

IBM 3592 TS1140, TS1150, TS1155, and
TS1160 Tape Drives

*Maintenance Information
Rack Mount Models EH7, EH8, 55F, and
60F*



Read this first

This Maintenance Information (MI) is intended for use only by trained, IBM® service personnel. Use the MI as a guide when you make a service call to diagnose or maintain an IBM 3592 tape drive.

How to use this information

- Go to “Maintenance starting point” on page 1 to begin all service activity.
- The glossary, beginning on page “Glossary” on page 297, provides terms and abbreviations that are used throughout this Maintenance Information (MI) document.
- **Do not use this MI** to complete service procedures on an IBM TS3500 Tape Library 3584, **but refer to the MI** for that product. If the drive is installed in a 3584 and you need operator information, use the TS3500 (3584) Operator Guide.
- **Do not use this MI** to complete service procedures on a 3592 EH7, EH8, 55F, or 60F drive installed in an IBM TS4500, **but refer to the Knowledge Center** for that product. If the drive is installed in a 3584 and you need operator information, use the TS4500 (3584) Operator Guide.
- In this MI, any reference to the **Operator** panel, or **Service** panel, or **Virtual Service** panel, refers to the **Virtual Operator** panel.
- Many figures in this MI depict typical representations of all 3592 drives, and might not exactly depict your drive.
- Review [Table 1 on page ii](#) to learn about some directional terms and other conventions that are used in this MI.



Attention: The customer must be instructed to not put the system into a dusty or contaminated environment that contains corrosive gases (for example, high sulfur) or metallic shavings (for example, zinc whiskers). Dusty environments can impact the air-cooling of assemblies and corrosive gasses can degrade components, causing a change to their characteristics, leading to a breakdown of the equipment.

This term . . .	. . . imparts this knowledge.
Front	Refers to the end of the drive where the tape cartridge enters the drive.
Left or left-hand drive	Refers to the drive on the left as you face the rear of a frame (the cable-connection end of a drive).
See	Directs you to page to another area in this MI for information
Refer to	Directs you to consult another publication or source for information.
3592 or drive	For this MI, the terms 3592 and drive imply any 3592 drive, such as the 3592 EH7 drive.
4804	Refers to the rack mount chassis or enclosure where the 3592 drives are installed

Sending comments

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Preface

This manual is for use by service personnel who intend to install, remove, diagnose, repair, or test the IBM 3592 drive.

Related information

Additional information related to the subsystem is available in the following publications:

- *IBM 3592 Models E07/E08, EH7/EH8, 55F, and 60F Tape Drives Knowledge Center* http://www.ibm.com/support/knowledgecenter/STPRH6/com.ibm.storage.drives.doc/jag_ichome.html
- *IBM External Key Manager Introduction, Planning, and User's Guide*, GA76-0418
- *IBM Tape Drive 3592 SCSI Reference*, GA32-0968
- *IBM 3592 Subsystem Solution Assurance Product Review (SAPR) Guide*, SA03-022
- *IBM Care and Handling of the IBM Magnetic Tape Cartridge*, GA32-0047
- *IBM Externally Attached Devices Safety Information*, SA26-2004
- *Electrical Safety for IBM Customer Engineers*, S229-8124
- *IBM Statistical Analysis and Reporting System User Guide*
- *Systems Safety Notices* (formerly known as "eServer Safety Notices"), G229-9054
- *IBM Tape Device Drivers Installation and User's Guide*, GC27-2130

3584 information

Do not use the 3592 tape drive MI to complete service procedures on an IBM TS4500 tape library (3584). Refer to the IBM TS4500 Knowledge Center.

Fibre Channel attachment information

- *IBM Fibre-Optic Channel Link Planning and Installation*, GA32-0367
- *Fibre Channel Storage Hub IBM 2103 Model H07 Installation, Service, and User's Guide*, SC26-7289
- *IBM 2109 S08 Switch User's Guide*, SC26-7349
- *IBM 2109 S08 Switch Service Guide*, SC26-7350
- *IBM 2109 S16 Switch User's Guide*, SC26-7351
- *IBM 2109 S16 Switch Service Guide*, SC26-7352

Website information

Table 2: Information website URLs

IBM RMSS product manuals	http://www.storage.ibm.com/hardsoft/tape/pubs/pubs3592.html
Storage area networks (SAN) and Fibre Channel support information	http://www-03.ibm.com/servers/storage/support/san/index.html
Open System Support information	http://www-03.ibm.com/servers/storage/tape/ts1120/
3592 Firmware and Device Driver matrix	http://www-03.ibm.com/servers/storage/tape/compatibility/pdf/3592attach.pdf

Table 2: Information website URLs (continued)

<i>Statistical Analysis and Reporting System User Guide (SARS)</i>	http://www.storage.ibm.com/hardsoft/tape/pubs/pubs3590.html Select '3590 Enterprise Tape Drive' not '3592 Enterprise Tape Drive.'
Currently available microcode	http://www.ibm.com/support/fixcentral
<i>Practical Guide for SAN with System p</i>	http://www.redbooks.ibm.com
Linux and Linux System z support	http://www-1.ibm.com/servers/eserver/zseries/connectivity/
Device driver information	http://www.ibm.com/support/fixcentral
T10 Standards Committee	http://www.t10.org
FIPS PUB 140-2, Security Requirements for Cryptographic Modules	http://www.itl.nist.gov/fipspubs/
RMSS PFE home page	http://snjInt02.sanjose.ibm.com/tape/tapetec.nsf
3592 Drive PFE website	http://snjInt02.sanjose.ibm.com/tape/tapetec.nsf/pages/3592page00
Terms that are not found in <u>“Glossary”</u> on page 297	<ul style="list-style-type: none"> • www.ibm.com/ibm/terminology • www-01.ibm.com/software/globalization/terminology/index.jsp

Chapter 1. Start

Maintenance starting point

Begin all maintenance activity here. Most drive failures result in a FID (FRU identifier) error code on the drive service panel. Some load or unload problems also might result in ATTN DRV messages. All of these error codes and messages are recorded in the drive CE Error Log. See [“CE Logs menu \(CE Offline Mode\)”](#) on page 133 for details.

Notes:

- If the service call is on a status 3 machine, see [“General instructions”](#) on page 156, then return here to continue the service call.
- Many figures and examples in this MI are typical representations of all 3592 drives. Unless otherwise indicated, substitute this drive type with the drive type of your drive. Distinctions among drive models are mentioned where appropriate.
- The ascending succession of 3592 Drive models is EH7, EH8, 55F, and 60F (Fibre Channel).
- Drive-cooling fans can cycle on and off and vary motor speed during normal operation.
- See [“Glossary”](#) on page 297 for a history of previous names for products like System i.

Table 3 on page 1 lists some possible reasons for service and the associated service action. Find in the left column the reason that you are here, and complete the stated action that is listed in the right column. After the failing hardware is determined, remove and replace the FRU, as directed. After any hardware replacement or other maintenance action is completed, go to [“End of call”](#) on page 185.

If you are unable to determine the cause of the problem (No Defect Found), or the problem is intermittent, or the symptoms change, go to [“Problem determination”](#) on page 182.

The next level of support needs an understanding of the error, the EC level, and link level of the microcode, and any recent error codes and messages that are recorded in the CE Error log. See [“Appendix D. Minimum microcode requirements”](#) on page 288 to verify the level of microcode that is installed in your drive.

If you are here for this reason . . .	Complete this action . . .
Install the 3592 drive canister	Go to “Before installation” on page 168.
Install one model of 3592 drive canister in place of a different model.	Refer to the Feature code or an Installation Instruction for that activity. See Table 138 on page 168.
FID message at the host, service panel, operator display, or CE Error Log in the device	Go to “FID entry point” on page 6.
Attention (ATTN) message from the host, service panel, operator display, or CE Error Log in the device	Go to “Attention Drive (ATTN DRV) messages” on page 11.
TapeAlert message from the host	Go to “TapeAlert reporting” on page 12.
Analyze 3592 drive CE Error Log	Go to “CE Error Log menu” on page 134.

<i>Table 3: Start here (continued)</i>	
If you are here for this reason . . .	Complete this action . . .
SIM message	Use the MSG section to get Message Code and FID. See “Message codes” on page 45, which contains SIM and MIM messages. See Figure 11 on page 40 for the location of the FID in the SIM record. Complete the stated action that is associated with the Message Code or from the displayed FID.
SIM service message	See “SIM/MIM service messages” on page 46. Read and understand the meaning of the service message. Use the MSG section to get message code and FID. See also “Message codes” on page 45. SIM format is shown on Figure 11 on page 40. Complete the stated action in the Message Code or from the displayed FID.
MIM message	See “Message codes” on page 45. For MIM format, see Figure 12 on page 42. Use this information to obtain the Message Code. Complete the stated action in the Message Code.
MIM exception message	See “MIM exception messages” on page 46. Read and understand the meaning of the exception message, then use the MSG section to get the message code from the MIM record. See “Message codes” on page 45 and complete the action for the Message Code. See also Figure 12 on page 42.
Fibre Channel Messages that are displayed on the service panel.	Go to “Fibre Channel problem determination” on page 237.
Drive Status LED on back of drive is flashing yellow.	A Drive Status message is available at the service panel. Install the service panel to display the error message.
Drive Status LED on back of drive is solid yellow.	POST diagnostic tests are running or a power cycle is started. If this condition continues, go to “FID entry point” on page 6 and use FID 84 or FID E6.
Fibre Channel Port 0 or Port 1 LED on back of drive is OFF.	<ul style="list-style-type: none"> • The normal condition if the port is not being used. <p style="text-align: center;">--OR--</p> <ul style="list-style-type: none"> • If the port is being used, ensure that the Fibre Channel cable is connected. Go to “Fibre Channel problem determination” on page 237.
Fibre Channel Port 0 or Port 1 LED on back of drive is flashing yellow	Fibre Channel communications were interrupted and are in recovery. If this condition continues, go to “Fibre Channel problem determination” on page 237.

<i>Table 3: Start here (continued)</i>	
If you are here for this reason . . .	Complete this action . . .
Fibre Channel Port 0 or Port 1 LED on back of drive is solid green.	<p>Fibre Channel connections are detecting light, but no data is being transferred.</p> <ol style="list-style-type: none"> 1. Wrap tools are installed. Remove the wrap tools, and connect the Fibre Channel cables. 2. Drive is offline to the host. Use the service panel to set the drive online, then reset the drive. See “Services menu” on page 97. 3. If this condition continues, go to “Fibre Channel problem determination” on page 237.
Power LED at back of drive is OFF (see Figure 4 on page 31 for LED location).	Go to “Power problems MAP” on page 193 .
Drive does not power ON.	Go to “Power problems MAP” on page 193 .
AC or DC LEDs on power supply indicate an error.	Go to “Power problems MAP” on page 193 .
Power supply LEDs do not light.	Go to “Power problems MAP” on page 193 .
Library LED at back of drive is OFF (see Figure 4 on page 31 for LED location).	The normal condition if the RS-422 or SDLC port is not used.
Front panel (bezel) problems such as a blank 8-character display or no power LED on back of drive	Go to FID entry point on page “FID entry point” on page 6 : FID AF.
Stuck tape or cartridge	Go to “Manual cartridge removal” on page 195 .
Replace a leader pin	Customer responsibility (see <i>3592 Drive Operator Guide</i>)
Clean messages on service panel or reported to the host, or you suspect that the drive must be cleaned	<p>Insert the cleaning cartridge in the drive; cleaning is completed automatically.</p> <p>Note: If an excessive number of clean messages appeared (that is, the additional message Clean Required appeared on the service panel), go to “Excessive Clean messages” on page 183.</p>
Drive rejects cleaning cartridge, and posts "Clean Required" message	Because the cleaning cartridge reached its end of life, a cleaning cycle cannot be allowed. Ask the customer to replace the cleaning cartridge. Refer to the <i>3592 Drive Operator Guide</i> .
Excessive temporary errors reported to the host	<ol style="list-style-type: none"> 1. Review the temporary error log. See “CE Temp Error Log menu” on page 137. Alternative error logs are the FID FE error log and the FID FF error log. See “CE Logs menu (CE Offline Mode)” on page 133 for a description of the error logs. 2. Go to Chapter 3, “Messages,” on page 39 for your system. <ol style="list-style-type: none"> a. Review “Message codes” on page 45. b. Review “Sense Keys, ASC, and ASCQ information” on page 47. 3. Ensure that the Force Error Log option is OFF. Go to “CE Config/Install menu” on page 118.

<i>Table 3: Start here (continued)</i>	
If you are here for this reason . . .	Complete this action . . .
Media surface errors reported by AIX	<ol style="list-style-type: none"> 1. Go to “Error Log Analysis - AIX” on page 53. Analyze the error log for media surface errors. 2. Contact your next level of support for further assistance.
Drive status indicator	Look for FIDs.
Tape write-protected errors	<ul style="list-style-type: none"> • If the write-protected icon appears on the service panel, the tape is either physically write-protected, or the customer used a SCSI command to logically write-protect the tape. Inform the customer that this action is normal operation. <p>--OR--</p> <ul style="list-style-type: none"> • If the write-protected icon does not appear on the service panel, the drive had a problem with reading the tape at the load point. Something might be wrong with the cartridge. Try writing on a different cartridge. If a failure occurs on multiple cartridges, go to FID entry point on page “FID entry point” on page 6: FID 85.
No Defect Found (NDF), intermittent, or changing symptoms	Go to “Problem determination” on page 182.
Service panel processor check light remains ON after power-on reset	Replace the drive canister. Go to “FID 85: Drive canister” on page 252.
Service panel displays the CE Options menu rather than the Services menu after a power-on sequence	1. Go to FID entry point on page “FID entry point” on page 6: FID 85.
Host-reported Fibre Channel interface problems (errors processing requests/responses, loop up/down/parity errors, LIP condition, timeouts, and similar errors)	Go to “Fibre Channel problem determination” on page 237.
Host-reported problem during Installation. Cannot get the drive online to the Host	Ensure that you have a valid fibre address. See “Setting customer options” on page 175.
Cannot get the drive online to the host	Ensure that the Port/Node Names (WWID) are unique. If two drives in an installation have the same WWID, only one is recognized by the host. See “Displaying WW names” on page 207.
Windows host-reported problem after a service activity. Cannot get the drive online to the host.	<ul style="list-style-type: none"> • Have the customer complete a Rescan Drive procedure from the host. <p>--OR--</p> <ul style="list-style-type: none"> • Force a rescan drive by disconnecting and reconnecting the fibre cables from the rear of the drive.
Drive communication problem (host related)	See the “Operator Mode menus” on page 97 beginning on page “Operator Mode menus” on page 97 for drive-addressing and setting information. See the library MI for more troubleshooting procedures.

<i>Table 3: Start here (continued)</i>	
If you are here for this reason . . .	Complete this action . . .
Ethernet problem that is suspected	Go to “Ethernet (laptop) Drive Dump procedures” on page 187
Microcode problem that is suspected	Go to “Suspected microcode problem” on page 246.
Load or update microcode	Go to “Microcode maintenance” on page 217.
Determine whether the drive is using FIPS (PUB 140-2) certified microcode (to maintain FIPS compliance) Note: FIPS-certified microcode is not available as factory-installed microcode.	If you determined from the customer that a drive uses FIPS-certified microcode or if you want to determine what level of microcode is FIPS-certified, refer to one of these websites for drive microcode information: <ul style="list-style-type: none"> • Internal http://snj1nt02.sanjose.ibm.com/tape/tapetec.nsf/pages/3592page00 • External http://www.ibm.com/support/fixcentral You can learn about FIPS certification at the website http://www.itl.nist.gov/fipspubs/
Enable or disable drive encryption	Go to “Setting drive encryption” on page 250.
Change the drive default density setting	Go to “Setting default density” on page 249.
Set error match trap	Go to “Setting the error match trap (to get dump)” on page 246.
Remove error match trap	Go to “Removing the error match trap” on page 247.
Offload memory dump to host with Fibre Channel	Go to one of these areas - <ul style="list-style-type: none"> • “Offloading Dumps to System i (OS/400)” on page 212 • “Offloading dumps to AIX with TAPEUTIL” on page 212 • “Offloading dumps to Solaris system with TAPEUTIL” on page 214 • “Offloading dumps to HP-UX system with TAPEUTIL” on page 215 • “Offloading dumps to Windows system with NTUTIL” on page 216 • “Offloading dumps to Linux system with TAPEUTIL” on page 213
Offload memory dumps to flash	Go to “Offloading the dump to flash memory” on page 211.
Clear flash memory dump memory or auto memory dumps to flash memory	Go to “Clearing flash dump memory” on page 211.
Retrieve automatic memory dump to flash	Complete the same action by which you retrieve or obtain any other memory dump from memory. Use only when directed by your next level of support.

