in “Service Menu” on page 132).</li> <li>3. If the tape drive diagnostics fail, replace the 3583 Tape Library. If the tape drive diagnostics run successfully, perform the operation that produced the initial media error.</li> </ol> <p>The error code clears when you remove the tape cartridge.</p>
8	<p>Tape drive or SCSI bus failure. The tape drive determined that a failure occurred in the tape drive's hardware or in the SCSI bus. Use the menus on the operator panel of the library to perform the SCSI wrap test (select <b>Main Menu</b> → <b>More</b> → <b>Service</b> → <b>Drives</b> → <b>Diags</b> → <b>SCSI Wrap Test</b>). The error code clears 10 seconds after the drive detected the error.</p>
9	<p>Tape drive or RS-422 error. The tape drive determined that a failure occurred in the tape drive's hardware or in the RS-422 connection. Replace the 3583 Tape Library. The error code clears 10 seconds after the drive detected the error.</p>
o, c, b, h, E, or F	<p>No error or message assigned. There may be a problem with the single-character display. Turn the power off, then on and determine whether all segments on the single-character display are lit. If so, you may have a down-level version of your 3583 Tape Library's firmware or this book. Refer to the latest version of the firmware or this book.</p>
A	<p>Tape drive hardware problem. The tape drive determined that a problem occurred which degraded the operation of the tape drive, but it did not restrict continued use. If the problem persists, replace the 3583 Tape Library. The drive is usable, though the single-character display continues to indicate an error and the status light flashes amber.</p> <p>The error code clears when you power-off the library.</p>
B	<p>No error or message is assigned. See error code 8 in this table.</p>
C	<p>The tape drive needs to be cleaned. Clean the tape drive (see “Cleaning Drives” on page 86).</p> <p>The error code clears when you clean the tape drive.</p>
D	<p>No error or message assigned. See error code 0 in this table.</p>
...	<p>The message display has lost communication with the 3583 Tape Library. This message appears on line 2 of the message display. The three dots may occasionally display during normal processing.</p>

---

## Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries or regions. Consult your local IBM representative for information on the products and services currently available in your area.

Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing  
IBM Corporation  
North Castle Drive  
Armonk, NY 10504-1785  
U.S.A.

**The following paragraph does not apply to the United Kingdom or any other country or region where such provisions are inconsistent with local law:**

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Some states or regions do not allow disclaimer of express or implied warranties in certain transactions; therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM web sites are provided for convenience only and do not in any manner serve as an endorsement of those web sites. The materials at those web sites are not part of the materials for this IBM product and use of those web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurement may have been

estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

If you are viewing this information in softcopy, the photographs and color illustrations may not appear.

---

## Do You Have Comments or Suggestions

Your feedback is important in helping to provide the most accurate and high-quality information. If you have comments or suggestions for improving this publication, you can send us comments electronically by using these addresses:

- IBMLink™ from US: starpubs@us.ibm.com
- IBMLink from Canada: STARPUBS at TORIBM
- IBM Mail Exchange: USIB3VVD at IBMMAIL
- Internet: starpubs@us.ibm.com
- Fax from U.S.A., Canada, and other countries (or regions): +1 520 799-2906

You can also mail your comments to:

IBM Corporation  
Information Development  
Department GZW  
9000 South Rita Road  
Tucson, AZ 85744-0001 U.S.A.

---

## Trademarks

The following are trademarks of International Business Machines Corporation in the United States, or other countries (or regions), or both:

AIX	iSeries	StorageSmart
AS/400	Netfinity	StorWatch
e-business logo	OS/400	xSeries
IBM	pSeries	
IBMLink	RS/6000	

Tivoli is a registered trademark of Tivoli Systems, Inc. in the United States, or other countries (or regions), or both.

The following are U.S. trademarks of Hewlett-Packard Company, International Business Machines Corporation, and Seagate Technology.

Linear Tape-Open  
LTO  
Ultrium

Intel is a registered trademark of Intel Corporation in the United States, or other countries (or regions), or both.

Microsoft, Windows, Windows NT, Windows 2000, and the Windows logo are registered trademarks of Microsoft Corporation in the United States, or other countries (or regions), or both.

Other company, product, or service names may be the trademarks or service marks of others.

---

## Electronic Emission Notices

The following statement applies to this product. The statement for other products intended for use with this product will appear in their accompanying manuals.

### Federal Communications Commission (FCC) Class A Statement

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### Industry Canada Class A Emission Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

### Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

### European Union (EU) Electromagnetic Compatibility Directive

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The

limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

**Attention:** This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Properly shielded and grounded cables and connectors must be used in order to reduce the potential for causing interference to radio and TV communications and to other electrical or electronic equipment. Such cables and connectors are available from IBM authorized dealers. IBM cannot accept responsibility for any interference caused by using other than recommended cables and connectors.

## Germany Electromagnetic Compatibility Directive

**Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 30. August 1995 (bzw. der EMC EG Richtlinie 89/336)**

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Konformitätserklärung nach Paragraph 5 des EMVG ist die IBM Deutschland Informationssysteme GmbH, 70548 Stuttgart.

Informationen in Hinsicht EMVG Paragraph 3 Abs. (2) 2: Das Gerät erfüllt die Schutzanforderungen nach EN 50082-1 und EN 55022 Klasse A.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

EN 50082-1 Hinweis: "Wird dieses Gerät in einer industriellen Umgebung betrieben (wie in EN 50082-2 festgelegt), dann kann es dabei eventuell gestört werden. In solch einem Fall ist der Abstand bzw. die Abschirmung zu der industriellen Störquelle zu vergrößern."

Anmerkung: Um die Einhaltung des EMVG sicherzustellen, sind die Geräte wie in den IBM Handbüchern angegeben zu installieren und zu betreiben.

## Japan VCCI Class A ITE Electronic Emission Statement

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

vcci

---

# Glossary

This glossary defines the special terms, abbreviations, and acronyms that are used in this publication.

## Numbers

**2:1 compression.** The relationship between the quantity of data that can be stored with compression as compared to the quantity of data that can be stored without compression. In 2:1 compression, twice as much data can be stored with compression as can be stored without compression.

**3583 Ultrium Scalable Tape Library.** A device that can be attached to a supported server and used to write data to and from magnetic tape. With its robotics, the tape library can process up to 72 tape cartridges each with a capacity of 100 GB and at a data transfer rate of 14.9 MB per second.

## A

**A.** Ampere.

**ac.** Alternating current.

**AL\_PA.** Arbitrated Loop Physical Address

**adapter card.** A circuit board that adds function to a computer.

**alphanumeric.** Pertaining to a character set that contains letters, numerals, and usually other characters, such as punctuation marks.

**alternating current (ac).** An electric current that reverses its direction at regularly recurring intervals.

**ambient temperature.** The temperature of air or other media in a designated area, particularly the area surrounding equipment.

**ampere (A).** A unit of measure for electric current that is equivalent to a flow of one coulomb per second, or to the current produced by one volt applied across a resistance of one ohm.

**arbitrated loop.** See *Fibre Channel arbitrated loop (FC-AL)*.

**archive.** To collect and store files in a designated place.

## B

**bar code.** A code representing characters by sets of parallel bars of varying thickness and separation which are read optically by transverse scanning.

**bar code label.** A specially coded label that can be affixed to a tape cartridge and which enables a device to identify the cartridge and its volume serial number. The bar code label must be affixed to a tape cartridge to enable the library to identify the cartridge and its volume serial number.

**bar code reader.** In the tape library, a device specialized for scanning and reading bar codes and converting them into either the ASCII or EBCDIC digital character code.

**bit.** Either of the digits 0 or 1 when used in the binary numbering system.

**browser.** A client program that initiates requests to a web server and displays the information that the server returns.

**bus.** See *SCSI bus*.

**byte.** A string consisting of a certain number of bits (usually 8) that are treated as a unit and represent a character. A fundamental data unit.

## C

**capacity.** The amount of data that can be contained on storage media and expressed in bytes of data.

**cartridge.** See *tape cartridge*.

**cartridge door.** On a tape cartridge, a hinged barrier that can be opened to access or closed to protect the magnetic tape within the cartridge.

**cartridge memory.** See *LTO cartridge memory*.

**cartridge manual rewind tool.** A device that can be fitted into the reel of a cartridge and used to rewind tape into or out of the cartridge.

**cartridge storage slot.** Individual slot located within a magazine that is used to house tape cartridges.

**caster.** A wheel mounted in a swivel frame and used for supporting the Tape Library.

**CD.** Compact disc.

**centimeter (cm).** One one-hundredth of a meter (0.01 m). Approximately 0.39 inch.

**circuit breaker.** A switch that automatically interrupts an electric circuit under an infrequent abnormal condition.

**cleaning cartridge.** A tape cartridge that is used to clean the heads of a tape drive. Contrast with *data cartridge*.

**cm.** Centimeter.

**compact disc (CD).** A disc, usually 4.75 inches in diameter, from which data is read optically by means of a laser.

**compression.** The process of eliminating gaps, empty fields, redundancies, and unnecessary data to shorten the length of records or blocks.

**configure.** To describe to a system the devices, optional features, and programs installed on the system.

**current.** The quantity of charge per unit time, measured in Amperes (Amps, A).

## D

**daisy-chain.** A hardware configuration in which devices are connected one to another in a series.

**data.** Any representations such as characters or analog quantities to which meaning is, or might be, assigned.

**data cartridge.** A tape cartridge dedicated to storing data. Contrast with *cleaning cartridge*.

**data compression.** See *compression*.

**data transfer rate.** The average number of bits, characters, or blocks per unit time passing between corresponding equipment in a data transmission system. The rate is expressed in bits, characters, or blocks per second, minute, or hour.

**dc.** Direct current.

**default setting.** The value that is assumed when none is explicitly specified.

**degauss.** To make a magnetic tape nonmagnetic by means of electrical coils carrying currents that neutralize the magnetism of the tape.

**degausser.** A device that makes magnetic tape nonmagnetic.

**device.** Any hardware component or peripheral, such as a tape drive or tape library, that can receive and send data.

**device driver.** A file that contains the code needed to use an attached device.

**DHCP.** Dynamic host configuration protocol.

**diagnostic.** A software program that is designed to recognize, locate, and explain faults in equipment or errors in programs.

**Diagnostic Menu.** A collection of diagnostic and maintenance functions that the tape library can perform.

Each function has a menu name that you can choose from the operator panel to activate the function.

**differential .** See *High Voltage Differential (HVD)*.

**direct current (dc).** An electrical current flowing in one direction only and substantially constant in value.

**disable.** To make nonfunctional.

**download.** To transfer programs or data from a computer to a connected device, typically a personal computer.

**drive.** See *IBM Ultrium Tape Drive*.

**drive head.** The component that records an electrical signal onto magnetic tape, or reads a signal from tape into an electrical signal.

**Dynamic Host Configuration Protocol (DHCP).** An agreed-upon format for assigning IP addresses to devices on a network at the moment they are needed rather than in advance.

## E

**eject.** To remove or force out from within.

**electronic mail.** Correspondence in the form of messages transmitted between user terminals over a computer network.

**e-mail.** See *electronic mail*.

**enable.** To make functional.

**erase.** To remove recorded matter from a magnetic tape.

**error code log.** A repository within a tape drive's firmware that contains a history of errors experienced by the drive.

**Ethernet.** Local area network (LAN) technology that transmits information between computers at speeds of 10 and 100 million bits per second (Mbps).

**export.** Pertaining to the tape library, to remove media from the library using the I/O station.

## F

**failover.** The routing of all transactions to a second device when the first device fails.

**Fibre Channel.** An optics cable utilizing filaments to transmit data.

**Fibre Channel arbitrated loop (FC-AL).** In this topology, two or more Fibre Channel end points are interconnected through a looped interface. Information is routed through the loop to its destination.



**Fibre Channel topologies.** Shared loop host and storage controllers.

**fiducial.** A reference point which guides the cartridge handling device to the tape subsystem location.

**field microcode replacement (FMR) tape.** A tape cartridge that contains new or revised firmware (microcode).

**file.** A named set of records stored or processed as a unit.

**file transfer protocol (FTP).** In the Internet suite of protocols, an application layer protocol that uses TCP and Telnet services to transfer bulk-data files between machines or hosts (servers).

**firmware.** Proprietary code that is usually delivered as firmware as part of an operating system. Firmware is more efficient than software loaded from an alterable medium and more adaptable to change than pure hardware circuitry. An example of firmware is the Basic Input/Output System (BIOS) in read-only memory (ROM) on a PC motherboard.

**flange.** A rib or rim used for strength, for guiding, or for attachment to another object.

**FMR tape.** See *field microcode replacement tape*.

**FTP site.** Any electronic repository of information that uses the File Transfer Protocol (FTP) for transferring files to and from servers. Use of an FTP site requires a user ID and possibly a password.

## G

**GB.** gigabyte.

**GBIC.** Gigabit interface converter.

**Gbit.** gigabit

**gigabit (Gbit).** 1 000 000 000 bits.

**gigabyte (GB).** 1 000 000 000 bytes.

**grounded.** Having or making an electrical connection with the earth.

**gigabit interface converter (GBIC).** Converts copper interface to optic interface.

## H

**head.** See *drive head*.

**hertz (Hz).** A unit of frequency equal to one cycle per second.

**High Voltage Differential (HVD/DIFF).** A logic signaling system that enables data communication

between a supported server and another device, such as the tape library. HVD/DIFF signaling uses a paired plus and minus signal level to reduce the effects of noise on the SCSI bus. Any noise injected into the signal is present in both a plus and minus state, and is thereby canceled. Synonymous with *differential*.