<i>Table 3: Start here (continued)</i>	
If you are here for this reason . . .	Complete this action . . .
Microcode update from host with Fibre Channel	Go to one of the following areas - <ul style="list-style-type: none"> • “Updating microcode from System i (OS/400)” on page 217 • “Updating microcode from AIX with TAPEUTIL” on page 218 • “Updating microcode from Solaris with TAPEUTIL” on page 220 • “Updating microcode from HP-UX system with TAPEUTIL” on page 221 • “Updating microcode from Windows with NTUTIL” on page 222 • “Updating microcode from Linux with TAPEUTIL” on page 219
Obtain and analyze error log and sense information data from RS/6000®	Go to “Error Log Analysis - AIX” on page 53.
Obtain and analyze error log and sense information data from Linux system	Go to “Obtaining drive error information from Linux system” on page 68.
Obtain and analyze error log and sense information data from System i (OS/400)	Go to “Error Log Analysis - System i” on page 63.
Obtain and analyze error information from Solaris systems	Go to “Obtaining drive error information from Solaris system” on page 70.
Obtain and analyze error information from Hewlett-Packard (HP-UX) systems	Go to “Obtaining drive error information from HP-UX system” on page 71.
Obtain and analyze error information from Windows systems	Go to “Obtaining drive error information from Windows system” on page 71.
Locate FRUs or replace defective FRUs	Go to Chapter 8, “Locations, checks, adjustments, removals, and replacements,” on page 251.
Vary (take) the device offline	Have the customer vary (take) the device offline.
Power OFF the 3592 drive	Go to “Powering the device ON and OFF” on page 183.
Remove the 3592 drive	Go to “Removing the drive from service” on page 180
Inspection for maintenance agreement qualification	See “General instructions” on page 156 for the safety inspection procedures.

FID entry point

Table 4 on page 7 lists the FRU identifiers (FIDs) that you might see and the field replaceable units (FRUs) that you can change. The reported FID is displayed on the service panel or the library manager in a FID message, is noted in the CE Error Log, and is reported to the host. For example, in the message FID1 82, **1** is the severity and **82** is the FID. [“Intervention messages” on page 84](#) describes the different types of messages and their impact on 3592 drive availability. The service information message (SIM) record, which the 3592 drive sends to the host, also has the reported FID information. See [“Service and Media Information messages \(SIMs and MIMs\)” on page 39.](#)

The following list also contains the FRU name and a page reference to the removal and replacement procedure for the FRU. Each FRU is identified by a 1-byte identifier (FID). The FID relates to the FRUs that have the highest probability of causing the problem. Always replace the FRU with the highest probability of failure first.

At the start of your service call, write down the reported FID and the 12 hex characters of support data. You might need this information if you contact your next level of support.

- FID is displayed in the service panel, see [Figure 35 on page 87](#). The 12 characters of support data are shown below the CALL FOR SERVICE message.
- FID was reported in one of the Error Logs, see [“CE Logs menu \(CE Offline Mode\)” on page 133](#). The 12 characters of support data are shown below the reported FID.

Reported FID	FRUs	FRU name or description	Probability	Page reference or instruction
50	An incorrect encryption configuration that is installed during manufacturing			
	85	Drive canister	100%	• “FID 85: Drive canister” on page 252
51	Encryption power-on self-test (POST HW) failed			
	85	Drive canister	100%	• “FID 85: Drive canister” on page 252
52	Encryption firmware power-on self-test (POST HW) failed			
	85	Drive canister	100%	See 'Reported FID 84' in this table
53	Encryption self-test (started) - An explicitly started encryption self-test failed			
	83	Drive microcode	50%	“FID 84 or E6 - Isolating fault between microcode and hardware” on page 240
	85	Drive canister	50%	• “FID 85: Drive canister” on page 252
54	Encryption self-test (automatic) - An automatically started encryption self-test failed			
	83	Drive microcode	20%	“FID 84 or E6 - Isolating fault between microcode and hardware” on page 240
	85	Drive canister	80%	• “FID 85: Drive canister” on page 252
55	Encryption module failure			
	83	Drive microcode	20%	“FID 84 or E6 - Isolating fault between microcode and hardware” on page 240
	85	Drive canister	80%	• “FID 85: Drive canister” on page 252
58	Encryption error			
	85	Drive canister	100%	• “FID 85: Drive canister” on page 252

Table 4: FIDs and FRUs (continued)

Reported FID	FRUs	FRU name or description	Probability	Page reference or instruction
59	Decryption error - Error was detected during the decryption of data			
	83	Microcode	25%	“FID 84 or E6 - Isolating fault between microcode and hardware” on page 240
	-	Encryption Key Manager	25%	<i>IBM External Key Manager Introduction, Planning, and User's Guide</i>
	87	Tape cartridge	25%	“FID 87 or F2 - Isolating fault between media and hardware” on page 243
	85	Drive canister	25%	• “FID 85: Drive canister” on page 252
5A	Encryption Key Manager failure - An unexpected status was returned by the key manager. Check the proxy interface and the Encryption Key Manager log. Note: This issue is not a drive or microcode problem. The customer must isolate the problem from this symptom.			
5B	Encryption PROXY failure - A failure or timeout occurred on the proxy interface. Check the proxy interface and the Encryption Key Manager log. Note: This issue is not a drive or microcode problem. The customer must isolate the problem from this symptom.			
5F	Security prohibited function - A function was attempted which is prohibited.			
81	Thermal sensor detected overtemperature condition 1. If you suspect that the problem is because of environmental conditions, you can order and use a datalogger tool (P/N 45P5917) to record ambient temperature. Contact your next level of support for procedures to correct this condition. 2. If the environmental conditions are within specification and the problem persists, replace the drive canister.			
	85	Drive canister	100%	• “FID 85: Drive canister” on page 252
82 or C1	Drive voltage not within specification, the drive detects a power outage, or a power supply-cooling fan failed Notes: • This error can be triggered only when a tape is loaded in the drive. • This error can take up to 50 minutes to be reported after the condition is detected.			
	82	Power supply	88%	“Power problems MAP” on page 193
	EA	Power supply cables	8%	• “FID EA: Cables FRU kit” on page 255
	85	Drive canister	4%	• “FID 85: Drive canister” on page 252
83 or E5	Microcode fault			
	83	Microcode	100%	“FID 83 or E5 - Microcode problem” on page 239

Table 4: FIDs and FRUs (continued)

Reported FID	FRUs	FRU name or description	Probability	Page reference or instruction
84 or E6	Timing problem in the microcode or the electronics, or multiple check-1 errors occurred			
	83	Microcode	50%	“FID 84 or E6 - Isolating fault between microcode and hardware” on page 240
	85	Drive canister	40%	• “FID 85: Drive canister” on page 252
	82	Power supply	7%	“Power problems MAP” on page 193
	EA	Power supply cables	3%	• “FID EA: Cables FRU kit” on page 255
85	Read/write, or track-following error			
	87	Cartridge	5%	“FID 87 or F2 - Isolating fault between media and hardware” on page 243
	85	Drive canister	95%	• “FID 85: Drive canister” on page 252
86 or F2	Hardware or media fault FID 87 or F2 that occurs while the Test Drive or Test Device diagnostic test is run, can be caused by a drive that needs calibration. An automatic calibration step runs during the longer Test Device diagnostic test. In addition, an automatic calibration step is run if the initial pass fails, during the short Test Drive diagnostic test.			
	87	Tape Cartridge	50%	“FID 87 or F2 - Isolating fault between media and hardware” on page 243
	85	Drive canister	50%	• “FID 85: Drive canister” on page 252
87 or FE	Cartridge problem			
	87	Tape cartridge	95%	“FID 87 or F2 - Isolating fault between media and hardware” on page 243
	85	Drive canister	5%	• “FID 85: Drive canister” on page 252
8A, D0, or D8	Degraded hardware - Customer jobs continue to run, but with degraded performance. Complete the action, at your earliest convenience.			
	85	Drive canister	100%	• “FID 85: Drive canister” on page 252
AA	General configuration problem			
	-	Configuration problem	90%	1. Reset drive 2. Go to “Installation checkout” on page 174.
	-	Invalid drive serial number	10%	Enter valid drive serial number. Go to “CE DRV Ser No menu (CE Offline Mode)” on page 121.
AC	Worldwide ID is blank, is invalid, or cannot be read			
	85	Drive canister	-	If you are installing a new drive, contact your next level of support and report this problem. If it is an existing drive, try to reenter the WWID (see “Setting WW names” on page 208.) Go to - • “FID 85: Drive canister” on page 252

Table 4: FIDs and FRUs (continued)

Reported FID	FRUs	FRU name or description	Probability	Page reference or instruction
AF	Eight-character operator display problem			
	85	Drive canister	100%	• “FID 85: Drive canister” on page 252
BF	Failure to electronically detect fan motion in the drive canister Note: This error can take up to 5 minutes to be reported after the condition is detected.			
	85	Drive canister	100%	• “FID 85: Drive canister” on page 252
C1	See 'Reported FID 82' in this table			
D0	See 'Reported FID 8A' in this table			
D8	See 'Reported FID 8A' in this table			
E4	Drive electronics			
	85	Drive canister	95%	• “FID 85: Drive canister” on page 252
	EA	Cards and power supply cables	5%	• “FID EA: Cables FRU kit” on page 255
E5	See 'Reported FID 83' in this table			
E6	See 'Reported FID 84' in this table			
ED	Flashdump			
	-	Memory dump exists in flash memory	-	Informational message that the memory dump is in flash memory. See “Offloading the dump to flash memory” on page 211 or “Clearing flash dump memory” on page 211 .
F2	See 'Reported FID 86' in this table			
F5	Fibre Channel error			
	F5	Interface, operator procedural, or host problem	-	“Fibre Channel problem determination” on page 237
F6	Informational message--Cleaning required			
	F6	Operator, procedural, or host problem	-	-
F7	Fibre Wrap Test Failure If you are running the Fibre Wrap Test, check the following before you replace the drive canister - 1. If you are running the Wrap Test at the drive itself, ensure that the wrap tool is making a good connection, or try a different wrap tool. Rerun the test to ensure that the drive canister is at fault. 2. If you are running the Wrap Test through the fibre cable when you received this error, try the Wrap Test at Drive. If the test runs without error at the drive, replace the cable. If the test still provides FID F7, replace the drive canister.			
	-	Fibre Channel cable	10%	Table 140 on page 178
	85	Drive canister	90%	• “FID 85: Drive canister” on page 252

Table 4: FIDs and FRUs (continued)

Reported FID	FRUs	FRU name or description	Probability	Page reference or instruction
FE	See 'Reported FID 87' in this table			
FF	Informational or non-hardware related status or error			
	-	Operator procedural or host problem	-	“FID FF - Operator action or host program error” on page 245

Attention Drive (ATTN DRV) messages

ATTN DRV message **is displayed on the service panel** (not from CE Error Log).

1. If ATTN is displayed, press **Enter**. If a FID appears, go to [“FID entry point” on page 6](#).
2. If no FID is presented, use the ATTN DRV message, and follow the Error Log procedure.

--OR--

ATTN DRV message is from the CE Error Log ([“CE Error Log menu” on page 134](#))

1. Go to [“CE Error Log menu” on page 134](#) and analyze the Error Log for any FIDs with a time stamp close to the time of the ATTN DRV message. If a FID appears to be associated with the ATTN DRV message, go to [Table 4 on page 7](#).
2. Error Log does not help identify a FID. Run **CE DIAGS** ([“CE Verify Fix/Diag menu” on page 108](#) or **Test Drive** function).
3. If **CE DIAGS** does not identify a FID, use the ATTN DRV message and [Table 5 on page 11](#) to find the fault.

Table 5: ATTN DRV messages

ATTN DRV	FRUs	FRU name or description	Probability	Page reference or instruction
Load Error	1. Ensure that the cartridge is not broken and that the leader pin is attached. See "Damaged Cartridges" in the <i>3592 Drive Operator Guide</i> . Have the customer replace the cartridge if it is damaged.			
	2. Ensure that the cartridge is a 3592 compatible-type cartridge.			
	3. Ensure that the cartridge is supported by the drive model.			
	87	Cartridge	35%	“FID 87 or F2 - Isolating fault between media and hardware” on page 243
	85	Drive canister	60%	• “FID 85: Drive canister” on page 252

Table 5: ATTN DRV messages (continued)

ATTN DRV	FRUs	FRU name or description	Prob-ability	Page reference or instruction
Unload Error	1. Ensure that the cartridge is not broken and the leader pin is attached. See "Damaged Cartridges" in <i>3592 Drive Operator's Guide</i> .			
	2. Ensure that the cartridge is a 3592 compatible-type cartridge.			
	87	Cartridge	35%	"FID 87 or F2 - Isolating fault between media and hardware" on page 243
	85	Drive canister	65%	<ul style="list-style-type: none"> "FID 85: Drive canister" on page 252
FSC Trap Taken	The microcode encountered the trap address that is set from a service panel menu.			
	-	Not a fault	-	-
Invalid Cartridge	Ensure that the cartridge is not damaged or broken and that the cartridge is a 3592 cartridge. Try another cartridge. Ensure that the cartridge is supported on the drive model.			
	87	Cartridge	95%	Ask customer to see "Damaged Cartridges" in <i>3592 Drive Operator Guide</i> .
	85	Drive canister	5%	<ul style="list-style-type: none"> "FID 85: Drive canister" on page 252
Clean Required	The drive is fenced and cannot be used until the drive is cleaned. This issue usually occurs when the customer ignores requests for a cleaning cycle.			
	-	Load cleaning cartridge	-	"Cleaning cartridge" on page 36

TapeAlert reporting

Note: Though not mentioned for every Customer Action, the customer must always call for IBM service after any unsuccessful attempt to recover from a failure or problem.

TapeAlert™ reporting is an industry standard that provides status monitoring and problem detection capability for tape devices with the fibre interface in an Open Systems environment. The TapeAlert interface uses as many as 64 alert flags, which are read by the host from the device by using log sense page 0x2e. Some of the flags are mandatory and must be supported by the tape drive. The remainder are non-mandatory flags and can be unsupported. All flags at the drive are cleared at Power On Reset (POR). Only those TapeAlert flags that are used by the 3592 drive are included here.

The 3592 drive supports the TapeAlert flags that are found in [Table 6 on page 12](#) that were developed for tape drive and autoloader devices.

Table 6: Supported TapeAlert flags. The **No.** column is presented in decimal format, not hexadecimal format.

No.	Flag	Description	Customer action	CE action
1	Read warning	The tape drive is having problems with reading data. No data is lost, but there is a reduction in the performance of the tape.	Isolate fault between drive and media.	Customer Responsibility, but if needed, go to "FID 87 or F2 - Isolating fault between media and hardware" on page 243 .

Table 6: Supported TapeAlert flags. The **No.** column is presented in decimal format, not hexadecimal format. (continued)

No.	Flag	Description	Customer action	CE action
2	Write warning	The tape drive is having problems with writing data. No data is lost, but there is a reduction in the capacity of the tape.	Isolate fault between drive and media.	Customer Responsibility, but if needed, go to “FID 87 or F2 - Isolating fault between media and hardware” on page 243.
3	Hard error	This flag is set for any unrecoverable read/write/positioning error, and is cleared when the cartridge is removed from the drive (this flag is set with flags 4, 5, or 6).	Look for accompanying TapeAlerts to help isolate the failure.	Same as Customer Action
4	Media	This flag is set for any unrecoverable read/write/positioning error that is because of faulty media, and is cleared when the cartridge is ejected.	Isolate fault between media and hardware.	Try other media. If problem persists, see Note 1.
5	Read failure	This flag is set for any unrecoverable read error where the isolation is uncertain and the failure can be either faulty media or faulty drive hardware. It is cleared when the cartridge is ejected.	Isolate fault between media and hardware.	If you have FID or ATTN MSG, complete Note 1. If no FID or ATTN MSG appears, go to “FID 87 or F2 - Isolating fault between media and hardware” on page 243.
6	Write failure	This flag is set for any unrecoverable write/positioning error where the isolation is uncertain and the failure can be either faulty media or faulty drive hardware. It is cleared when the cartridge is ejected.	Isolate fault between media and hardware.	If you have FID or ATTN MSG, complete Note 1. If no FID or ATTN MSG appears, go to “FID 87 or F2 - Isolating fault between media and hardware” on page 243.
7	Media life	The tape cartridge reached the end of its calculated, useful life (EOL).	<ol style="list-style-type: none"> 1. Copy data to another tape cartridge 2. Discard old (EOL) tape cartridge. 	None
8	Not data grade	The tape cartridge is not data-grade. Any data that you back up to the tape is at risk. The flag is set when severe servo problems are detected while a cartridge is loaded.	Isolate fault between media and hardware.	If you have FID or ATTN MSG, complete Note 1. If no FID or ATTN MSG appears, go to “FID 87 or F2 - Isolating fault between media and hardware” on page 243.