**host .** The controlling or highest-level system in a data communication configuration. Synonymous with *server*.

**host cleaning.** A method of cleaning that enables the host (server) to detect the need to clean an Ultrium Tape Drive and to control the cleaning process.

**HVD/DIFF.** High voltage differential.

**Hz.** Hertz.

## I

**IBM Ultrium Tape Drive.** Located within the tape library, a data-storage device that controls the movement of the magnetic tape in an IBM LTO Ultrium Tape Cartridge. The drive houses the mechanism (drive head) that reads and writes data to the tape. The drive is the first of four drives planned for the Ultrium format. Its native data capacity is 100 GB per cartridge; with 2:1 compression, its capacity is up to 200 GB.

**ID.** Identifier.

**import.** Pertaining to the tape library, to insert media into the library using the I/O station.

**initialize.** To format a magnetic tape, write a label (VOLSER) on the tape, and leave the tape empty except for the system files containing the structure information. All former contents of the tape are lost.

**insert.** Pertaining to the tape library, to place a tape cartridge into a cartridge storage slot in the library.

**install.** To set up for use or service. The act of adding a product, feature, or function to a system or device either by a singular change or by the addition of multiple components or devices.

**Internet.** The worldwide collection of interconnected networks that use the Internet suite of protocols and permit public access.

**interposer.** An adapter-like device that allows a connector of one size and style to connect to a mating connector of a different type and style.

**inventory.** A survey of tape cartridges in the library.

## K

**kg.** Kilogram.

**kilogram (kg).** One thousand grams (approximately 2.2 pounds).

## L

**LAN.** Local area network.

**label.** See *bar code label*.

**label area.** On the LTO Ultrium tape cartridge, a recessed area next to the write-protect switch where a label must be affixed.

**LCD.** See *liquid crystal display*.

**leader pin.** With the LTO Ultrium Tape Cartridge, a small metal column attached to the end of the magnetic tape. During tape processing the leader pin is grasped by a threading mechanism, which pulls the pin and the tape out of the cartridge, across the drive head, and onto a takeup reel. The head can then read or write data from or to the tape.

**LED.** Light-emitting diode.

**light-emitting diode (LED).** A semiconductor chip that gives off visible or infrared light when activated.

**Linear Tape-Open (LTO).** A type of tape storage technology developed by the IBM Corporation, Hewlett-Packard, and Seagate. LTO technology is an “open format” technology, which means that its users will have multiple sources of product and media. The “open” nature of LTO technology enables compatibility between different vendors’ offerings by ensuring that vendors comply with verification standards. The LTO technology is implemented in two formats: the Accellis format focuses on fast access; the Ultrium format focuses on high capacity. The Ultrium format is the preferred format when capacity (rather than fast access) is the key storage consideration. An Ultrium cartridge has a compressed data capacity of up to 200 GB (at 2:1 compression) and a native data capacity of up to 100 GB. The Ultrium format is designed with a 4-generation road map that provides for up to 1.6 TB per cartridge (at 2:1 compression) in Generation 4, with compressed transfer rate of up to 320 MB per second.

**liquid crystal display (LCD).** A low-power display technology used in computers and other I/O devices.

**load.** Pertaining to the tape library and following the insertion of a tape cartridge into a cartridge storage slot, the act (performed by the picker) of transferring the cartridge from the storage slot to the drive and of positioning the tape (performed by the tape drive) for reading or writing by the drive head.

**load and unload cycle.** The act of inserting a cartridge into a tape drive, loading the tape to load point, rewinding the tape into the cartridge, and ejecting the cartridge from the drive.

**Local area network (LAN).** A computer network that spans a relatively small area. Most LANs are confined to a single building or group of buildings.

**Low Voltage Differential/Single Ended (LVD/SE).** A low-noise, low-power, and low-amplitude electrical signaling system that enables data communication between a supported server and another device such as the tape library. LVD/SE signaling uses two wires to drive one signal over copper wire. The use of wire pairs reduces electrical noise and cross talk. This method of data transmission requires a cable that is no longer than 25 meters (82 ft.).

**LTO.** Linear Tape-Open.

**LTO-CM.** LTO cartridge memory.

**LTO cartridge memory (LTO-CM).** Within each LTO Ultrium data cartridge, an embedded electronics and interface module that can store and retrieve a cartridge’s historical usage and other information.

**LVD/SE.** Low-voltage differential/single ended.

## M

**m.** Meter.

**magnetic tape.** A tape with a magnetizable surface layer on which data can be stored by magnetic recording.

**manual cleaning.** A method of cleaning by which an operator selects a menu option from the tape library operator panel to perform cleaning on one or more of the Ultrium Tape Drives.

**Management Information Base (MIB).** A database of objects that can be monitored by a network management system.

**MB.** Megabyte.

**media.** The plural of *medium*.

**media capacity.** See *capacity*.

**media-type identifier.** Pertaining to the bar code on the bar code label of the IBM Ultrium Tape Cartridge, a 2-character code, L1, that represents information about the cartridge. L identifies the cartridge as one that can be read by devices which incorporate LTO technology; 1 indicates that it is the first generation of its type.

**medium.** A physical material in or on which data may be represented, such as magnetic tape.

**megabyte (MB).** 1 000 000 bytes.

**metal particle tape.** In the LTO Ultrium tape cartridge, tape that uses very small, pure metal particles (rather than oxide coatings) in the magnetic layer.

**meter.** In the Metric System, the basic unit of length; equal to approximately 39.37 inches.

**MIB.** Management Information Base.

**Model L18.** One of three versions of the tape library. The Model L18 has a storage capacity of 18 cartridges. Contrast with *Model L36, and Model L72.*

**Model L36.** One of three versions of the tape library. The Model L36 has a storage capacity of 36 cartridges. Contrast with *Model L18, and Model L72.*

**Model L72.** One of three versions of the tape library. The Model L72 has a storage capacity of 72 cartridges. Contrast with *Model L18, and Model L36.*

## N

**native data capacity.** The amount of data that can be stored without compression on a cartridge.

**NVRAM.** Non-Volatile Random Access Memory

**Non-Volatile Random Access Memory.** A type of memory that retains its contents when power is turned off.

## O

**oersted.** The unit of magnetic field strength in the unrationalized centimeter-gram-second (cgs) electromagnetic system. The oersted is the magnetic field strength in the interior of an elongated, uniformly wound solenoid that is excited with a linear current density in its winding of one abampere per  $4\pi$  centimeters of axial length.

**operating environment.** The temperature, relative humidity rate, and wet bulb temperature of the room in which the tape library routinely conducts processing.

**operating system.** The master computer control program that translates the user's commands and allows application programs to interact with the computer's hardware.

**operator panel.** Located on the front door of the tape library, the functional unit that contains buttons to control the tape library, and an LCD display that provides information about the operation of the library.

## P

**PDF.** Portable Document Format.

**PDU.** Protocol Data Unit

**pick.** Pertaining to the tape library, to remove, by means of a robotic device, a tape cartridge from a storage slot, tape drive, or I/O station.

**picker.** An electromechanical device located on the picker assembly that moves cartridges between the cartridge storage slots, tape drives, or I/O station.

**picker assembly.** The mechanism in the Tape Library that moves cartridges between the storage slots, tape drives, and the I/O station. The assembly includes the rotary axis motor, sensors, picker, and bar code reader.

**Portable Document Format (PDF).** A standard specified by Adobe Systems, Incorporated, for the electronic distribution of documents. PDF files are compact, can be distributed globally (via e-mail, the web, intranets, or CD-ROM), and can be viewed with the Acrobat Reader, which is software from Adobe Systems that can be downloaded at no cost from the Adobe Systems home page.

**POST.** Power-On Self Test.

**PostScript.** A standard specified by Adobe Systems, Incorporated, that defines how text and graphics are presented on printers and display devices.

**power cord.** A cable that connects a device to a source of electrical power.

**power cord plug.** On a power cord, the male fitting for making an electrical connection to a circuit by insertion into a receptacle.

**power-off.** To remove electrical power from a device.

**power-on.** (1) To apply electrical power to a device. (2) The state of a device when power has been applied to it.

**Power-On Self Test (POST).** A series of diagnostic tests that are run automatically by a device when the power to that device is turned on.

**power receptacle.** The mounted female electrical fitting that contains the live parts of the circuit.

**power switch.** Located on the back of the tape library, a toggle switch that lets you turn the power to the library on or off.

**Protocol Data Unit (PDU).** Messages sent over a network.

**push buttons.** Located below the operator panel of the tape library, 4 buttons that, when pressed, let you interact with the menus on the operator panel.

**put.** Pertaining to the tape library, to place, by means of a robotic device, a tape cartridge into a storage slot or drive.

## R

**rack.** A unit that houses the components of a storage subsystem, such as the tape library.

**rackmount kit.** A packaged collection of articles used to install the rack-mounted version of the tape library.

**read.** To acquire or interpret data from a storage device, from a data medium, or from another source.

**reinitialize.** To reformat a magnetic tape, write a label (VOLSER) on the tape, and leave the tape empty except for the system files containing the structure information. All former contents of the tape are lost.

**relative humidity.** The ratio of the amount of water vapor actually present in the air to the greatest amount possible at the same temperature.

**Remote Management Unit (RMU).** Device that allows user access to the library using a web browser.

**remove.** Pertaining to the tape library, to take a tape cartridge from a cartridge storage slot.

**retention screws.** Pertaining to the connector on a cable, two screws on either side of the connector that secure it to its mating connector.

**RMU.** Remote Management Unit

**robotics.** The picker and any associated mechanisms that move a tape cartridge within the tape library.

## S

**SAN.** Storage area network

**scratch cartridge.** A data cartridge that contains no useful data, but can be written to with new data.

**SCSI.** Small computer systems interface.

**SCSI-2.** Small computer systems interface-2.

**SCSI bus.** (1) A collection of wires through which data is transmitted from one part of a computer to another. (2) A generic term that refers to the complete set of signals that define the activity of the Small Computer Systems Interface (SCSI).

**SCSI bus cable.** See *SCSI bus*.

**SCSI cable.** See *SCSI bus*.

**SCSI commands.** An operation performed by a target (tape drive) for an initiator (host). The command is initiated by the operator from the host console.

**SCSI connector.** One of the set of all female and male connectors on the SCSI bus.

**SCSI device.** Anything that can connect into the SCSI bus and actively participate in bus activity.

**SCSI host adapter card.** The logic card that connects a host (server) to the SCSI bus cable. Synonymous with *SCSI controller*.

**SCSI ID.** The hexadecimal representation of the unique address (0–F) which a user assigns to the tape library and which is used in SCSI protocols to identify or select the drive. The user normally assigns and sets the SCSI ID when installing the drive.

**SCSI wrap tool.** A device that attaches to the SCSI connector on the tape library and enables internal tests on the SCSI interface.

**seat, seated.** (1) To fit to. (2) To ensure that one object is fitted to another object.

**sequential access.** An access technique for retrieving or storing data in which the data is read from, written to, or removed from a file based on the logical order (sequence) of the data in the file. When the tape library operates in sequential access mode, its firmware (not the server's application software) manages the cartridges (and thus the data).

**server.** A functional unit that provides services to one or more clients over a network. Examples include a file server, a print server, and a mail server. The pSeries, iSeries, HP, and Sun are servers. Synonymous with *host*.

**ship group.** The group of supplies, cords, or documentation that is shipped with the tape library.

**shipping environment.** The temperature, relative humidity rate, and wet bulb temperature of the environment to which the tape library is exposed when being transferred from one location to another.

**Simple Network Management Protocol (SNMP).** An agreed-upon format for managing complex networks. SNMP works by sending messages, called protocol data units (PDUs), to different parts of a network. SNMP-compliant devices, called agents, store data about themselves in Management Information Bases (MIBs) and return this data to the SNMP requesters.

**sled.** Pertaining to a tape library, the enclosure that contains the tape drive.

**Small Computer Systems Interface (SCSI).** A standard used by computer manufacturers for attaching peripheral devices (such as tape drives, hard disks, CD-ROM players, printers, and scanners) to computers (servers). Pronounced "scuzzy". Variations of the SCSI provide for faster data transmission rates than standard serial and parallel ports (up to 160 MB per second). The variations include:

- Fast/Wide SCSI: Uses a 16-bit bus, and supports data rates of up to 20 MBps.
- SCSI-1: Uses an 8-bit bus, and supports data rates of 4 MBps.
- SCSI-2: Same as SCSI-1, but uses a 50-pin connector instead of a 25-pin connector, and supports multiple devices.

- **Ultra SCSI:** Uses an 8- or 16-bit bus, and supports data rates of 20 or 40 MBps.
- **Ultra2 SCSI:** Uses an 8- or 16-bit bus and supports data rates of 40 or 80 MBps.
- **Ultra3 SCSI:** Uses a 16-bit bus and supports data rates of 80 or 160 MBps.

**Small Computer Systems Interface-2 (SCSI-2).** See *Small Computer Systems Interface (SCSI)*.

**SNMP.** Simple Network Management Protocol.

**Storage Area Network (SAN).** High-speed, open-standard scalable network of storage devices and servers providing accelerated data access.

**storage environment.** The temperature, relative humidity rate, and wet bulb temperature of the environment in which the tape library is nonoperational and being kept for future use.

**storage slot.** See *cartridge storage slot*.

## T

**TapeAlert.** A patented technology from Hewlett-Packard that monitors the status of a tape device and media, and detects problems as they occur.

**TapeAlert flags.** Status and error messages that are generated by the TapeAlert utility and display on the host console. The messages indicate the type of problem and tell how to resolve it.

**tape cartridge.** A removable storage device that consists of a housing containing a belt-driven magnetic tape wound on a supply reel and a takeup reel.