Table 6: Supported TapeAlert flags. The **No.** column is presented in decimal format, not hexadecimal format. (continued)

No.	Flag	Description	Customer action	CE action
9	Write protect	This flag is set when the tape drive detects the tape cartridge is physically write-protected and device driver sees a write command. It is cleared when the cartridge is ejected.	Set Write-Protect switch on the cartridge to OFF. Ensure that cartridge is not logically protected. Refer to the 3592 Drive Operator Guide.	Go to "Tape write-protected errors" in Table 3 on page 1 (page "Maintenance starting point" on page 1). See "Write-protected icons" on page 84 to read more about logical write-protect.
10	No removal	This flag is set when an Unload is attempted and SCSI Prevent Media Removal is set to ON. This flag is cleared when the cartridge is ejected.	Check for operator procedure error or customer software error.	None
11	Cleaning media	This flag is set when a cleaning cartridge is loaded into the drive. It is cleared when the cartridge is ejected.	No action is required. Status only.	None
12	Unsupported format	This flag is set when a non-supported cartridge type is loaded into the drive. It is cleared when the cartridge is ejected. This issue also can be caused by an FMR tape cartridge that is loaded for Read/Write.	Use supported tape cartridge.	If problem persists, consider media or drive failure. If you have FID or ATTN MSG, see Note 1. If no FID or ATTN MSG, go to "FID 87 or F2 - Isolating fault between media and hardware" on page 243.
14	Unrecoverable snapped tape	The operation failed because the tape is broken inside the drive.	Do not attempt to extract the tape cartridge. Call for Service.	Remove tape (see "Manual cartridge removal" on page 195). This problem can be caused by previously used drive. See Note 2 and "FID 87 or F2 - Isolating fault between media and hardware" on page 243.
15	Memory chip in cartridge	The memory in the tape cartridge failed.	Do not use the cartridge for further backup operation. Replace the cartridge.	None
16	Forced eject	This flag is set when a tape cartridge was manually removed during read or write operation. This flag is cleared when a cartridge is loaded in the drive.	No action is required. Status only.	None
17	Read-only format	This flag is set when a tape cartridge that is marked as read-only is loaded into the drive. It is cleared when the cartridge is ejected.	No action is required. Status only.	None

Table 6: Supported TapeAlert flags. The **No.** column is presented in decimal format, not hexadecimal format. (continued)

No.	Flag	Description	Customer action	CE action
18	Tape directory that is corrupted on load	Customer action optional. The drive automatically rebuilds the directory as data is read or the operator can reread all data from the tape to rebuild the directory.	Set when the tape drive detects that the directory is corrupted and results in longer file-search times. The flag is cleared when the cartridge is removed from the drive.	Can be caused by power failure or reset while tape is reading/writing. If problem persists, go to “FID 87 or F2 - Isolating fault between media and hardware” on page 243.
19	Nearing media life	Tape cartridge is nearing its specified end of life. This flag is cleared when the cartridge is ejected.	<ol style="list-style-type: none"> 1. Copy data to another tape cartridge 2. Replace the tape cartridge. 	None
20	Clean now	This flag is set when the tape drive detects it needs cleaning (performance problem) and is cleared when the drive is successfully cleaned.	Clean the tape drive at the earliest convenience, if not done automatically.	(Same as Customer Action)
21	Clean periodic	This flag is set when the tape drive detects it needs routine cleaning (based on usage) and is cleared when the drive is successfully cleaned.	Clean the tape drive between jobs if not done automatically.	None
22	Expired cleaning media	This flag is set when the tape drive detects that a cleaning cartridge expired. It is cleared when a valid cleaning cartridge is loaded.	Replace the cleaning cartridge.	None
23	Invalid cleaning cartridge	The drive expects a cleaning cartridge to be loaded, and the loaded cartridge is not a valid cleaning cartridge.	Use a valid cleaning cartridge.	None
25	Dual-port interface error	A redundant Fibre interface port on the tape drive failed.	Call for Service.	Go to “Fibre Channel problem determination” on page 237.
26	Cooling fan failure	A tape drive or power supply-cooling fan failed.	Call for Service.	Look for a displayed FID on service panel. If no FID exists, go to “Power problems MAP” on page 193.
27	Power supply	Power supply failed	Call for Service.	Go to “Power problems MAP” on page 193.
30	Hardware A	Tape drive has a hardware fault when it is reading or writing. It is cleared when the drive is reset.	<ol style="list-style-type: none"> 1. Eject the tape. 2. Reset the drive. 	See Note 1.

Table 6: Supported TapeAlert flags. The **No.** column is presented in decimal format, not hexadecimal format. (continued)

No.	Flag	Description	Customer action	CE action
31	Hardware B	This flag is set when the tape drive fails its internal Power-On Self-Test (POST), and is not cleared until the drive is powered OFF.	Call for Service.	See Note 1.
32	Interface	This flag is set when the tape drive detects a problem with the fibre interface. It is cleared when the drive is powered OFF, or a successful microcode update is completed.	Call for Service.	See Note 1.
33	Eject media	This flag is set when a failure occurs that requires the tape cartridge to be ejected from the drive and retried. The flag is cleared when the cartridge is ejected.	Try different media.	Try different media. If problem persists, go to “FID 87 or F2 - Isolating fault between media and hardware” on page 243.
34	Download fail	This flag is set when an FMR image is unsuccessfully downloaded to the tape drive with the fibre or RS-422 (LDI) interface. It is cleared when the drive is powered OFF or a successful microcode update is completed.	Call for Service.	Try microcode update procedure again (see “Microcode maintenance” on page 217).
36	Drive temperature	Drive temperature sensor indicates that the drive is too hot. It is cleared when the drive is powered off.	Call for Service.	Go to “FID 85: Drive canister” on page 252.
37	Drive voltage	This flag is set when the drive detects power supply voltages outside of the specified voltage limits. It is cleared when the drive is powered OFF.	Call for Service.	See Note 1.
38	Predictive failure	A hardware failure of the tape drive is predicted.	When it is convenient, call for Service.	See Note 1.
39	Diagnostics required	This flag is set when a tape cartridge or drive FID or ATTN DRV message is posted.	Call for Service.	See Note 1.
50	Lost statistics	Media statistics were lost at some time in the past.	No action that is required. Status only.	None

Table 6: Supported TapeAlert flags. The **No.** column is presented in decimal format, not hexadecimal format. (continued)

No.	Flag	Description	Customer action	CE action
51	Tape directory invalid at unload	The tape directory on the tape cartridge that just unloaded is corrupted. File search performance is degraded.	Customer action optional. The drive automatically rebuilds the directory as data is read or the operator can reread all data from the tape to rebuild the directory.	Can be caused by power failure or reset while tape is reading/writing. If problem persists, go to “FID 87 or F2 - Isolating fault between media and hardware” on page 243.
52	Tape system area write failure	The unloaded tape cannot write its volume control region (VCR) successfully.	Try another tape.	Go to “FID 87 or F2 - Isolating fault between media and hardware” on page 243.
53	Tape system area read failure	The tape VCR cannot be read successfully at load time.	Try another tape.	Go to “FID 87 or F2 - Isolating fault between media and hardware” on page 243.
54	No start of data	The start of data cannot be found on the tape.	Verify that you are using the correct format tape. Try another tape.	Go to “FID 87 or F2 - Isolating fault between media and hardware” on page 243.
55	Load failure	The operation failed because the media cannot be loaded and threaded.	Remove tape; try another tape.	Remove the cartridge. If problem persists, see ‘Load Error’ in Table 5 on page 11.
56	Unload failure	Tape does not eject and might require manual removal.	1. Press Unload . 2. Call for Service.	Go to “Manual cartridge removal” on page 195.
57	Interface	This flag is set when the tape drive detects a problem with the RS-422 (LDI) interface. It is cleared when the drive is powered OFF, or a successful microcode update is completed.	Call for Service.	See Note 1.
58	Firmware failure	Microcode problem	Call for Service	Go to “FID 83 or E5 - Microcode problem” on page 239.
59	WORM medium - integrity check failed	Drive determined that data on tape is suspect, from a WORM-point of view.	1. Copy the data to another WORM tape cartridge. 2. Discard the faulty WORM tape cartridge.	None
60	WORM medium - overwrite attempted	This flag is set when the drive rejects a write operation because the rules for allowing WORM-writes are not met. Data can be appended only to WORM media. Overwrites to WORM media are not allowed.	Write the data to a WORM tape cartridge or write the data to a non-WORM tape cartridge.	None

Table 6: Supported TapeAlert flags. The **No.** column is presented in decimal format, not hexadecimal format. (continued)

No.	Flag	Description	Customer action	CE action
<p>Note:</p> <ol style="list-style-type: none"><li>1. Look for a displayed FID or ATTN message, or an entry in the drive error log. See “CE Error Log menu” on page 134, or run diagnostic tests. Go to “Maintenance starting point” on page 1.<li>2. The broken tape can be caused by another drive nicking or otherwise damaging the tape before it was placed in the current drive.				

Chapter 2. Introduction

3592 introduction

The IBM 3592 tape drives provide high capacity, performance, reliability, and a wide range of host connectivity by using Fibre Channel technology. [Table 7 on page 19](#) provides a summary of drive functions and capabilities.

Capability	EH7	EH8	55F	60F
Encrypt data.	X	X	X	X
Use T10-standard encryption.	X	X	X	X
Permanently decommission and remove encryption keys and critical security parameters.	X	X	X	X
Tamper-evident labels	X			

Notes:

Less backhitching because of larger 2.15 GB (2 GiB) data buffer
Faster data-acquisition speed
Up to 14% increase in track density
400 MB/s native data rate support (JE media only) and enhanced interfaces
Allows dual-port 16 Gbps Fibre Channel attachment
Magnetic head advancements
Faster tape speed
Same physical size as prior 3592 models
Available MES upgrade from EH8/55F to 60F

Less backhitching because of larger 2.15 GB (2 GiB) data buffer
Faster data-acquisition speed
Increased track density
Increased tape cartridge native capacities
Magnetic head advancements
Faster tape speed
Same physical size as prior 3592 models

Table 9: Model EH8/55F enhancements to Model EH7 (continued)

Available MES upgrade from EH7 to EH8/55F

Table 7 on page 19 provides a summary of the support and attachment capabilities of the drive models.

Table 10: 3592 drive attachment capabilities

Capability	EH7	EH8	55F	60F
Allows dual port, 1 Gbps Fibre Channel attachment	X	X	X	
Allows dual port, 2 Gbps Fibre Channel attachment	X	X	X	
Allows dual port, 4 Gbps Fibre Channel attachment	X	X	X	X
Allows dual port, 8 Gbps Fibre Channel attachment	X	X	X	X
Allows dual port, 16 Gbps Fibre Channel attachment				X
Includes front Ethernet port for tasks such as service, downloading memory dumps, and uploading microcode	X	X	X	X
Supported by the IBM TS4500 tape library (IBM 3584).	X	X	X	X
Supported in stand-alone rack installations	X	X	X	X

Each 3592 drive canister is a single FRU. After the drive is varied offline to the host, each drive canister can be removed and replaced with power ON (hot-pluggable), with minimal impact to customer operations. Power to the drive canisters is supplied by two redundant DC power supplies. If one power supply fails, another provides shared power until the failed supply is replaced. Each power supply is individually hot-pluggable.

Table 11 on page 20 lists the minimum installation configurations.

Table 11: Minimum installation configuration

Installation	Minimum configuration
Rack Installation	One enclosure, one drive canister, and two power supplies

The 3592 tape drives are installed in a rack environment, and can be mixed with EH7, EH8, 55F, and 60F drives.

RAS characteristics

RAS is an abbreviated IBM term for the product design characteristics of Reliability, Availability, and Serviceability.

Reliability

- Fewer cables because of integral canister plug-in enclosure
- Reliable, brushless motors
- Continuous channel calibration for improved data integrity
- Durable cartridge loader design
- Drive canister is a single FRU
- No pneumatics
- Reliable electronics because of one card versus multiple cards
- Speed matching that requires less backhitching
- No mechanical adjustments on the drive
- Low power requirements
- Proven microcode that is based on predecessor products
- Simplified tape path and tape tracking

Availability

- Drives and power supplies are hot-pluggable, meaning a single drive can be removed or installed while power is still applied to the product, without affecting the remainder of the product or the customer's operations
- Product is designed for first-time fix (reduces CE callbacks)
- Product has built-in hardware/microcode error detection and isolation
- Captured error that is recorded in expanded nonvolatile Vital Product Data (VPD)
- Reduced number of FRUs
- Redundant power supplies
- Concurrent microcode update, new/old copy of drive microcode - switch during inactivity
- Service Information Message/Media Information Message (SIM/MIM) clearly indicate impact of failures, FRUs affected, and the impact of service
- No scheduled downtime that is required for preventive maintenance
- Two CE modes (one allows review of logs and status without customer job interruption)
- FRUs designed for quick and easy replacement
- Product has high level of integration with fewer subassemblies
- Predictive maintenance is possible with SIM/MIM and TapeAlerts
- The product uses a sophisticated algorithm called SARS (Statistical Analysis Reporting System) to track error statistics to isolate between drive and media problems.
- A warning message is given when the hardware or media is degraded
- The design eliminates the need to take multiple drives offline for service

Serviceability

- Service actions can be initiated from the virtual service panel.
- Wrap tools are provided to test the Fibre Channel external interface
- Automatic dump to flash memory
- Non-disruptive microcode dump
- Drive microcode can be written into the flash memory, when the drive is IMLed, without affecting the current microcode in DRAM
- No error recreation that is required to isolate the failing FRU
- Error information (SIM/MIM, TapeAlert, Request Sense data) is sent to the host

- Error indicators for microcode and media type problems. These allow detection and reporting of microcode and media type problems
- Error records are captured and recorded in a drive error log
- All drive electronics are contained within the drive canister FRU
- Design of power supply for easy removal and replacement without removing power (hot-pluggable)
- Limited number of FRUs in subsystem
- Special utilities for IBM support service that is built into drive
- Easy-to-view LEDs on drive canister for fibre status, power good, and fault indications
- Compact package
- Can be serviced by one CE
- All procedures can be accessed from your laptop, through an ethernet port

Maintenance strategy

The 3592 maintenance strategy does not use diagnostic tests for problem recreation. The hardware and microcode are designed to capture and isolate failures when they occur. The fault symptom code (FSC) generated either by the functional microcode or diagnostic microcode is converted into a FRU identifier (FID). This FID is available to the operator and the service representative. They are in the form of service information messages (SIMs) or media information messages (MIMs) in systems where these functions are supported. If the host system does not support SIMs and MIMs, sense data is available if the subsystem is able to present it. In addition, the FID is displayed on the 3592 operator message display and service panel, and it is placed into the drive error log.

When a permanent error occurs or an error is detected by the test, a SIM is generated and a flag is set in the SCSI sense data. This flag informs the host system that information about the error is read from the drive and displayed to the operator. Only a permanent error causes a FID to be displayed on the front operator panel or the service panel.

The maintenance strategy for the 3592 drive includes these items -

- Provides for SIM/MIM and TapeAlert reporting
- Concurrent maintenance is possible.
- Each 3592 drive can be removed without powering OFF any other 3592 drives.
- The drive is not designed for customer setup (CSU).
- The error logs record as many as 30 machine error entries.
- The FID 87 and FID FF logs contain up to 10 entries for a record of sense data sent to the host with a FID of 87 or FF.
- Temporary error logs contain as many as 10 entries for errors, with sense key of 1.
- The drive is not intended to be serviced or disassembled in the field.

FID strategy

With the *FID code* concept, the maintenance documentation does not list FSC codes, only FID codes. Each microcode EC level has a conversion table that reflects additions or deletions in the FSC codes. The FSC-to-FID conversion table is updated and maintained for that specific microcode level without the need to correct documentation. More than 2000 FSCs are connected to FIDs.