**tape drive.** See *IBM Ultrium Tape Drive*.

**TB.** Terabyte.

**teach.** A process where the bar code scanner reads the fiducial labels to identify the types of storage and tape drives installed in the library.

**terminate, termination.** To prevent unwanted electrical signal reflections by applying a device (a terminator) that absorbs the energy from the transmission line.

**terminator.** (1) A part used to end a SCSI bus. (2) A single-port, 75- $\Omega$  device that is used to absorb energy from a transmission line. Terminators prevent energy from reflecting back into a cable plant by absorbing the radio frequency signals. A terminator is usually shielded, which prevents unwanted signals from entering or valid signals from leaving the cable system.

**terabyte (TB).** 1 000 000 000 000 bytes.

**toggle.** To alternate between two states.

**track.** A linear or angled pattern of data written on a tape surface.

**transfer rate.** See *data transfer rate*.

**trap.** An unprogrammed conditional jump to a specified address that is automatically activated by hardware.

## U

**Ultra SCSI.** See *Small Computer Systems Interface (SCSI)*.

**Ultra2 SCSI.** See *Small Computer Systems Interface (SCSI)*.

**Ultrium Tape Drive.** See *IBM Ultrium Tape Drive*.

**unattended backup.** The act of copying files without operator assistance.

**uniform resource locator (URL).** The address of an item on the World Wide Web. It includes the protocol followed by the fully qualified domain name (sometimes called the host name) and the request. The web server typically maps the request portion of the URL to a path and file name. For example, if the URL is `http://www.networking.ibm.com/nsg/nsgmain.htm`, the protocol is `http`; the fully qualified domain name is `www.networking.ibm.com`; and the request is `/nsg/nsgmain.htm`.

**unload.** Pertaining to the tape library, the act (performed by the tape drive) of rewinding the tape into the cartridge and ejecting it from the drive and the act (performed by the picker) of transferring the cartridge to a cartridge storage slot.

**URL.** Uniform resource locator.

## V

**V dc.** Volts of direct current.

**VOLSER.** Volume serial number.

**volume serial number (VOLSER).** A number that a computer assigns to a tape cartridge when it prepares (initializes) the cartridge for use.

**volt.** The SI (international) unit of potential difference and electromotive force, formally defined to be the difference of electric potential between two points of a conductor carrying a constant current of one ampere, when the power dissipated between these points is equal to one watt.

**voltage.** The electric potential or potential difference expressed in volts.

# W

**W.** Watts.

**watt.** A metric unit of measure of power; the power required to keep a current of one ampere flowing under a potential drop of one volt; about 1/736 of one horsepower.

**Web.** See *World Wide Web*.

**wet bulb temperature.** The temperature at which pure water must be evaporated adiabatically at constant pressure into a given sample of air in order to saturate the air under steady-state conditions. Read from a wet-bulb thermometer.

**World Wide Web.** A network of servers that contain programs and files. Many of the files contain hypertext links to other documents available through the network.

**write.** To make a permanent or transient recording of data in a storage device or on a data medium.

**write protected.** A tape volume is write protected if some logical or physical mechanism causes the device processing the tape volume to prevent the program from writing on the volume.

**write-protect switch.** Located on the LTO Ultrium tape cartridge, a switch that prevents accidental erasure of data. Pictures of a locked and unlocked padlock appear on the switch. When you slide the switch to the locked padlock, data cannot be written to the tape. When you slide the switch to the unlocked padlock, data can be written to the tape.

---

# Index

## Numerics

- 10/100 Ethernet port, on RMU 15
- 12-slot I/O station 11

## A

- About menu 151
- ac power supply, description 8, 15
- acclimating the tape drive 160
- acoustical requirements 18
- adapters, supported 7
- Advanced Service dialog 134
- AIX server 3
- altitude, maximum 17
- application code, viewing 151, 152
- ARCserve 4
- ARCserve2000 4
- Arkeia 4
- AS/400 server
  - attachment to HVD tape drives 6, 7
  - supported by library 3
- attaching leader pin to tape, procedure 163
- attention notice, definition xvii
- axes
  - locating to home position 143
  - manipulating vertical and rotary 140, 141, 142

## B

- Backup Exec 4
- Backup Express 4
- Backup Recovery and Media Services/400 (BRMS/400) 4
- backup software
  - installing 62
  - supported 4
- BakBone Software, Inc. 4
- bandwidth 20, 21
- bar code
  - description 157
  - scanning 111, 139
  - specifications 156
- bar code label
  - description 157
  - for tape cartridges 157
  - guidelines for using 158
  - ordering 170
  - placement on cartridge 156, 157
  - specifications 156, 157
- bar code scanner 15, 157
- boot code, viewing 151, 152
- BrightStor Enterprise Backup 4
- browsers, supported by RMU 15

## C

- cables
  - connecting 47
  - connectors 50
  - maximum length of SCSI 48
- calibration of library 147
- capacity 1, 2, 156
- cartridge memory 156
- cartridge movement, testing 144
- cartridge picker 15
- cartridge storage 12
- cartridge storage slots
  - configurations for each model 13
  - description 8
  - maximum per column 13
  - numbering in library columns 12
  - viewing status 94
- caution notice, definition xv
- changing library configuration 128
- changing library password 129, 131
- changing to online or offline state 90
- cleaning cartridge
  - description 156
  - ordering 170
- cleaning drives 86
- Clear Log dialog 103
- clearance, for service 18
- clearing drive error log 103
- columns, library
  - description 8, 12
  - installing 46
- Command Log dialog 100
- Command menu 105
- commands to library, ways of issuing 65
- CommVault Galaxy 4
- CommVault Systems, Inc. 4
- compressed capacity 156
- compression, using 19
- Computer Associates International, Inc. 4
- concurrent tape drive operation 19
- Config dialog 128
- configuration switch, on host interface board 6
- configuration, changing library 72, 128
- configuring tape library to server 62
- contents of ship group 24, 28
- control hardware, for the library 6
- Copy Dump dialog 104
- copying drive dump 104
- corrosive gas limits 18
- Cray/REELlibrarian 4
- creating FMR tape 149
- current, specification for electrical 17

## D

- damage to library, reporting 23
- danger notice, definition xv

- Dantz Development Corporation 4
- data cartridge
  - description 156
  - load and unload cycles 156
  - ordering 170
- data compression, using 19
- data transfer rate 1
- date, setting 127
- Date/Time dialog 127
- dc power supply, description 8, 15
- degaussing a tape cartridge 160, 170
- Demo dialog 144
- depth of tape library 17
- description of tape library 1
- Details dialog 152
- device driver
  - installing 24, 28, 62
  - supported 5
- diagnostics
  - drive 149
  - fingers 135, 136
  - library 74, 134
  - picker 135, 136, 140
  - sensors 135, 136
- Diagnostics dialog 149
- Diags submenu 135
- direct insertion of media 78
- direct removal of media 79
- disabling library security 131
- disposing of a tape cartridge 170
- disposing of the tape library xix
- documentation, viewing latest level 5
- door, library
  - location and description 10
  - safeguard to library xviii
- drive error codes 205
- drive error log
  - clearing 103
  - copying dump 104
  - forcing dump 104
  - viewing 102
- Drive Log dialog 102
- Drive SCSI dialog 125
- Drive Service dialog 148
- drive sled
  - dc power supply 15
  - description 14
  - installing 40
- drive status area, on operator panel 65, 68
- Drives dialog 99, 148
- Drives submenu 118, 124
- dump, drive error log
  - copying 104
  - forcing 104

## E

- ejecting media 79, 173
- electronic emission notices 211
- element addressing
  - description 13

- element addressing (*continued*)
  - for other supported operating systems 177
  - for Windows 2000 with RSM Enabled 180
- emergency shutdown 77
- enabling library security 129
- end of life (EOL) plan xix
- environmental notice xix
- environmental specifications
  - for library 17
  - for media 161
- EOL plan xix
- erasing FMR tape 149
- erasing tape 160
- Error Log dialog 101
- error messages 195
  - drive 102, 205
  - library 101
  - operator information messages 204
  - operator intervention messages 202
  - reported to host
    - TapeAlert flags supported by drive 185
    - TapeAlert flags supported by library 187
  - service action codes 195
- Ethernet port 15, 56, 70
- Exercise submenu 143
- exercises, for library
  - demo 143, 144
  - self test 143, 145
  - teach 143, 147
- Export dialog 116
- exporting cartridges from library 114, 116

## F

- FAST read/write test 149
- feature codes 189
- Federal Communications Commission (FCC)
  - Statement 211
- fiber cables
  - connecting 50
  - description 24, 28
- Fibre Channel connectivity 1
  - accessing Fibre Channel devices 2
  - description 6
  - interconnection distances 2
- Fibre Channel interface
  - attachment 7
  - ports on SAN Data Gateway Module 3, 7
  - supported adapters 7
- Fingers submenu 136
- firmware
  - description of library 6
  - displaying current level 80, 99, 152
  - updating by using FMR tape 80, 85
  - updating by using library serial port 80, 85
  - updating by using SAN Data Gateway Module 80, 82
  - updating by using the RMU 80, 82
  - updating by using the SCSI bus 80, 83
  - updating drive 73, 80, 82, 83
  - updating library 73, 80, 82, 83, 85, 134



- firmware (*continued*)
  - updating RMU 73, 80
  - version of library 151
- Firmware Update dialog 120, 135
- fixed storage slot 13
- FMR tape
  - creating or erasing 149
  - use in updating drive firmware 80, 83
- FMR Tape dialog 149
- Force Dump dialog 104
- front door 10

## G

- gigabit interface converter (GBIC) module 7

## H

- hazards, safety xvii
- head read/write test 149
- heat output 17
- height of tape library 17
- height of tape library in EIA units 17
- Help/Systems 4
- Hewlett-Packard server 3
- high voltage differential (HVD/DIFF) SCSI interface 1, 6
- history
  - drive errors 102
  - library errors 101
  - library operations 100
- home position, locating axes to 143
- host
  - configuring library to 62
  - supported 3
- host adapter card, SCSI
  - installing 62
  - list of supported 3
- host attachment
  - Fibre Channel 7
  - SCSI 6
- host cleaning 86
- host interface board (SCSI)
  - connecting to 47, 49, 51
  - description 8
  - location of connectors for medium changer 6
  - range of SCSI IDs 7
  - types of connectors 7
- host name, RMU 56
- HP server
  - See Hewlett-Packard server
- HP-UX, supported operating system 3
- HVD/DIFF SCSI interface
  - See high voltage differential (HVD/DIFF) SCSI interface
- HyperTerminal connections and settings 100

## I

- I/O station
  - configurations for each model 13

- I/O station (*continued*)
  - description 2, 8, 11
  - location 10
- I/O station status area, on operator panel 65, 66
- I/O Station submenu 114
- IBM Ultrium Tape Drive 14
- icons
  - in drive status area 69
  - in I/O station status area 67
- ID
  - setting drive SCSI 61, 124
  - setting library SCSI 60, 122
- Import dialog 115
- importing cartridges into the library 114, 115
- inquiry data, retrieving 86
- inrush current 17
- inserting media 78
- installing
  - library
    - post-installation considerations 63
    - rack-mounted version 28
    - stand-alone version 24
  - multiple slot I/O station 45
  - optional features 6
  - redundant dc power supply 42
  - SAN Data Gateway Module 44
  - SCSI host adapter card 62
  - storage column 46
  - tape drive sled 40
- Intel server 3
- interconnection distances 2
- interfaces, supported 1, 6
- inventory of library 10
- inventory of ship group 24, 28
- iSeries server
  - attachment to HVD tape drives 6, 7
  - supported by library 3

## K

- key, for front door xviii, 10
- keylock, location on front door 10
- Knox-Software 4

## L

- label area, on Ultrium Tape Cartridge 156
- label, for Ultrium Tape Cartridge 156
- laser safety information xvii
- leader pin
  - in tape cartridge 156
  - reattaching to tape 163
- leader pin attachment kit, ordering 170
- Legato Systems, Inc. 4
- library access xviii
- library columns, description 12
- library components 8
- library status area, on operator panel 65, 66
- Library submenu 92, 122, 134
- library type, in top information frame 75
- Linear Tape-Open (LTO) Cartridge Memory (CM) 156

- Linux 3
- location of cartridge, viewing 97
- lock, on door xviii
- log
  - drive error
    - clearing 103
    - forcing dump 104
    - history 102
  - history of library operations 100
  - library error 101
- Logs submenu 99
- low voltage differential/single ended (LVD/SE) SCSI interface 1, 6
- LVD/SE SCSI interface
  - See low voltage differential/single ended (LVD/SE) SCSI interface

## M

- MAC ID
  - See media access control address (MAC ID)
- magazines
  - description 8, 12
  - numbering in columns 12
- Main menu 89
- main power switch xviii, 76
- manual cleaning 86
- manually removing a tape cartridge 174
- maximum altitude 17
- maximum electrical power 17
- maximum noise level 17
- media
  - ejecting 173
  - inserting 78
  - manually removing 174
  - moving 106
  - removing 79
  - using 155
- media access control address (MAC ID) 57
- Media dialog 97
- media read/write test 149
- media supplies, ordering 170
- media-type identifier, on bar code 157
- medium changer
  - description 6
  - SCSI address 6
  - SCSI connection 6, 7
- menu guidelines 88
- menu tree 88
- menus
  - About menu 151
    - Details dialog 152
  - Command menu 105
    - Drives submenu 118
    - Export dialog 116
    - Firmware Update dialog 120
    - I/O Station submenu 114
    - Import dialog 115
    - Move Media dialog 106
    - Move submenu 105
    - Position Picker dialog 109