Host messages

The Statistical Analysis and Reporting System (SARS) creates service information messages (SIMs) and media information messages (MIMs) which are incorporated into the 3592. These messages provide the

customer with diagnostic and repair information before they call for service, which can eliminate unnecessary service calls.

The SIM and MIM functions were developed to improve 3592 product serviceability. See “Service and Media Information messages (SIMs and MIMs)” on page 39 and “Statistical Analysis and Reporting System (SARS)” on page 43 for details. Another accommodation of the 3592 is the ability to use the TapeAlert industry standard.

Service Information messages (SIM)

The SIM contains the machine type, machine serial number, and Field Replaceable Unit (FRU) information. This information allows the dispatch of the appropriate service personnel and the replacement parts that are required to correct the machine fault. This procedure helps improve service response time and machine repair time. See “SIMs” on page 39 for information.

Media Information messages (MIM)

The MIM identifies problems with the media and with a specific cartridge volume number. The customer can do maintenance within the tape library and prevent unnecessary service calls when the fault is the media. The customer's media maintenance activity is directed to reduce the time that is required to separate hardware from media problems. The operator's media maintenance and the CE's service activity is based on failure events that occur in the customer's functional environment. This feature eliminates the need to use time-consuming machine checkout procedures to re-create the failure. See “MIMs” on page 41 for information.

TapeAlert messages

When the 3592 detects a permanent error, a TapeAlert is made available to the customer's host. See “TapeAlert reporting” on page 12 for information.

Federal Information Processing Standards (FIPS)

To maintain FIPS PUB 140-2 compliance for a tape drive, load only FIPS-certified microcode into that tape drive. Therefore, the current drive microcode that is available might not be FIPS certified and must not be loaded on a FIPS drive. For information about FIPS, see <http://www.itl.nist.gov/fipspubs/>. For information on FIPS-certified microcode, see <http://ftp.software.ibm.com/storage/3592>.

The following security levels can be available depending on the drive model.

Table 12: FIPS availability

Drive model	FIPS Security Level 1	FIPS Security Level 2
EH7	No ¹	With correct microcode level when certification is applied for and approved.
EH8	No ¹	With correct microcode level when certification is applied for and approved.
55F	No ¹	With correct microcode level when certification is applied for and approved.
60F	No ¹	With correct microcode level when certification is applied for and approved.

Note: ¹ When Security Level 1 is not explicitly available, Security Level 2 meets the Security Level 1 requirements.

Device characteristics

Refer to the *IBM TS1120 Tape Drive and Controller 3592 Models J1A, E05, J70, and C06 Introduction and Planning Guide* for program support and physical characteristics.

Refer to the *IBM 3592 Model E07/E08, EH7/EH8, 55F, and 60F Tape Drive Knowledge Center* at https://www.ibm.com/support/knowledgecenter/STPRH6/com.ibm.storage.drives.doc/jag_ichome.html for 3592 Models E07/E08, EH7/EH8, 55F, and 60F program support and physical characteristics.

Fibre Channel connectivity

The 3592 drive can be direct-attached to various host systems by one or two Fibre Channel ports . The 3592 tape drive support also is available for AIX, UNIX, or numerous other hosts with one or both ports of the Fibre Channel.

The drive end of a Fibre Channel uses only an LC-type of connection. To choose the cable-type feature code you need, determine the type of attachment on the other end of the cable for the connection you make. See [“Fibre Channel cabling examples”](#) on page 178 for cable feature codes.

Fibre addressing

The 3592 tape drive must have a fibre address to communicate over the Fibre Channel interface. The 3592 tape drive allows both hard and soft addressing. Most fibre hosts (initiators) support hard addressing and do not support soft addressing. Have the customer refer to their device driver documentation for information.

Note: Soft addressing is not recommended.

Selecting the hard addressing option allows assignment of the drive selection of the Arbitrated Loop Physical Address (AL_PA). The higher the number, the lower the priority. Most hosts have the lowest AL_PA number (highest priority) and the drives have a higher AL_PA (lower priority). When multiple drives are connected in an arbitrated loop, the drive closest to the host has a lower AL_PA number (higher priority) than the next drive. Follow this protocol through the loop.

The soft address feature allows the drive to arbitrate the AL_PA number with other fibre devices. When a device is shared between different systems, be certain that two hosts do not attempt to use the same drive at the same time.

Fibre Channel worldwide identification (names)

Each Fibre Channel card has four names (Node 0, Node 1, Port 0, and Port 1) that are hardcoded into the electronics of the card. These names are similar to a serial number and are unique throughout the world. Some customer Fibre Channel networks that have switches with the “zoning” function uses these names, in addition to using the port addresses for communications between the host and the drive.

When a 3592 drive is installed, the person that is installing the drive configures it by using the service panel. The worldwide node names and port names (addresses) are stored in Vital Product Data (VPD). These addresses can be changed from the service panel.

It is important to update the VPD whenever FRUs are replaced. A FRU-replacement drive canister must be updated with this information from the removed drive - the WWID, AL_PA, Serial Number, and other configuration data for both fibre ports. This procedure is performed as part of the steps outlined in [“FID 85: Drive canister”](#) on page 252 in Chapter 8.



Attention: If Fibre Channel VPD data is lost, customers must reconfigure their entire fibre network to accommodate a replacement drive.

The VPD is updated during the following scenarios.

- Error Log is updated
- Drive configuration is changed through the service panel while in **CE Mode**
- Drive canister FRU is replaced and VPD was updated

- Regular VPD updates occur on periodic intervals

System connectivity

The 3592 tape drive provides redundant Fibre Channel ports (Port 0 and Port 1) that can be attached to supported systems directly.

The 3592 supports a broad range of computing environments, including selected

- IBM eServer System z, S/390, or Linux
- IBM eServer System i, AS/400
- IBM eServer System p, RS/6000 (AIX)
- IBM eServer System x
- Sun
- HP servers
- Intel-compatible servers that run Microsoft Windows or Linux

Tape cartridge

The 3592 drive uses a 3592 tape cartridge. The 3592 tape cartridges can be intermixed with some other type tape cartridges within the same library, but must be stored in a 3592-dedicated library frame. Do not insert a 3592 cartridge into a tape drive other than a 3592. Do not insert any other type of tape cartridge into a 3592 drive.

Cartridge type indicator

Several types of cartridges are available for the 3592:

- Data cartridge - Identified by the 2 characters **J?**, followed by a 6-character volume ID number (VOLSER). Replace the **?** with one of the characters in [Table 13 on page 26](#). Match this identifier with descriptions of the various data cartridge types.
- Cleaning cartridge - The case of the unique 3592 cleaning cartridge is black, and the door, tab, and label are cool gray. The cleaning cartridge is an “FFF4” category tape. See [“Cleaning cartridge” on page 36](#).
- CE scratch tape - This diagnostic cartridge, an “FFF5” category tape, carries a label with the identifying information “CE nnnJC.” For this example, use CE 110JC.
 - CE = CE scratch tape
 - nnn = the unique tape cartridge serial number to differentiate which tape cartridge was used for test on a drive. For this example, it is '110'
 - JC = one of several media types for 3592 models (see [“3592 data tape cartridge” on page 25](#))

The EH7 and EH8 drives use a JK type cartridge for a diagnostic cartridge. The 55F and 60F drives use a JL type cartridge for a diagnostic cartridge.

3592 data tape cartridge

The 3592 data cartridges contain media that is housed in a cartridge. The 3592 cartridges are the same physical size as the 3590 cartridges. This size similarity makes the 3592 data cartridges compatible with storage slots in many existing libraries. Though a 3592 cartridge has the same length and width dimensions as a 3590 cartridge, mechanical differences prevent it from being loaded into a 3590 drive by mistake. Also, a 3590 tape cartridge cannot be mistakenly loaded into a 3592 drive. The external and internal labels are different for each type of cartridge. When a cartridge is installed into the library, the media type is associated with the storage location within the library.

The data tape cartridge that is used in a 3592 contains a

- Single reel of magnetic tape
- Leader pin **1**

- Clutch mechanism **2**
- Cartridge write-protect mechanism **3**
- Internal cartridge memory (CM)

Also,

- [Figure 1 on page 26](#) provides an illustration of a 3592 data cartridge.
- [Table 13 on page 26](#) provides descriptions of the 3592 data cartridge types, with the actual identifier (JC, JD, JE, JK, JL, JM, JV, JY, or JZ).
- [“Setting drive encryption” on page 250](#) provides information about encrypting data cartridge media.

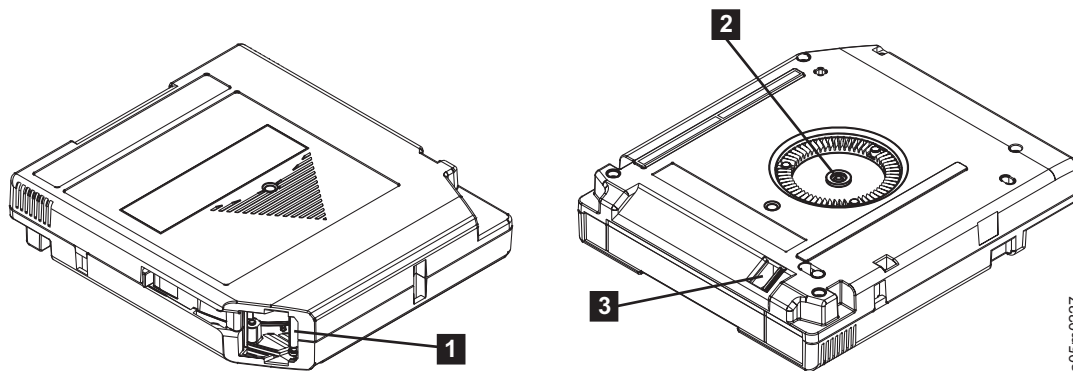


Figure 1: 3592 tape cartridge. Use with [Table 13 on page 26](#). Notice the Door **1** and the Tab **3**.

Table 13: Types of data tape cartridges. Use with [Figure 1 on page 26](#).

Ident.	Case color	Door 1 , tab 3 , and label color	Data cartridge capacity				Cartridge type
			EH7 native capacity	EH8 native capacity	55F native capacity	60F native capacity	
JC	Black	Dark Purple	4000 GB	7 TB	7 TB	10 TB	Advanced Type C data
JD	Black	Burnt Orange	N/A	10 TB	15 TB	15 TB	Advanced Type D read/write
JE	Black	Brick Red	N/A	N/A	N/A	20 TB	Advanced Type E read/write
JK	Black	Light Purple	500 GB	900 GB	900 GB	10 TB	Advanced Type C economy
JL	Black	Apricot	N/A	2 TB	3 TB	10 TB	Advanced Type D economy
JM	Black	Cherry Red	N/A	N/A	N/A	5 TB	Advanced Type E economy
JV	Platinum (Silvery gray)	Brick Red	N/A	N/A	N/A	20 TB	Advanced Type E WORM
JY	Platinum (Silvery gray)	Dark Purple	4000 GB	7 TB	7 TB	10 TB	Advanced Type C WORM

Table 13: Types of data tape cartridges. Use with Figure 1 on page 26. (continued)

JZ	Platinum (Silvery gray)	Burnt Orange	N/A	10 TB	15 TB	15 TB	Advanced Type D WORM
----	----------------------------	-----------------	-----	-------	-------	-------	-------------------------

Notes:

- The standard read/write cartridge might be called "data cartridge" in other documentation.
- 1 GB = 1 000 000 000 bytes. 1 000 GB = 1 TB (1 000 000 000 000 bytes).
- Although you can format the same data cartridge in any of the native capacities, if you change the Default Density of the drive, a data cartridge is limited to that particular density. See [“Setting default density”](#) on page 249 for information about default density.
- The terms 'Extended' and 'Advanced' are used in the **Description** column to denote increased capacity.
- When cartridges are formatted for the 55F tape drive, native capacities for JD, JL, and JZ cartridges are increased.

Cartridge capacity scaling

The 3592 tape drive supports capacity scaling of individual JC and JD data cartridges. Capacity scaling allows the customer to contain data in a specified area, at the beginning of the tape. This feature reduces 'locate' and 'read' times.

This capacity scaling is not supported for either economy or WORM tape cartridges.

Cartridge memory (CM)

Each 3592 data cartridge contains a passive, silicon storage device called cartridge memory (CM). This CM holds information about the cartridge and the media in the cartridge, and holds statistics about media performance.

The cartridge and media information is stored in a protected, read-only area of the CM. The CM reader uses a radio-frequency interface to read this information when the cartridge is loaded into the drive.

The media performance statistics are stored in an unprotected, read/write area of the CM. These statistics are updated by the CM writer just before the cartridge is unloaded. The media performance statistics are maintained by the Statistical Analysis and Reporting System (SARS) portion of the drive microcode. For information, see [“Statistical Analysis and Reporting System \(SARS\)”](#) on page 43.

Write-once read-many (WORM)

Some records retention and data security applications require the write-once read-many (WORM) function of tape data storage. This WORM function is accomplished on the 3592 by a combination of microcode controls in the drive, and a special WORM tape cartridge.

No physical hardware changes are required to make the drive WORM-capable. All 3592 drives are WORM-capable.

See [Table 13 on page 26](#) to determine the WORM cartridge types. Use the color of the case and other markings to distinguish the WORM cartridges.

The WORM tape media is formatted differently than the standard read/write media. This unique format prevents a WORM cartridge from being written on by a drive that does not have the WORM microcode.

One field in the servo manufacturer's word (SMW) on the tape designates that the media is WORM. Also, the cartridge memory (CM) has a WORM indicator byte in the cartridge type field. Both of these conditions must be true for the drive to work with a WORM cartridge. If one condition is true and the other is false, an ATTN DRV - Invalid Cartridge message posts.

Each WORM cartridge also has a 12-byte, unique, worldwide cartridge identifier (WWCID). This WWCID is made up of 4 bytes of the unique CM chip serial number and 8 bytes of the unique tape media serial number.

When the drive senses that a cartridge is a WORM cartridge, the microcode prohibits the changing or altering of user data that is already written on the tape. The microcode tracks the last appendable point on the tape by using an overwrite-protection pointer that is stored in the cartridge memory (CM).

SARS data can be written and updated on WORM tapes because the SARS data is not in the user area of the tape.

Tape drive

The 3592 tape drive is housed in a canister. The two components are assembled into a single FRU called a drive canister. The drive canister is installed in a rack enclosure that can house two canisters. The enclosure includes redundant DC power supplies and appropriate cables and cards that provide power and signals to the drives.

No power ON/OFF switches are on the 3592 tape drive canister. Because the drive canister and the power supplies are single FRUs and are hot-pluggable, they do not require power ON/OFF switches to allow the customer engineer to complete service activities.

The tape drive has an operator display with an eight character display at the front bezel of each drive. The operator uses this panel when in **Operator Mode**. VOLSER, status, and error messages display here as they occur.

Drive layout

The operator bezel (used by the operator) and the service panel (not available to the operator) provide menu-driven displays. The operator and the service representative use these controls to display information, set different options, and complete tasks such as -

- Device status
- Error conditions (FID)
- Drive set up
- Mount activities

Operator bezel

Each 3592 drive has a faceplate or bezel (called 'drive front panel' in customer documentation) installed on the front, and contains these controls, indicators, and functional areas.

- An 8-character display
- **Unload** button
- **Reset** button
- Power-on LED
- Fiducial

The bezel contains white-colored areas that are called fiducials. A fiducial is used by the library device to help "teach" the library the position of the drive, that is, where the drive is located. [Figure 2 on page 29](#) shows the operator bezel, and [Table 14 on page 29](#) lists the corresponding active (or functional) areas of the operator bezel.

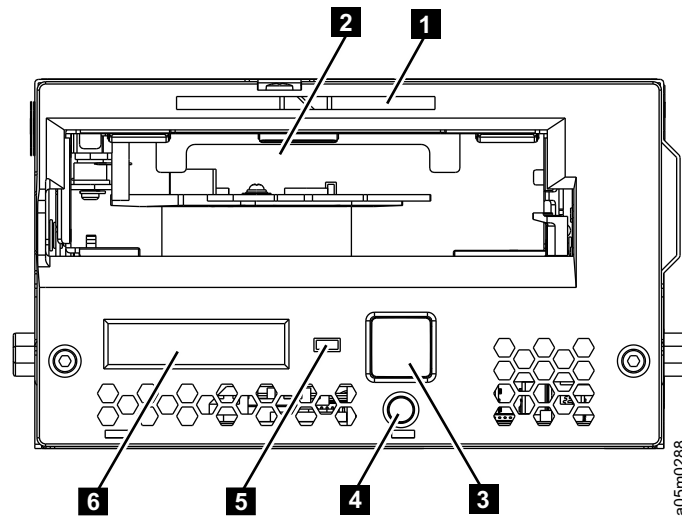


Figure 2: Operator bezel - drive canister front view. Use with reference numbers in Table 14 on page 29.