- menus (*continued*)
  - Command menu (*continued*)
    - Reset dialog 119
    - Scan Barcode dialog 111
    - Unload dialog 118
  - Main menu 89
  - online/offline selection 90
  - Service menu 132
    - Demo dialog 144
    - Diagnostics dialog 149
    - Diags submenu 135
    - Drive Service dialog 148
    - Drives dialog 148
    - Exercise submenu 143
    - Fingers submenu 136
    - Firmware Update dialog 135
    - FMR Tape dialog 149
    - Get/Put dialog 137
    - Library submenu 134
    - Picker submenu 140
    - Repair dialog 150
    - Scanner dialog 139
    - Self Test dialog 145
    - Sensor dialog 136
    - Start dialog 133
    - Step dialog 138
    - Teach dialog 147
  - Setup menu 121
    - Config dialog 128
    - Date/Time dialog 127
    - Drive SCSI dialog 125
    - Drives submenu 124
    - Ethernet 10/100 dialog 124
    - Library submenu 122
    - SCSI dialog 122
    - Secure dialog 129
    - Utils submenu 126
  - Status menu 92
    - Clear Log dialog 103
    - Command Log dialog 100
    - Copy Dump dialog 104
    - Drive Error Log Options dialog 103
    - Drives dialog 99
    - Error Log dialog 101
    - Force Dump dialog 104
    - Library submenu 92
    - Logs submenu 99
    - Media dialog 97
    - Slot dialog 94
    - System dialog 93
- message area, on operator panel 65, 68
- messages
  - See error messages
- Microsoft Windows 2000 3
- Microsoft Windows NT 3
- models, description of library 2
- motors, testing movement 145
- Move Media dialog 106
- Move submenu 105
- moving a tape cartridge 106, 137
- moving the picker 109, 135

multiple slot I/O station, installing 45  
multiple tape drives, operating concurrently 19

## N

narrow data transfer 6, 7  
NetBackup 4  
NetVault 4  
network access through RMU 15  
network address, RMU 56  
Networker 4  
noise level, maximum 17  
nonaddressable storage slot 13  
normal read/write test 149  
Normal Service dialog 133  
normal shutdown 77  
numbering, of elements in library columns 12

## O

offline state  
    changing to 90  
    commands that require 90  
Omniback II 4  
online state, changing to 90  
operating systems and supported servers 3  
operator information messages 204  
operator intervention messages 202  
operator panel  
    description 8, 65  
    drive status area 68  
    I/O station status area 66  
    icons  
        in drive status area 69  
        in I/O station status area 67  
    library status area 66  
    location 10  
    menus 87  
    message area 68  
optional features  
    18-slot tape storage column 46  
    installing 6  
    multiple-slot I/O station 45  
    redundant dc power supply 42  
    SAN Data Gateway Module 16  
    Ultrium Tape Drive 40  
ordering tape cartridges and supplies 170  
OS/400 operating system 3

## P

particulate limits 18  
parts list 189  
password, changing or setting library 129, 131  
performance, variables that affect 19  
physical specifications, library 17  
picker assembly  
    description 15  
    moving and manipulating 109, 135, 138  
Picker submenu 140  
Position Picker dialog 109

power cords 24, 28, 191  
power supply  
    description 2  
    installing redundant dc 42  
power switch, main xviii, 76  
power-off procedure 77  
power-on procedure 52, 76  
power-on self test 149  
power, electrical  
    library requirements 15  
    specifications 17  
    turning off library 77  
    turning on library 52, 76  
product environment 18  
protective devices xviii  
pSeries server 3  
push buttons, on operator panel 65  
Put/Get dialog 137

## R

rack-mounted library  
    description 3  
    installing 28  
rackmount kit 3, 29  
reach (Z) axis drive 15  
read/write test 149  
recording method, of tape drive 156  
recycling, of tape library xix  
redundant dc power supply  
    description 2, 8, 15  
    installing 42  
REELbackup 4  
REELlibrarian 4  
related publications xxii  
relative humidity specifications  
    for media 161  
    for tape library 17  
remote access to library 2  
remote communication, establishing 124  
remote management unit (RMU)  
    configuring 56  
    description 1, 2, 8, 15  
    diagnostics 74  
    MAC ID 57  
    menu descriptions 70  
    operating 70  
    use with StorWatch Specialist 56, 70  
    using to retrieve SCSI inquiry data 86  
removing cartridge from library 79  
removing or replacing a drive 150  
Repair dialog 150  
Reset dialog 119  
resetting a tape drive 119  
resource sharing 3  
restarting the library 77  
Retrospect 15  
RMU dialog 124  
RMU host name 56  
RMU network address 56  
Robot/SAVE 4

- robotic system 1, 6, 8, 15
- rotary (X) axis drive
  - description 15
  - locating to home position 143
  - manipulating 140, 141, 142
- RS/6000 server 3
- RS/6000 SP server 3

## S

### SAC

- See service action codes

### safety

- definition of notices
  - attention notice xvii
  - caution notice xv
  - danger notice xv
- hazards xvii
- laser xvii
- manual of translated notices 24, 28
- protective devices xviii
- translated safety notices xv
- understanding xv

### SAN

- See storage area network (SAN)

### SAN Data Gateway Module

- See Storage Area Network (SAN) Data Gateway Module

### SC connector 7

### Scan Barcode dialog 111

### Scanner dialog 139

### scanning a bar code 111, 139

### SCSI cables

- connecting 48, 50
- description 24, 28

### SCSI commands, for drive and library 183

### SCSI dialog 122

### SCSI host adapter card, installing 62

### SCSI ID, setting 60

- drive 61, 125
- library 60, 122

### SCSI interface 1

- bus cable 24, 28
- cable connections 47, 48
- description 1, 6
- high voltage differential (HVD/DIFF) 6
- low voltage differential/single ended (LVD/SE) 6
- narrow data transfer 6, 7
- setting IDs 60
- supported adapters 7
- supported commands 183
- wide data transfer 6, 7

### SCSI ports, on SAN Data Gateway Module 7

### SCSI wrap test 149

### SCSI wrap tool 24, 28

### Secure dialog 129

### security of data on cartridge 170

### security, library

- disabling 131
- enabling 129

### Self Test dialog 145

### self test, of library 145

### Sensor dialog 136

### serial number

- RMU 57
- tape library 8, 151

### server

- configuring library to 62
- supported 3

### service action codes 133, 195

### service clearance 18

### Service menu 132

### service on library

- advanced 134
- basic 132, 133

### setting date and time 127

### setting library password 129, 131

### setting SCSI IDs

- drive 60, 61, 125
- library 60, 122

### setting the write-protect switch 159

### Setup menu 121

### sharing, library by servers 3

### shutdown

- emergency 77
- normal 77

### signal cable, SCSI 24, 28

### Simple Network Management Protocol (SNMP), use with RMU 15

### single-slot I/O station 11

### sled, description of tape drive 8, 14

### sling, for lifting library 25, 29

### Slot dialog 94

### small computer systems interface

- See SCSI interface

### SNMP

- See Simple Network Management Protocol (SNMP), use with RMU

### softkeys 65

### software

- installing 62
- supported backup application 4

### Solaris 3

### specifications

- for bar code and bar code label 156, 157
- for library 17
- for media 161

### stacking tape cartridges 160

### Start dialog 133

### starting up tape library 52, 76

### state, changing library 90

### Status menu 92

### status, viewing

- drive 99
- library 71
- media 97
- storage slot 94

### Step dialog 138

### storage area network (SAN) 2

- accessing 2

### Storage Area Network (SAN) Data Gateway Module

- configuring 60

- Storage Area Network (SAN) Data Gateway Module
  - (*continued*)
    - description 2, 8, 16
    - installing 44
    - operating 75
    - port speeds 3
    - use in Fibre Channel connectivity 7
- storage column, installing 46
- storage slot
  - numbering 12
  - status 94
- Storage Technology Corporation 4
- storing cartridges in I/O station 128
- StorWatch Specialist application
  - use with RMU 15, 70
  - use with SAN Data Gateway Module 16
- stuck tape, manually removing from drive 174
- subscriber connector (SC) 7
- summary of changes xxiii
- Sun server 3
- supplies, ordering 170
- supported browsers for RMU 15
- supported device drivers 5
- supported SCSI commands, for drive and library 183
- supported servers and operating systems 3
- supported software 4
- supported TapeAlert flags
  - drive 185
  - library 187
- symbols
  - in drive status area 69
  - in I/O station status area 67
- Syncsort Inc. 4
- System dialog 93

## T

- tape cartridge
  - bar code label
    - description 157
    - for physical library 157
    - guidelines for using 158
    - ordering 171
    - specifications 156, 157
  - capacity 156
  - cartridge door 156
  - cleaning cartridge 24, 28, 156, 170
  - data cartridge 24, 28, 156, 170
  - data security 170
  - degaussing 160, 170
  - description 2, 155, 156
  - dimension of tape 156
  - disposing of 170
  - ejecting 173
  - exporting from library 114, 116
  - handling 160
  - importing into library 114, 115
  - inserting into library 78
  - labels 156
  - leader pin 156
  - Linear Tape-Open cartridge memory (LTO-CM) 156

- tape cartridge (*continued*)
  - load and unload cycles 156
  - manually removing 174
  - maximum quantity in library 2
  - moving 106, 137
  - ordering 170
  - recording method, of tape drive 156
  - removing from library 79
  - specifications for media 161
  - stacking 160
  - status, viewing 97
  - storing in I/O slots 128
  - unloading 118
  - VOLSER 97, 157
  - write-protect switch 156, 159
- tape drive
  - bandwidth considerations 20, 21
  - basic service functions 148
  - cleaning 86
  - description 8
  - diagnostics 148, 149
  - error codes 205
  - Fibre Channel connection 7
  - multiple, operating concurrently 19
  - numbering in library columns 12
  - performance, variables that affect 19
  - quantity in library 2
  - removing or replacing 150
  - resetting 119
  - SCSI connection 6
  - SCSI ID
    - requirement 6
    - setting 61, 122, 124
  - supported 1
  - updating firmware
    - by using FMR tape 83
    - by using RMU 82
    - by using SAN Data Gateway Module 80
    - by using SCSI bus 83
- tape drive sled
  - description 8
  - installing 40
- TapeAlert flags
  - supported by the drive 185
  - supported by the library 187
  - use with RMU 15
- TapeWare 4
- Teach dialog 147
- temperature specification
  - for library 17
  - for media 161
- termination
  - Fibre Channel drives 51
  - SCSI drives 49
- terminator 24, 28
- testing
  - cartridge movement 144
  - drive head 149
  - drive read/write function 149
  - lock and unlock function 145
  - media 149

- testing (*continued*)
  - motor movement 145
  - power connection 149
  - SCSI function 149
  - sensor 145
- time, setting 127
- Tivoli Storage Manager 4
- turning on power to library 52, 76

## U

- Ultrium Tape Drive 1, 14
- Unload dialog 118
- unloading a tape cartridge 118
- unpacking the tape library 23
- updating firmware
  - by using an FMR tape 83
  - by using the library serial port 80, 85
  - by using the RMU 73
  - by using the SAN Data Gateway Module 80
  - by using the SCSI bus 83
  - drive 73, 80, 82, 83, 120
  - library 73, 80, 82, 83, 85, 135
  - RMU 73, 80, 82
- URL identifier, in top information frame 75
- using the operator panel 88
- Utils submenu 126

## V

- verifying firmware levels 80
- VERITAS Software Corporation 4
- vertical (Y) axis drive
  - description 15
  - locating to home position 143
  - manipulating 140, 141, 142
- viewing
  - history of drive errors 102
  - history of library errors 101
  - history of library operations 100
  - latest supported attachments to the tape library 5
  - status
    - drive 99
    - of library 93
    - of media 97
    - of storage slot 94
- VOLSER
  - See volume serial number (VOLSER)
- voltage, specification 17
- volume serial number (VOLSER) 97, 157

## W

- weight of tape library 17
- wet bulb temperature specifications
  - library 17
  - media 161
- wide data transfer 6, 7
- width of tape library 17
- Windows 2000 3
- Windows NT 3

- write-protect switch
  - location 156
  - setting 159

## X

- X-axis drive 15
- xSeries server 3

## Y

- Y-axis drive 15
- Yosemite Technologies, Inc. 4

## Z

- Z-axis drive 4

---

# Readers' Comments — We'd Like to Hear from You

3583 Ultrium Scalable Tape Library  
Setup and Operator Guide

Publication No. GA32-0411-03

Overall, how satisfied are you with the information in this book?

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Overall satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How satisfied are you that the information in this book is:

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Accurate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easy to find	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Well organized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Applicable to your tasks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please tell us how we can improve this book:

Thank you for your responses. May we contact you?  Yes  No

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you.

---

Name

---

Address

---

Company or Organization

---

Phone No.



Fold and Tape

Please do not staple

Fold and Tape



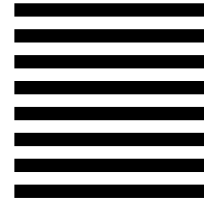
NO POSTAGE  
NECESSARY  
IF MAILED IN THE  
UNITED STATES

# BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

International Business Machines Corporation  
Information Development  
Department GZW  
9000 South Rita Road  
Tucson, Arizona U.S.A. 85775-4401



Fold and Tape

Please do not staple

Fold and Tape





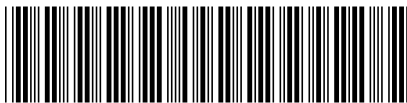


Part Number: 19P5308



Printed in the United States of America  
on recycled paper containing 10%  
recovered post-consumer fiber.

GA32-0411-03



(1P) P/N: 19P5308



Spine information:



3583 Ultrium Scalable Tape  
Library

3583 Tape Library Setup and Operator Guide