Reference number	Item	More information
1	Chevron fiducial	Used by library accessor
2	Tape cartridge slot	Area where tape cartridge is loaded
3	Unload	Press Unload to manually unload a tape cartridge Note: If you press Unload while a tape cartridge is loaded, the drive completes any operation in progress, then rewinds and unloads the tape cartridge.
4	Reset	Press Reset to generate a drive reset Note: This action stops tape motion before a reset is completed. Reset is recessed to prevent accidental activation. Use a pointed object like a pencil to press Reset .
5	LED power indicator	Green LED indicates that power is applied. This LED becomes yellow during activities like a microcode load.
6	Eight-character (message) display	Information area for operator. The CE does not use this display for normal maintenance. This display provides FID messages, attention drive messages, clean messages, and drive status. Note: For information, refer to the <i>3592 Operator Guide</i> .

Operator panel (8-character display) message types

The 3592 operator panel message display has various message types -

- FID messages

- Attention messages
- Status messages
- Mount messages

See “Intervention messages description” on page 86 for information about message types.

Drive rear layout

The rear of the drive has the functional areas that are shown in [Figure 3 on page 30](#) and listed and identified in [Table 15 on page 30](#).

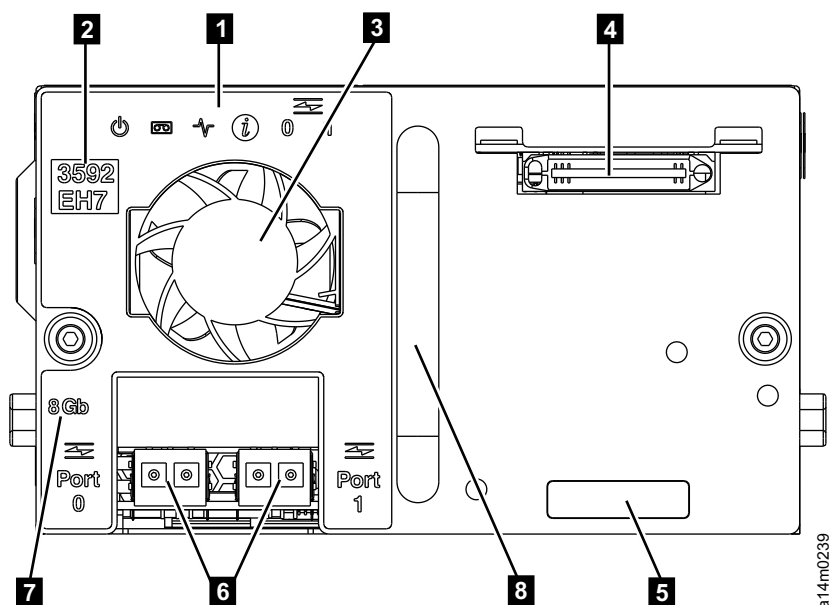


Figure 3: Drive rear layout - Models EH7/EH8/55F/60F (Fibre Channel) . Use with [Table 15 on page 30](#).

Item number	Item name and details
1	LED array (described from left to right) <ul style="list-style-type: none"> • Power • Drive status • Library communications • Information (error messages) • Port 0 Fibre • Port 1 Fibre Green LEDs flash at half-second intervals. Yellow LEDs flash at 1-second intervals.
2	Model number label (EH7/EH8/55F/60F)
3	Fan
4	Canister cable port The cable from this port connects to the Ethernet port and power supply on the front enclosure behind the enclosure bezel.
5	MTM/Serial number label

Table 15: Drive rear layout (continued)

Item number	Item name and details
6	Dual port 8 Gbps or 16 Gbps for 60F Fibre Channel ports
7	Fibre Channel: 8 Gb label, or 16 Gb label for 60F
8	Handle

Note: All EH7/EH8/55F/60F drives are encryption-capable.

Drive LED indicators

The drive LED indicators are identified in [Figure 4 on page 31](#) and their functions and meanings are listed in [Table 16 on page 31](#).

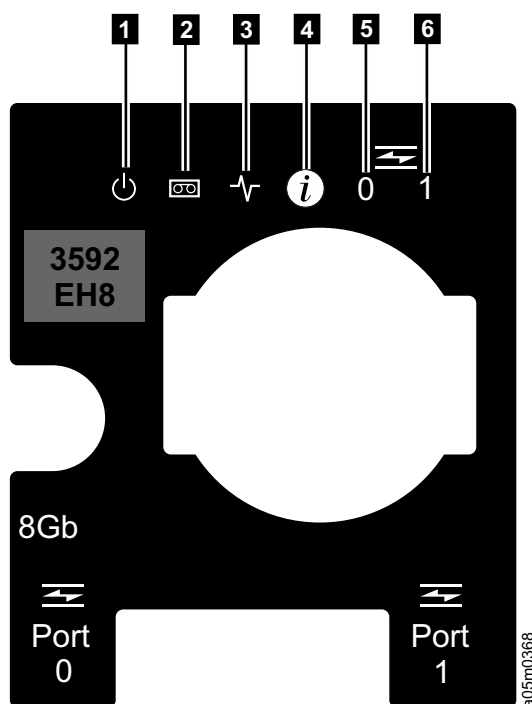


Figure 4: LED locations for EH7/EH8/55F/60F

Table 16: LED indicators for EH7/EH8/55F/60F

LED	LED name	LED color	LED-on indicates:	Flashing LED indicates:	No LED indicates:
1	Drive power	Yellow	N/A	N/A	+5 V dc or +12 V dc is missing at drive
		Green	+5 V dc or +12 V dc is present at drive	During reset, LED might flash, indicating drive is attempting to unload cartridge before actual reset process	

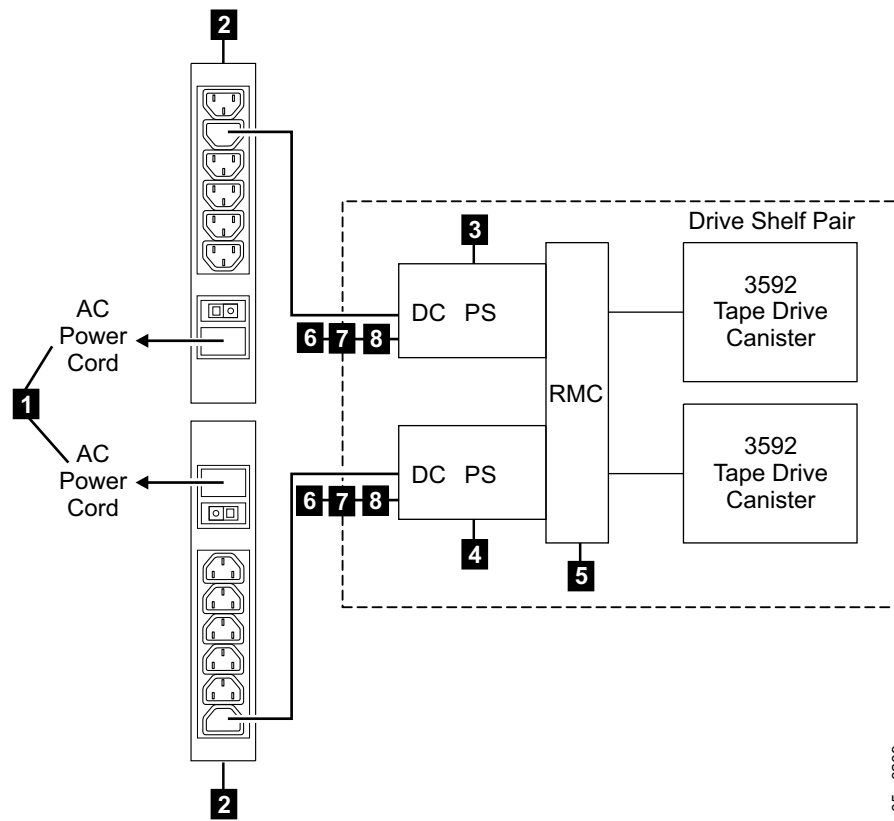
Table 16: LED indicators for EH7/EH8/55F/60F (continued)

2	Drive status	Yellow	<ul style="list-style-type: none"> Cartridge status not indicated No message or error POR diagnostic in progress 	<ul style="list-style-type: none"> Cartridge not present Message or error POR diagnostic completed 	<ul style="list-style-type: none"> Cartridge not present No message or error POR diagnostic completed
		Green	<ul style="list-style-type: none"> Cartridge present No message or error POR diagnostic completed 	<ul style="list-style-type: none"> Cartridge present Message or error POR diagnostic completed 	
3	Ethernet communication¹	Yellow	N/A	N/A	No communications since last POST of drive
		Green	N/A	Ethernet communication activity	
4	Information²	Blue	N/A	N/A	N/A
5	Port 0 - Fibre Channel activity	Yellow	N/A	Fibre Channel connections are good; not ready to transmit	<ul style="list-style-type: none"> No light is detected through Fibre Channels Fibre Channel cable is disconnected Port is not in use Fibre wrap plug is installed on the port Drive was not returned to operator mode (is still in CE offline mode or CE online mode)
		Green	Fibre Channel connections are detecting light, but no data is being transferred. Wrap tools are installed or drive canister is offline to host.	Fibre Channel connections are good; data is being transferred	
6	Port 1 - Fibre Channel activity	Yellow	N/A	Fibre Channel connections are good; not ready to transmit	
		Green	Fibre Channel connections are detecting light, but no data is being transferred. Wrap tools are installed or drive canister is offline to host.	Fibre Channel connections are good; data is being transferred	

Notes:

1. The **Ethernet Communication** LED is always off unless the CE or the customer is connected to the Ethernet port at the front of the enclosure.
2. The **Information** LED is not lit. However, even if it is, it is not a cause to replace the drive. If it is on, the fan is probably running at full speed.

Power supplies



a05m0209

Figure 5: Power distribution diagram

Table 17: Power supplies and related components	
Item number	Item name
1	AC power cord
2	Power Distribution Units
3	DC power supply
4	Redundant power supply
5	Rack Mount Card (RMC)
6	DC LED ¹
7	AC LED ¹
8	! (Attention) LED ¹
¹ DC LED: ON - good, OFF - fault AC LED: ON - good, OFF - fault ! LED: OFF - good, ON - fault	

Power in the 3592 is supplied by a redundant pair of power supplies **3** and **4**. The AC power cord **1** of each supply is plugged into the AC power distribution unit **2** of the rack into which the 3592 is mounted.

No power ON/OFF switches are on the power supplies. Because the drive canister and the power supplies are all single FRUs and are hot-pluggable, they do not require power ON/OFF switches to allow the performance of service activities.

The power supply is packaged in a metal housing for structural and safety purposes. The power supply converts AC input to +12 V DC and +5 V DC, and provides DC power to the 3592 through a separate (removable) cable that connects to the drive canister FRU.

The 3592 DC power supply is

- A single FRU
- Hot-pluggable

The power supply has

- Over-voltage circuits
- Over-current circuits
- Thermal protection circuits
- Under-voltage detection
- Fan to provide cooling air
- No adjustments
- No serviceable components

The operational status of the power supply is indicated by three LEDs that are in the rear cover of the power supply. Item **6** is the **DC** LED and Item **7** is the **AC** LED. The third ! (Attention) LED (**8**) is always OFF, unless a supply fault occurs (in which case the ! LED turns ON).

One power supply can provide power to two drive canisters, if required.

Power switch and power sequence

The DC power supplies do not include power switches.

- Power can be removed from each power supply by removing the AC power cord (**1**) from the DC power supply.
- When AC power is first applied, an AC LED (**7**) lights.
- When DC voltages are generated, a DC LED (**6**) lights.
- If AC or DC power is lost, one or both of the LEDs (**7**) and (**6**) turn OFF.
- During power sequencing, power on self-test (POST) runs diagnostic tests to verify the operation of memory, sensors, and electronic circuits.

A description of the power-on sequence follows.

1. When the 3592 power cord (**1**) is plugged into the power source, the AC LED (**7**) on the back of the power supply goes ON.
2. About 1 - 2 seconds after power is applied, the following steps occur:
 - The DC LED (**6**) goes ON and remains ON.
 - The cooling fans begin operating.

Power cords

Power cords consist of an AC power cord **3** that runs from one 110/220 V AC outlet to 2 DC power supplies that are connected to one or two 3592 drive canisters. DC power to the drive is delivered through a quick connect/disconnect connector that mates with the drive.

The cable connects to one supply in the left enclosure and one supply in the right enclosure. Each cable per cable pair also connects to a different circuit breaker on the PCC. This feature eliminates a single point of failure within a frame.

Power specifications

The 3592 power supply accepts a single phase 50 or 60 Hz, $\pm 5\%$, 100-127 or 200-240V AC (nominal) voltage source. The DC voltages generated are 5V dc $\pm 10\%$ and 12V dc $\pm 10\%$.

Redundant power

Two DC power supplies (3) and (4) provide power to two drive canisters (7) through a Rack Mount Card or RMC (5).

The RMC allows both power supplies to share the load to the two drive canisters. If one power supply fails, the RMC selects the remaining power supply to provide power to both drive canisters.

The power cables provide redundant AC power to each pair of power supplies, and in turn, to each pair of drive canisters.

The dual AC power sources, power cables, and dual DC power supplies provide redundant AC and DC power paths so that any single failure does not affect the drive canister performance.

Subsystem initialization

Subsystem initialization includes initial microprogram load (IML), power sequencing, and subsystem diagnostic tests.

Initial microprogram load (IML)

During an initial microprogram load (IML), a microcode image that permits the subsystem to become functional is loaded into the RAM.

Anytime the unit is initially powered ON, the 3592 attempts to complete an IML from nonvolatile storage.

Power sequencing

When power is applied, internal diagnostic tests check the voltages. After the voltages are checked, the logic is reset. Finally, a basic function test of the logic is completed. Errors that are detected during the power-ON sequence are displayed on the service panel.

Subsystem diagnostic tests

When power sequencing is complete, the power-on self test (POST) checks out memory, electronic circuits, and sensors. Then, it ensures that the microcode can be loaded into memory.

You can use the service panel to monitor the progress and activity during initialization. For information about the service panel, see [“Virtual Operator panel menus”](#) on page 87.

Field microcode update

The 3592 subsystem can accept microcode updates from many sources.

- Download from the host (with *tapeutil*, *ntutil*, or ITDT)
- CE laptop-to-drive with drive Ethernet port
- Microcode cartridge (FMR)

Note: See [“Microcode maintenance”](#) on page 217 for details.

Special tools and customer supplies

Use the special tools that are shipped, purchased, or ordered to repair or maintain the tape drive. [Table 18 on page 36](#) contains a list of the special tools. See [“Tools”](#) on page 169 for information.

Table 18: Special tools and customer supplies

Special tool	Part number	Extra information
CE scratch tape cartridge, JK type	46X9869	“Tape cartridge” on page 25.
Cleaning cartridge	18P8792	“Cleaning cartridge” on page 36 (customer-purchased item)
Leader pin replacement kit	18P8887	“Leader pin replacement kit” on page 37 (customer-purchased item)
ESD kit	--	“ESD kit” on page 38
Tape unit cleaner	05H3929	“Tape unit cleaner” on page 38
Hook-and-loop fastener	19P0362	“Hook-and-loop fastener” on page 38
Fibre wrap tool	See Note 1	“Fibre wrap tool” on page 38
Screwdriver, #1 Phillips	73G5362	Use when a drive is removed from a canister
Laptop straight-through Ethernet (patch) cable	See Note 1	“Connecting and disconnecting the laptop from the drive” on page 186
Laptop null modem (RS-232) serial cable	See Note 1	Figure 3 on page 30
Lint-free cloths	2108930	Can be used for bezel
Lint-free, nylon gloves	461621	Use for “Manual cartridge removal” on page 195
Microcode CD	-----	P/N changes with each microcode release.
Relocation kit	19P5096	For use when a drive is relocated or stored
Note:		
1. See Chapter 9, “Parts catalog information,” on page 259 for the most current part number.		

Cleaning cartridge

Use the 3592 cleaning cartridge only in a 3592 drive to clean the head guide assembly. See the attention notices in [“Cleaning the operator bezel” on page 193](#), and refer to the *3592 Drive Operator Guide* for drive cleaning and cleaning cartridge information.

The 3592 cleaning cartridge is identifiable by its physical characteristics. The black case has a gray door **3** and a gray plastic insert **2**, which mimics the write-protect mechanism. The first 3 characters of the volume serial (VOLSER) on the label **1** are CLN, which identifies the cartridge as a cleaning cartridge.

To use the cartridge, load it in a drive and the cleaning procedure occurs automatically. The cartridge unloads after the cleaning procedure completes. See [“Excessive Clean messages” on page 183](#) for information.

The cleaning cartridge

- Contains a cartridge memory (CM) device that automatically maintains a record of the number of times it is used (see [“Cartridge memory \(CM\)” on page 27](#))
- Must be replaced after 50 uses
- Is part of the ship group
- Is a customer-purchased item

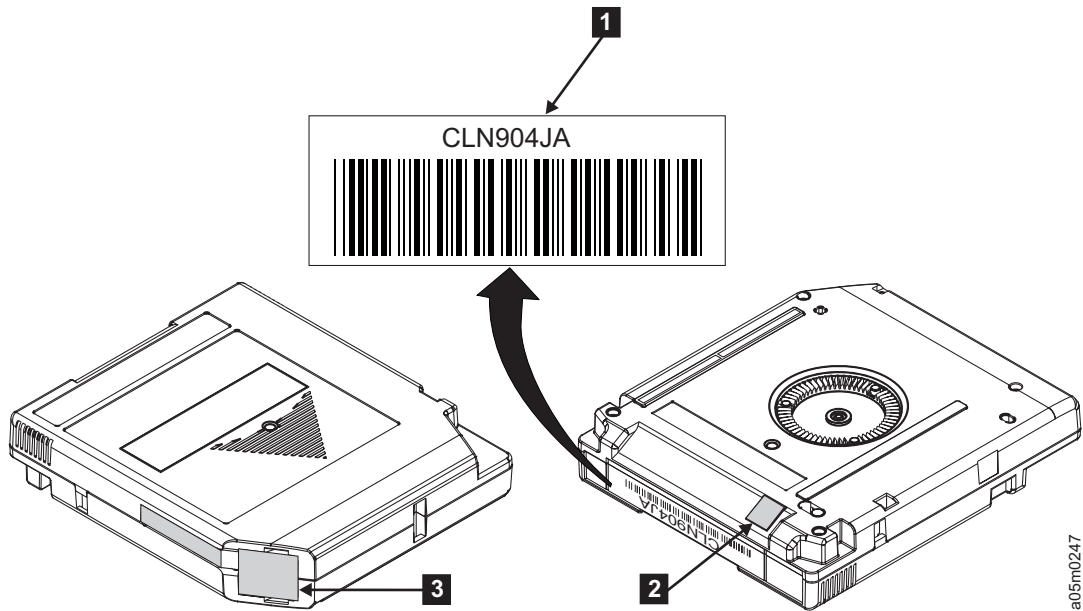


Figure 6: Cleaning cartridge

Leader pin replacement kit

The leader pin replacement kit (P/N 18P8887) is a *customer-purchased item*. Replacing the leader pin is the customer's responsibility. Use [Table 19 on page 37](#) with [Figure 7 on page 37](#) to identify the leader pin replacement kit items.

Table 19: Leader pin replacement kit. Use with [Figure 7 on page 37](#)

Item number	Description
1	Leader pin-attach tool
2	Cartridge manual-rewinding tool
3	Leader pins and C-clips
(Not shown)	Instructions (refer to the <i>3592 Operator Guide</i>)

Note: Replacing the leader pin is used only as a temporary measure to retrieve the data from the tape; it is not a permanent fix.

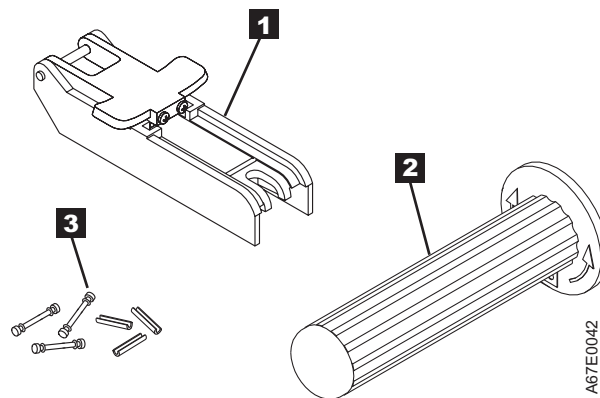


Figure 7: Leader pin replacement kit. Use with [Table 19 on page 37](#)

ESD kit

Use an ESD kit (P/N is available in *General CE Tools Reference Summary*, 5131-0075) to prevent damage to ESD- (electrostatic discharge) sensitive parts in the 3592. See “[Electrostatic discharge \(ESD\) sensitive parts](#)” on [page 192](#) for information on using the ESD grounding wrist strap and mat. **This tool (Figure 8 on page 38) is not shipped with the product, and must be ordered.**

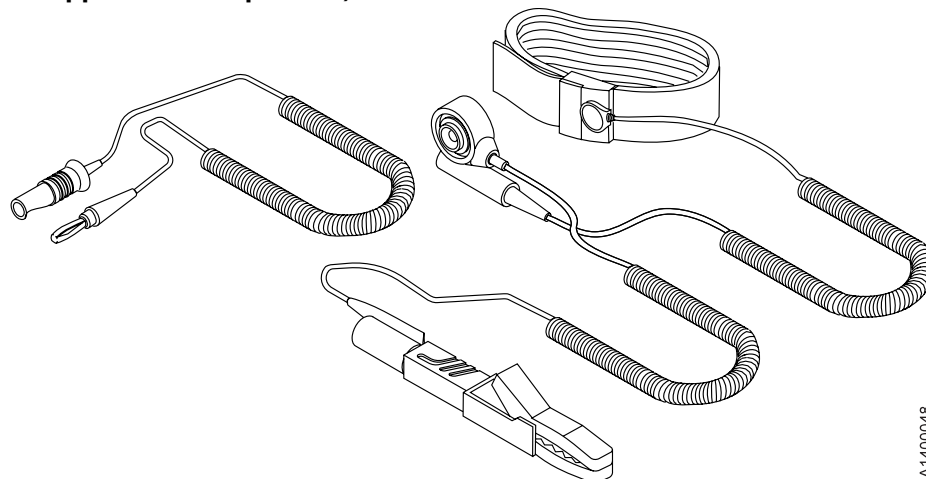


Figure 8: ESD grounding strap

Tape unit cleaner

Use only IBM tape unit cleaner (P/N 05H3929) to clean the 3592 tape cartridge and the drive bezel. Since the IBM tape unit cleaner might not be available in your area, consider the use of tap water as a cleaning agent.

Hook-and-loop fastener

The hook-and-loop fastener (P/N 19P0362) is used during installation of fibre channel cables on the 3592. Use this part to eliminate damage by isolating and supporting fibre channel cables in a bundle.



Figure 9: Hook-and-loop fastener

Fibre wrap tool

The fibre wrap tool is used during installation and diagnostic check of the 3592. This tool is to be used only by the service representative. Use only the recommended fibre wrap tool. To keep the fibre ports at the back of the drive and at the end of the cables and wrap tools clean, immediately insert plugs into detached ports or cables.

The LC fibre wrap tool (P/N 11P3847) is used to wrap the Fibre Channel circuits at the drive.

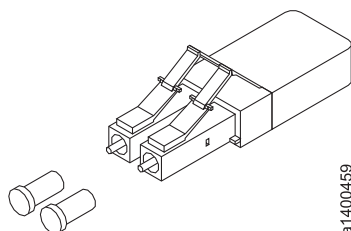


Figure 10: LC fibre wrap tool and plugs

Chapter 3. Messages

Refer to the following topics for messages and related information.

Important: The examples of sense data and messages refer to a drive that is not supported in the current configuration. The data is shown as examples only.

Service and Media Information messages (SIMs and MIMs)

The SIM and MIM functions are a primary factor in the 3592 maintenance plan for improved product availability (see “RAS characteristics” on page 20 for an explanation of availability).

The IBM service representative decodes the SIM and MIM information to help when service is scheduled.

Depending on the software they possess, customers can select the severities that they want to see. For example, one customer might want to see only the **acute** SIM/MIM. Another customer might want to see **all** the SIMs and MIMs that are sent to the host.

SIMs

A service information message (SIM) alerts the customer when an abnormal 3592 condition requires attention. Information in the SIM identifies the affected drive and the failing component. Information highlights the severity of the fault condition and the expected operational impact of the pending service action.

A SIM contains the machine type and machine serial number. Knowledge of this information potentially allows service personnel to arrive at the customer site with the correct replacement parts. This action can improve service response time and can help reduce machine repair time.

Physical location identifiers in the SIM direct the CE to the failing unit. The SIM FID code specifies the parts to be replaced, and directs the CE to the appropriate service procedures. The machine fault can then be repaired without first looking in log records and without having to try to re-create the failure by using diagnostic procedures.

SIM error information

SIMs reflect conditions with the hardware. A service message within the SIM informs the customer what the service impact is. For example, *impact unknown* disables access to the drive or requires the interface to be disconnected. The SIM severity codes are listed and explained in Table 20 on page 39. See Figure 11 on page 40 for a sample SIM. Read a description of each **SIM** field in Table 21 on page 40.

A service information message (SIM) includes the following error information -

- To which drive the SIM refers.
- The FRU identifier (FID) code and FID severity for drive errors. Go to [Start](#), and use the FID information to locate the failing FRU group.
- The message code that is presented to the customer. See “[Message codes](#)” on page 45.
- The first FSC, second FSC or flag bytes, model and microcode link level. These items are not required to enter the START section. This support data might be requested by your next level of support.

SIM severity code	Meaning
0 (FID4)	Drive requires service, but operation is not affected.

1 (FID3)	Problem is moderate. Drive is operating in a degraded condition.
2 (FID2)	Problem is serious. Drive is operating in a degraded condition.
3 (FID1)	Problem is acute. Drive requires immediate service attention.

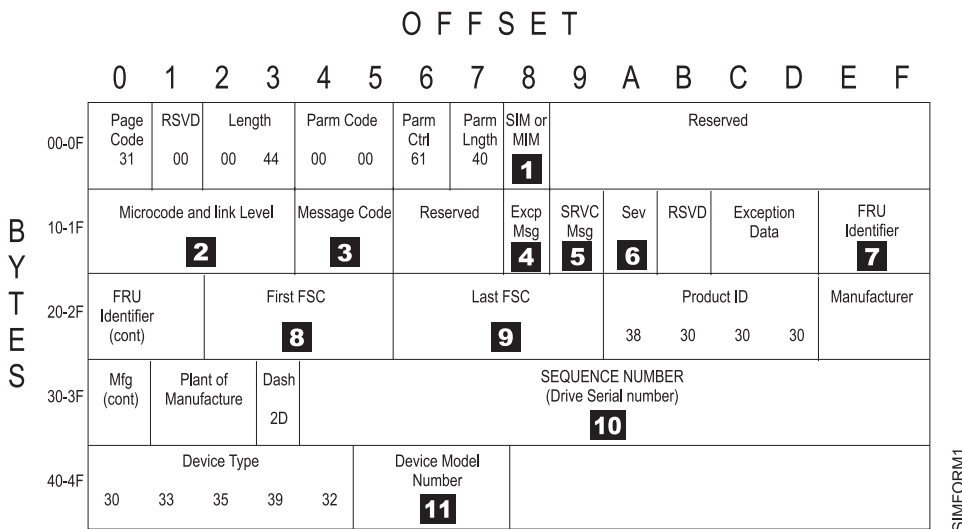


Figure 11: SIM format - sample. Use with [Table 21](#) on page 40.

Locator number	Field name	Field data or references
1	SIM/MIM Present	00 No SIM or MIM present. 01 SIM present. 02 MIM present.
2	Microcode and Link Level	-
3	Message Code	See “Message codes” on page 45
4	Exception Message	See “SIM exception messages” on page 46
5	Service Message	See “SIM/MIM service messages” on page 46
6	Severity	See “SIM/MIM severity” on page 47
7	FRU Identifier (FID)	See “FID entry point” on page 6
8	First FSC	-
9	Last FSC	-
10	Sequence Number	-

Table 21: SIM fields descriptions. Use with Figure 11 on page 40. (continued)

Locator number	Field name	Field data or references
11	Device Model Number	454837 (EH7) 454838 (EH8/55F) 454839 (60F)
<p>Note: The Field Data in Locator Numbers 7, 8, and 9 is presented in hexadecimal format. Use Table 24 on page 43 to convert the information in these fields to ASCII values.</p>		

MIMs

A media information message (MIM) identifies problems with the media (tape cartridge), and provides the volume number of the bad cartridge. This MIM number allows the customer to identify faulty media that might prevent unnecessary service calls. If the bad cartridge cannot be identified at the time of failure, the **VOLSER** field of the MIM is blank and the VOLSER Valid Flag is **00**: VOLSER not Valid.

MIM error information

The MIM severity codes are listed and explained in Table 22 on page 41. See Figure 12 on page 42 for a sample SIM. Read a description of each **SIM** field in Table 23 on page 42.

A media information message (MIM) includes the following error information:

- The message code that is presented to the customer. See “Message codes” on page 45.
- The VOLSER number of the cartridge that is having a problem, if it can be determined from the data available at the time of failure.
- You do not need information such as the first FSC, machine type and model, and the microcode level to enter the START section of this MI, but you might be requested to provide this information by your next level of support. “Error log on host display” on page 44 provides an example of this information, which can be seen at the host.

This information is used to service the 3592 drive and also can be obtained directly from the drive display. “Virtual Operator panel” on page 77 describes the 3592 display.

Table 22: Meaning of MIM severity codes

MIM severity code	Meaning
1	Problem is moderate; <i>high temporary read/write</i> errors were detected.
2	Problem is serious: <i>permanent read/write</i> errors were detected.
3	Problem is acute; <i>block 0, cartridge type, or volser or label</i> errors were detected.

O F F S E T

		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
B Y T E S	00-0F	Page Code 31	RSVD 00	Length 00 44		Parm Code 00 00		Parm Ctrl 61	Parm Lngth 40	SIM or MIM 1	Reserved						
	10-1F	Microcode and link Level 2			Message Code 3		Engineering Data		Excp Msg 4	SRVC Msg 5	Sev 6	Reserved			First FSC 7		
	20-2F	First FSC (cont)		VOLSER (Volume Serial Number) 8					Valid Flag 9	RSVD	Product ID 38 30 30 30			Manufacturer			
	30-3F	Mfg (cont)	Plant of Manufacture	Dash 2D	SEQUENCE NUMBER (Drive Serial number) 10												
	40-4F	Device Type 30 33 35 39 32					Device Model Number 11										

MIMFORM1

Figure 12: MIM format - sample. Use with Table 23 on page 42.

Locator number	Field name	Field data or references
1	SIM/MIM Present	00 No SIM or MIM present. 01 SIM present. 02 MIM present.
2	Microcode and Link Level	-
3	Message Code	"Message codes" on page 45.
4	Exception Message	"MIM exception messages" on page 46
5	Service Message	"SIM/MIM service messages" on page 46
6	Severity	"SIM/MIM severity" on page 47
7	First FSC	-
8	VOLSER	Volume serial number
9	VOLSER Valid Flag	00 VOLSER not valid. 01 VOLSER valid.
10	Sequence Number	-
11	Device Model Number	454837 (EH7) 454838 (EH8/55F) 454839 (60F)

Table 23: MIM fields descriptions. Use with Figure 12 on page 42. (continued)

Locator number	Field name	Field data or references
Note: The Field Data in Location number 7 is presented in hexadecimal format. Use Table 24 on page 43 to translate the information in this field to ASCII values.		

Table 24: Hexadecimal-to-ASCII conversion. The Notes in Table 21 on page 40 and Table 23 on page 42 provide information about when to use this table.

Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII
00	Null	30	0	41	A	4A	J	54	T
20	Space	31	1	42	B	4B	K	55	U
		32	2	43	C	4C	L	56	V
		33	3	44	D	4D	M	57	W
		34	4	45	E	4E	N	58	X
		35	5	46	F	4F	O	59	Y
		36	6	47	G	50	P	5A	Z
		37	7	48	H	51	Q	5F	-
		38	8	49	I	52	R		
		39	9			53	S		

Note: Not all codes are shown.

Statistical Analysis and Reporting System (SARS)

The statistical analysis and reporting system (SARS) helps determine whether read and write errors are caused by the media (tape) or the drive hardware, and reports SIMs and MIMs. To analyze errors, the 3592 microcode contains a volume SARS (VSARS) algorithm for a MIM and a hardware SARS (HSARS) algorithm for a SIM.

Note: For information on SARS reporting, refer to the *Statistical Analysis and Reporting System User Guide*. To obtain online documentation, refer to “Website information” on page xviii for a website URL.

The algorithms are run in the 3592 just before a tape cartridge is unloaded. The HSARS data is stored in nonvolatile storage in the drive and the VSARS data is stored in cartridge memory (CM) on the tape cartridge media.

To distinguish error patterns and trends, the SARS *volume* algorithms require the tape cartridge to be mounted on different drives, while the SARS *hardware* algorithms require different volumes to be mounted on one drive. As hardware passes through predefined error thresholds, cleaning and service repair messages or error codes are presented. Similarly, if tape volumes continue to perform poorly on different drives, rewrite or discard-media messages are presented.

Enable the SARS options to take advantage of media error isolation with MIMs and some SIMs. You can enable or disable SARS options from “CE Drv Options menu” on page 119. When a drive is shipped from the factory, the default value for SARS options is set to **Enabled**. The customer must continue to operate the drive with SARS enabled.

Obtaining drive error information at host

This section explains how to obtain 3592 drive error information by using the System p (RS/6000) AIX, System i (OS/400), and Sun platforms. If the utilities described here are not used on your system, refer to the documentation that came with your system drivers.

See “Service and Media Information messages (SIMs and MIMs)” on page 39 for information on SIMs and MIMs. See [servpan](#) for more information about the service panel.

IBM device drivers for the System z, Linux systems, System p (RS/6000) AIX, and System i (OS/400) allow the drive to log the service and media information messages (SIMs and MIMs) when an error occurs on the 3592 drive.

Note: Sun, HP-UX, Windows NT, or Windows 2000 systems do not log SIM/MIM data. You can disable SIMs and MIMs if your host does not support this function.

Error log on host display

Use the example in [Figure 13](#) on page 44 with [Table 25](#) on page 44 to learn to read an error log that appears at the host.

CE ERROR LOG	
▶ CANCEL CLEAR LOG CURRENT TIMESTAMP: 00002 DAYS 11:02:42 FID1 86 VS: 123456 3132 3105 241F	PORT0 ADDR=1 OFFLINE PORT1 ADDR=2 OFFLINE

Figure 13: Drive error log example. Use with [Table 25](#) on page 44.

<i>Table 25: Drive error log data. Use with Figure 13 on page 44.</i>	
Relative Time Format	
00002 DAYS 11:02:42	Relative Time Format: Relative to accumulative power-on time for the drive canister except that the time is saved in VPD every 8 hours. The time stamp is in the order dddd DAYS hh : mm : ss
--OR--	
Real Time Format	
2005:03:21 11:02:42	If available from host, application, library, and so forth. The real time stamp is in the order: yyyy : mm : dd hh : mm : ss
FID information	
FID1 86 VS: 123456	1 = FID Severity 86 = FID VS: 123456 = Volume Serial 123456
3132 3105	3132 = First FSC 3105 = Last FSC
241F	2 = 3592 Drive 41F = Microcode Level

For information, see [“CE Error Log menu”](#) on page 134.

Message codes

The message codes are intended to explain to the customer what to do under certain conditions. [Table 26](#) on page 45 contains codes in hexadecimal and in ASCII, and a brief description of what action must be taken when a message code displays.

<i>Table 26: Message codes and descriptions</i>		
Message code: Hex	Message code: ASCII	Description: This area tells the customer what to do.
SIM message codes		
3030	00	No Message: The default message that indicates that the device does not have an error to report.
3430	40	Operator Intervention Required: An operator action is required at the device. Check the device error log for possible repair action. See “Error log on host display” on page 44; also, servpan describes the 3592 display.
3431	41	Device Degraded: The device is working in a degraded state, but can be used. A FID is displayed with the error message. Check the device error log for possible repair action. See “Error log on host display” on page 44; also, Virtual Operator panel describes the 3592 display.
3432	42	Device Hardware Failure: The device cannot be used. A FID is displayed with the error message. Check the device error log for possible repair action. See “Error log on host display” on page 44; also, Virtual Operator panel describes the 3592 display.
3433	43	Service Circuits Failed, Operations not Affected: This error does not affect the performance of the device. The failure affects only circuits that are used for non-operational testing. A FID displays with the error message. Check the device error log for possible repair action. See “Error log on host display” on page 44; also Virtual Operator panel describes the 3592 display.
3535	55	Clean Device: Load a cleaning cartridge into the device. The drive returns the cleaning cartridge, following the cleaning procedure. If excessive Clean messages are posted, go to “Maintenance starting point” on page 1.
MIM message codes		
3537	57	Device has been cleaned: The drive is cleaned by a cleaning cartridge.
3630	60	Bad Media, Read Only Permitted: MIM message. Cartridge is logically write-protected. Read-only is allowed. If the customer wants to write to this tape cartridge, they must copy data to another volume. Remove this volume from the library.
3631	61	Rewrite Data if Possible: MIM message. Data on the tape cartridge is degraded. Attempt to copy data to a new volume. This volume must be removed from the library.
3632	62	Read Data if Possible: MIM message. The tape directory is degraded. Attempt to read tape to rebuild the tape directory.
3634	64	Bad Media, Cannot Read or Write: MIM message. Remove media from the tape library. Data is likely lost without special tools to recover it.
3732	72	Replace Cleaner Cartridge: MIM message. Have the customer order a new cleaning cartridge.

MIM exception messages

Table 27 on page 46 provides descriptions of MIM exception messages for your information. You can acquire action information by using the **Exception Message** that is contained in the reported MIM.

Table 27: MIM exception messages and descriptions

Exception message Hex	Exception message ASCII	Description
32	2	Data degraded
34	4	Medium degraded
36	6	Block 0 error
37	7	Medium exception

SIM exception messages

Table 28 on page 46 provides descriptions of SIM exception messages for your information. You can acquire action information by using the **exception message** and **FID** that are contained in the reported SIM.

Table 28: SIM exception messages and descriptions

Exception message Hex	Exception message ASCII	Description
30	0	Reserved
31	1	Effect of failure unknown
32	2	Device exception - no performance impact
33	3	Device exception on interface
35	5	Device exception on service panel
36	6	Device exception on tape path
37	7	Device exception in drive
38	8	Device maintenance that is required (might not be used on 3592)
39	9	Device maintenance that is required (might not be used on 3592)
41-46	A-F	Reserved

SIM/MIM service messages

Table 29 on page 47 provides descriptions of SIM/MIM service messages for your information. You can acquire action information by using the **service code** that is contained in the reported SIM/MIM.

Table 29: SIM/MIM service messages and descriptions

Service message Hex	Service message ASCII	Description
30	0	Reserved
31	1	Repair impact is unknown
32-36	2-6	Reserved
37	7	Repair disables access to device
38	8	Repair disables message display IDs on device
39	9	Device cleaning is required
41	A	Device cleaning complete
42	B	Device cleaning for performance reasons is required
43-46	C-F	Reserved

SIM/MIM severity

Table 30 on page 47 provides descriptions of SIM/MIM severity for your information. You can acquire action information by using the **Message code** that is contained in the reported SIM/MIM.

Table 30: SIM/MIM severity descriptions

SIM/MIM severity HEX	SIM/MIM severity ASCII	FID severity Algorithm	FID severity that is displayed on service panel	Description
33	3	4-3 = 1	1	Acute: Device requires immediate attention. Device is unusable
32	2	4-2 = 2	2	Serious: Device is usable, but is seriously degraded
31	1	4-1 = 3	3	Moderate: Device is usable, but is running degraded
30	0	4-0 = 4	4	Service: Device needs maintenance, but is usable

Sense Keys, ASC, and ASCQ information

The following **Sense Key** tables list **Additional Sense Codes (ASC)** and **Additional Sense Code Qualifiers (ASCQ)** that can be reported by the 3592. See *IBM Tape Drive 3592 SCSI Reference (GA32-0968)* for information.

Sense Key 0 (No Sense)

Table 31: ASC, and ASCQ summary for Sense Key 0 (No Sense)

ASC ASCQ	Description
00 00	No additional sense information - EOM
00 00	No additional sense information - ILI

Table 31: ASC, and ASCQ summary for Sense Key 0 (No Sense) (continued)

ASC ASCQ	Description
00 00	No additional sense information - FM
00 01	Filemark detected
00 04	Beginning-of-partition or medium detected
EE xx	Encryption related
EF xx	Encryption related
EF 13	Encryption - key translate

Sense Key 1 (Recovered Error)

Table 32: ASC, and ASCQ summary for Sense Key 1 (Recovered Error)

ASC ASCQ	Description
00 00	No additional sense information
00 17	Drive needs cleaning
0A 00	Error log overflow
17 01	Recovered data with retries
18 00	Recovered data with error correction applied
37 00	Rounded parameter
5B 01	Threshold condition met
5B 02	Log counter at maximum

Sense Key 2 (Not Ready)

Table 33: ASC, and ASCQ summary for Sense Key 2 (Not Ready)

ASC ASCQ	Description
04 00	Logical unit not ready; cause not reportable
04 01	Logical unit is in process of becoming ready
04 03	Logical unit not ready; manual intervention required
04 04	Logical unit not ready, format in progress
30 03	Cleaning in progress
3A 00	Media not present
3A04	Not Ready - Medium Auxiliary Memory Accessible
53 00	Media load or eject failed

Sense Key 3 (Medium Error)

Table 34: ASC, and ASCQ summary for Sense Key 3 (Medium Error)

ASC ASCQ	Description
03 02	Excessive write errors

Table 34: ASC, and ASCQ summary for Sense Key 3 (Medium Error) (continued)

ASC ASCQ	Description
09 00	Track following error
0C 00	Write error
11 00	Unrecovered read error
11 01	Read retries exhausted
11 08	Incomplete block read
14 00	Recorded entity not found
14 01	Record not found
14 02	Filemark or setmark not found
14 03	End-of-data not found
14 04	Block sequence error
30 00	Incompatible medium installed
30 01	Cannot read medium, unknown format
30 02	Cannot read medium, incompatible format
31 00	Medium format corrupted
31 01	Format command failed
33 00	Tape length error
51 00	Erase failure
53 04	Medium thread or unthread error
85 00	Write-protected because of tape or drive failure
85 01	Write-protected because of tape failure
85 02	Write-protected because of drive failure
EE xx	Encryption related
EF 60	Encryption - proxy command error
EF D0	Encryption - data read decryption failure
EF D1	Encryption - data read after write decryption failure
EF E0	Encryption - key translation failure
EF E1	Encryption - key translation ambiguous
EF F0	Encryption - decryption fenced (read)
EF F1	Encryption - decryption fenced (write)
EF xx	Encryption related

Sense Key 4 (Hardware Error)

<i>Table 35: ASC, and ASCQ summary for Sense Key 4 (Hardware Error)</i>	
ASC ASCQ	Description
09 00	Track following error
15 01	Mechanical positioning error
3B 00	Sequential positioning error
3B 08	Reposition error
40 00	Diagnostic failure
44 00	Internal target failure
4C 00	Logical unit failed self-configuration
52 00	Cartridge fault
53 00	Media load or eject failed
53 01	Unload tape failure
53 04	Medium thread or unthread error
EE xx	Encryption related
EE 0E	Encryption - key service timeout
EE 0F	Encryption - key service failure
EF xx	Encryption related

Sense Key 5 (Illegal Request)

<i>Table 36: ASC, and ASCQ summary for Sense Key 5 (Illegal Request)</i>	
ASC ASCQ	Description
0E03	Invalid Field in Command Information Unit
1A 00	Parameter list length error
20 00	Invalid command operation code
24 00	Invalid field in CDB
25 00	Logical unit not supported
26 00	Invalid field in parameter list
26 01	Parameter not supported
26 02	Parameter value invalid
26 03	Threshold parameters not supported
2C 00	Command sequence error
39 00	Saving parameters not supported
3D 00	Invalid bits in identify message
53 02	Medium removal prevented
5B 03	Log list codes exhausted

Table 36: ASC, and ASCQ summary for Sense Key 5 (Illegal Request) (continued)

ASC ASCQ	Description
80 00	CU mode, vendor-unique
85 03	Write protected because of current tape position
EE xx	Encryption related
EE 00	Encryption - key service not enabled
EE 01	Encryption - key service not configured
EE 02	Encryption - key service not available
EE 10	Encryption - key required
EE 20	Encryption - key count exceeded
EE 21	Encryption - key alias exceeded
EE 22	Encryption - key reserved
EE 23	Encryption - key conflict
EE 24	Encryption - key method change
EE 25	Encryption - key format not supported
EE 26	Encryption - unauthorized request - dAK
EE 27	Encryption - unauthorized request - dSK
EE 28	Encryption - unauthorized request - eAK
EE 29	Encryption - authentication failure
EE 2A	Encryption - Invalid RDKi
EE 2B	Encryption - key incorrect
EE 2C	Encryption - key wrapping failure
EE 2D	Encryption - sequencing failure
EE 2E	Encryption - unsupported type
EE 2F	Encryption - new key encrypted write pending
EE 30	Encryption - prohibited request
EE 31	Encryption - key unknown
EE 42	Encryption - Encryption Key Manager challenge pending
EE E2	Encryption - key translation disallowed
EE FF	Encryption - security prohibited function
EF xx	Encryption related
EF 01	Encryption - key service not configured

Sense Key 6 (Unit Attention)

<i>Table 37: ASC, and ASCQ summary for Sense Key 6 (Unit Attention)</i>	
ASC ASCQ	Description
00 02	End-of-partition/medium detected, early warning
28 00	Not ready to ready transition, medium might have changed
29 00	Power-on, reset, or bus device reset occurred
2A 01	Mode parameters changed
2A 02	Log parameters changed
2F 00	Commands cleared by another initiator
30 00	Incompatible medium Installed
3F 01	Microcode has been changed
3F 02	Changed operating definition
3F 03	Inquiry data has changed
5A 01	Operator medium removal request
82 83	Cleaning completed, cleaning cartridge ejected
EE xx	Encryption related
EE 12	Encryption - key change detected
EE 18	Encryption - changed (read)
EE 19	Encryption - changed (write)
EE 40	Encryption - Encryption Key Manager identifier changed
EE 41	Encryption - Encryption Key Manager challenge changed
EE 50	Encryption - initiator identifier changed
EE 51	Encryption - initiator response changed
EF xx	Encryption related

Sense Key 7 (Data Protect)

<i>Table 38: ASC, and ASCQ summary for Sense Key 7 (Data Protect)</i>	
ASC ASCQ	Description
27 00	Write protected
50 01	Data protect, write append position error
EE xx	Encryption related
EF xx	Encryption related
EF 10	Encryption - key required
EF 11	Encryption - key generation
EF 13	Encryption - key translate
EF 1A	Encryption - key optional

Table 38: ASC, and ASCQ summary for Sense Key 7 (Data Protect) (continued)

ASC ASCQ	Description
EF C0	Encryption - no operation

Sense Key 8 (Blank Check)

Table 39: ASC, and ASCQ summary for Sense Key 8 (Blank Check)

ASC ASCQ	Description
00 05	End-of-data detected
14 01	Record not found, void tape

Sense Key B (Aborted Command)

Table 40: ASC, and ASCQ summary for Sense Key B (Aborted Command)

ASC ASCQ	Description
14 00	Recorded entity not found
14 01	Record not found
14 02	Filemark or setmark not found
1B 00	Synchronous data transfer error
43 00	Message error
44 00	Internal target failure
45 00	Select or reselect failure
47 00	SCSI parity error
48 00	Initiator detected error message received
49 00	Invalid message error
4A 00	Command phase error
4B 00	Data phase error
4E 00	Overlapped commands attempted

Sense Key D (Volume Overflow)

Table 41: ASC, and ASCQ summary for Sense Key D (Volume Overflow)

ASC ASCQ	Description
00 02	End-of-partition/medium detected

Error Log Analysis - AIX

The AIX® Tape and Medium Changer device driver for the AIX provides logging to the system error log for various errors. Use one of the following AIX commands to view the error log in various formats -

- Tapeutil command on [“Tapeutil command”](#) on page 54
- Diag command on [“Diag command”](#) on page 54
- SMIT command on [“SMIT command”](#) on page 58

- ERRPT command on [“ERRPT command”](#) on page 58

Use the Hex-to-ASCII conversion in [Table 24](#) on page 43 to help you understand an error. [Figure 14](#) on page 55, [Figure 15](#) on page 55, [Figure 16](#) on page 56, and [Figure 17](#) on page 56 provide examples of the different error log formats for the `tapeutil` and `diag` commands.

Tapeutil command

Follow these steps to use the `tapeutil` command.

Note: The `tapeutil` command gives you a detailed report by device only.

1. Type `tapeutil` at the AIX command line.
2. Select **Tape Drive Service Aids** (listed under **General Commands**) from the menu.
3. Select **Error Log Analysis** from the **Service Aid** menu.
4. Select the device from the **Drive Selection** menu, and press **PF7** to commit. The error log displays.
5. Press **Enter** to scroll through the log.

Diag command

Follow these steps to use the `diag` command.

Notes:

- You must have root authority to run the AIX `diag` command.
 - The `diag` command gives you a detailed report by device only.
1. Type `diag` at the AIX command line.
 2. Select **Service aids** from the **Diagnostic Function Selection** menu.
 3. Select **IBM Tape Drive Service Aids** from the **Service Aid Selection** menu.
 4. Select **Error Log Analysis** from the **Service Aid** menu.
 5. Select the device from the **Selection** menu, and press **PF7** to commit. The error log displays.
 6. Press **Enter** to scroll through the log.

Analyzing Tapeutil and Diag command Error Log

Analyze the sense key and ASC/ASCQ data to determine the type of sense information reported in the error log. If a hardware failure is indicated, use the FID and go to [“Maintenance starting point”](#) on page 1 for problem determination.

For errors that indicate system problems, enter the appropriate maintenance package.

```

IBM Tape Device Error Log Analysis
NAME: rmt1   LOCATION: 00-02-01-20   DEVICE TYPE: 3592
DATE: 10/21/03 07:33:21   SEQUENCE #203274   ERROR ID: HARDWARE ERROR
SCSI CDB: 0A0100001400
SCSI STATUS BYTE: CHECK CONDITION   SENSE KEY: 4   ASC/ASCQ: 4400
SCSI SENSE BYTES 0-17:
  710004000000004000000000440086083106
SCSI EXTENDED SENSE BYTES:
  4132030101000000724100000A50053343000E00000000033410000000000000
  FFFFFFF000000000000000000000000000000000000000000003433412020202000
Press ENTER for additional entries...

F3=Cancel           F10=Exit           Enter

```

```

-----HEX-----ASCII-----
Description-----
      04           Sense key (Byte 2)
      4400        ASC/ASCQ (additional sense code/additional sense code qualifier)(Bytes
12 and 13)
                    (See "Sense Keys, ASC, and ASCQ information" on page 47
                    for error sense information.)
      86           FID (FRU identification number, Byte 14)
      3106        First FSC (fault symptom code, Bytes 16 and 17)
      3341        Last FSC (fault symptom code, Bytes 41 and 42)
      343341     43A Microcode level (Bytes 72-78)
(not shown)      VOLSER Number in ASCII or EBCDIC (Bytes 83-88)
-----
-----

```

Figure 14: AIX TAPEUTIL and DIAG commands Error Log example

```

IBM Tape Device Error Log Analysis
NAME: rmt1   LOCATION: 00-02-01-20   DEVICE TYPE: 3592
DATE: 10/21/03 07:33:21   SEQUENCE #203274   ERROR ID: 3592 SIM/MIM PAGE
SIM/MIM DATA:
  31000044000061400130303030303030303144383634313030373732303030303045383338
  3039333830393830303049424D31332D303030303030303030303331353033353930423131
Press ENTER for additional entries...

F3=Cancel           F10=Exit           Enter

```

Figure 15: AIX TAPEUTIL and DIAG commands SIM Error Log example

Table 42: Device driver to AIX ERRNO translation

AIX errno	Device driver error code	Description
1	EPERM	<ul style="list-style-type: none"> • General: The process does not have adequate permission to complete the wanted function.
5	EIO	<ul style="list-style-type: none"> • Open: An I/O error occurred that indicates a failure to operate the device. • Write: The physical end of medium was detected, or it is a general error state that indicates a failure to write to device. • IOCTL: An I/O error occurred during the operation. • Close: An I/O error occurred during the operation.
6	ENXIO	<ul style="list-style-type: none"> • General: The device is not configured and is not receiving requests. • Write: A write operation was attempted after the device reached end of medium.
9	EBADF	<ul style="list-style-type: none"> • General: A bad file descriptor was passed. • Write: A write operation was attempted on a device that was opened for read only.
11	EAGAIN	<ul style="list-style-type: none"> • Read: The device is already opened.
12	ENOMEM	<ul style="list-style-type: none"> • General: Insufficient memory available for some internal memory operation. • Read: The number of bytes requested in a read of a variable block record was less than the size of the block. Referred to as an over-length condition.
14	EFAULT	<ul style="list-style-type: none"> • General: A memory failure occurred because of an invalid pointer or address.
16	EBUSY	<ul style="list-style-type: none"> • General: An excessive busy state was encountered. • Open: The device is reserved by another initiator or an excessive busy state was encountered.
22	EINVAL	<ul style="list-style-type: none"> • Open: The operation requested had invalid parameters or an invalid combination of parameters. • Write: The operation requested had invalid parameters or an invalid combination of parameters. Or, the number of bytes requested in the write was not a multiple of the block size for a fixed block transfer. Or, the number of bytes requested in the write was greater than the maximum block size allowed by the device for variable block transfers.
28	ENOSPC	<ul style="list-style-type: none"> • Write: A write operation failed because it reached the early warning mark while it was running in label processing mode. This return code is only returned once at the moment that early warning is reached.
46	ENOTREADY	<ul style="list-style-type: none"> • General: The device is not ready for operation or a tape cartridge is not in the drive. • Open: If not opened with the O_NONBLOCK or O_NDELAY, the drive is not ready for operation or there is no tape cartridge in drive. If the non-blocking flags are used, the drive is not ready for operation.

Table 42: Device driver to AIX ERRNO translation (continued)

AIX errno	Device driver error code	Description
47	EWRPROTECT	<ul style="list-style-type: none"> • Open: An open operation with the O_RDWR or O_WRONLY flag was attempted on a write-protected tape cartridge. • Write: A write operation was attempted on a write-protected tape cartridge. • IOCTRL: An operation that modifies the media was attempted on a write-protected tape cartridge or a device that was opened for O_RDONLY.
78	ETIMEDOUT	<ul style="list-style-type: none"> • General: A command that is timed out.
110	EMEDIA	<ul style="list-style-type: none"> • General: An unrecoverable media error was detected.

SMIT command

Follow these steps to use the `smit` command.

Note: The `smit` command has various ways to format the error log. “[Analyzing Tapeutil and Diag command Error Log](#)” on page 54 provides examples of the different error log formats for the `smit` and `errpt` commands.

1. Type `smit` at the AIX command line.
2. Select **Problem Determination** from the **System Management** menu.
3. Select **Error Log** from the **Problem Determination** menu.
4. Select **Generate Error Report** from the **Error Log** menu.
5. Select **filename**. Select **no** from the **Single Select** list.
6. From the **Generate Error Report** menu, you can select the type of reports you want to view, then press the **Do** icon.
7. You can scroll through the log by using the up or down icons on the menu.

ERRPT command

Follow these steps to use the `errpt` command.

1. Select `errpt |pg` at the AIX command line. The summary report is displayed.
2. You can scroll through the log by pressing the **Enter** key for the next page.
3. You can type `q` to quit the error log at any time.

--OR--

1. Type `errpt -a |pg` at the AIX command line. The detailed report is displayed.
2. You can scroll through the log by pressing the **Enter** key for the next page.
3. You can type `q` to quit the error log at any time.

SMIT/ERRPT errors

Analyze the sense key and ASC/ASCQ data to determine the type of sense information reported in the error log. If a hardware failure is indicated, use the FID, and go to “[Maintenance starting point](#)” on page 1 for problem determination. [Figure 19 on page 59](#), [Figure 20 on page 60](#), [Figure 21 on page 61](#), [Figure 22 on page 62](#), and [Figure 23 on page 63](#) provide examples of the different error log formats for the `smit` and `errpt` commands.

For errors that indicate system problems, enter the appropriate maintenance package.

```

-----
LABEL:                Tapper
IDENTIFIER:           A7AB4C8F

Date/Time:            Tue Oct 21 07:33:21
Sequence Number:     1563
Machine ID:           0000C9DF4C00
Node ID:              kitt
Error Class:          H
Error Type:           PERM
Resource Name:        rmt1
Resource Class:       tape
Resource Type:        3592
Location:             00-02-01-20
VPD:
    Manufacturer.....IBM
    Machine Type and Model.....03592J1A
    Serial Number.....000000000083
    Device Specific . (FW) .....0462
    Loadable Microcode Level...A170029E

Description
TAPE SIM/MIM RECORD

Probable Causes
TAPE DRIVE

10
TAPE
TAPE DRIVE

Recommended Actions
PERFORM PROBLEM DETERMINATION PROCEDURES

Detailed Data
SENSE DATA
0604 0000 1101 FFFF FE00 0000 0000 0000 0102 0000 7000 0400 0000 0048 0000 0000
4400 8603 3010 004A 1E01 0191 004A 8250 0000 1100 0036 2800 0033 4D00 0033 0600
0000 0000 0190 0000 2700 0000 0020 0000 0000 0000 0000 0000 C700 0000 3433 4120
2020 2000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
-----

```

HEX	ASCII	Description
04		Sense key
4400		ASC/ASCQ (additional sense code/additional sense code qualifier)
	(See "Sense Keys, ASC, and ASCQ information" on page 47 for error sense information.)	
86		FID (FRU identification number)
3010		First FSC (fault symptom code)
3628		Second FSC (fault symptom code)
334D		Next to last FSC (fault symptom code)
3306		Last FSC (fault symptom code)
343341	43A	Microcode level
(not shown)		VOLSER Number in ASCII or EBCDIC (Bytes 83-88)

Figure 19: AIX SMIT and ERRPT command Error Log example

```

-----
LABEL:          TAPE_SIM_MIM_RECORD
IDENTIFIER:     A7AB4C8F

Date/Time:      Tue Oct 21 07:33:21
Sequence Number: 1563
Machine ID:     0000C9DF4C00
Node ID:        kitt
Error Class:    H
Error Type:     INFO
Resource Name:  rmt1
Resource Class: tape
Resource Type:  3592
Location:       00-02-01-20
VPD:
  Manufacturer.....IBM
  Machine Type and Model.....03592J1A
  Serial Number.....000000000083
  Device Specific . (FW) .....0462
  Loadable Microcode Level....A170029E
Description
TAPE SIM/MIM RECORD

Probable Causes
TAPE DRIVE
MEDIA

Failure Causes
TAPE DRIVE
MEDIA

Recommended Actions
REFER TO PRODUCT DOCUMENTATION FOR ADDITIONAL INFORMATION

Detailed Data
DIAGNOSTIC EXPLANATION
3100 0044 0000 6140 0130 3030 3030 3030 3234 3634 3431 3030 3737 3330 3030 3030
4544 4135 3036 4135 3036 3830 3030 4942 4D50 4D2D 3030 3030 3030 3030 3030 3833
3033 3539 324A 3141

```

HEX	ASCII	Description
01		01=SIM 02=MIM
3234 3634	2464	Model and Microcode level
3431	41	Message code (See "Message codes" on page 45)
32	2	FID severity (See "SIM/MIM severity" on page 47)
4544	ED	FID (FRU identification number)
4135 3036	A506	First FSC (fault symptom code)
4135 3036	A506	Last FSC (fault symptom code)
3033 3539 32	03592	Machine Type
4A 3141	J1A	Model

Figure 20: Error Log example of SIM message - AIX


```

-----
LABEL:          TAPE_SIM_MIM_RECORD
IDENTIFIER:     2E2EFDDE

Date/Time:      Tue Oct 21 07:33:21
Sequence Number: 203274
Machine ID:     000003243700
Node ID:        kitt
Error Class:    H
Error Type:     UNKN
Resource Name:  rmt1
Resource Class: tape
Resource Type:  3592
Location:       00-02-01-20
VPD:
  Manufacturer.....IBM
  Machine Type and Model.....03592J1A
  Serial Number.....000000000315
  Device Specific . (FW) .....5B8A
  Loadable Microcode Level....A170029E

Description
UNDETERMINED ERROR

Probable Causes
TAPE DRIVE
TAPE CONTROL UNIT

Failure Causes
TAPE DRIVE

Recommended Actions
REFER TO PRODUCT DOCUMENTATION FOR ADDITIONAL INFORMATION

Detailed Data
DIAGNOSTIC EXPLANATION
3100 0044 0000 6140 0230 3030 3030 3030 3235 3841 3631 3535 3630 3130 3030 3341
3241 5051 5239 3530 0130 3830 3030 4942 4D31 322D 3030 3030 3030 3058 5858 5858
3033 3539 324A 3141

```

HEX	ASCII	Description
02		01=SIM 02=MIM
3235 3841	258A	Model and Microcode level
3631	61	Message code (See "Message codes" on page 45)
31	1	FID severity (See "SIM/MIM severity" on page 47)
5051 5239 3530	PQR950	VOLSER (volume serial number)
3033 3539 32	03592	Machine Type
4A 3141	J1A	Model

Figure 21: Error Log example of MIM message - AIX

```

-----
LABEL:          RECOVERED_ERROR
IDENTIFIER:     0F78A011

Date/Time:      Tue Oct 21 07:33:21
Sequence Number: 15026
Machine ID:     0000C9DF4C00
Node ID:        kitt
Error Class:    H
Error Type:     PERM
Resource Name:  rmt1
Resource Class: tape
Resource Type:  3592
Location:       00-02-01
VPD:
  Manufacturer.....IBM
  Machine Type and Model.....03592J1A
  Serial Number.....YN1A00000083
  Device Specific . (FW) .....045B
  Loadable Microcode Level....A170029E

Description
TAPE DRIVE FAILURE

Probable Causes
TAPE DRIVE

Failure Causes
TAPE
TAPE DRIVE

Recommended Actions
PERFORM PROBLEM DETERMINATION PROCEDURES

Detail Data
SENSE DATA
0600 0000 0A01 0000 0200 0000 0000 0000 0102 0000 F100 0400 0000 0058 0000 0000
5300 8602 8E02 0000 0006 0191 00FF 0000 0025 0AFF E733 4300 0033 4D00 0033 4100
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 3433 4120
2020 2000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
-----

```

HEX	ASCII	Description
86		FID (FRU identification number)
8E02		First FSC (fault symptom code)
33 43		Second FSC (fault symptom code)
33 4D		Next to Last FSC (fault symptom code)
33 41		Last FSC (fault symptom code)
343341	43A	Microcode level
(not shown)		VOLSER (Bytes 83-88)

Figure 22: AIX SMIT and ERRPT command Error Log example

1	2	3	4	5	6
0502F666	1003075695	P	H	scsi0	ADAPTER ERROR
0502F666	1003075595	P	H	scsi0	ADAPTER ERROR
1104AA28	1003075495	T	S	SYSPROC	System reset interrupt received
9DBCfDEE	1003075795	T	O	errdemon	Error logging turned on
0F78A011	1003075195	T	H	rmt1	Recovery logic initiated by device
4865FA9B	1003074995	P	H	rmt1	TAPE OPERATION ERROR
476B351D	1003074995	P	H	rmt1	TAPE DRIVE FAILURE
2E2EFDDE	1003074995	U	H	rmt1	UNDETERMINED EFFOR
476B351D	1003074995	P	H	rmt1	TAPE DRIVE FAILURE
2E2EFDDE	1003074995	U	H	rmt1	UNDETERMINED ERROR
2E2EFDDE	1003074995	U	H	rmt1	UNDETERMINED ERROR
0502F666	1003074495	P	H	scsi0	ADAPTER ERROR
0502F666	1003074395	P	H	scsi0	ADAPTER ERROR
1104AA28	1003074395	T	S	SYSPROC	System reset interrupt received
9DBCfDEE	1003074595	T	O	errdemon	Error logging turned on
4865FA9B	1003073795	P	H	rmt1	TAPE OPERATION ERROR
476B351D	1003073795	P	H	rmt1	TAPE DRIVE FAILURE
2E2EFDDE	1003073795	U	H	rmt1	UNDETERMINED ERROR
476B351D	1003073795	P	H	rmt1	TAPE DRIVE FAILURE
2E2EFDDE	1003073595	U	H	rmt1	UNDETERMINED ERROR
AA8AB241	1003030195	T	O	OPERATOR	OPERATOR NOTIFICATION
AA8AB241	1002030195	T	O	OPERATOR	OPERATOR NOTIFICATION
AA8AB241	1001030195	T	O	OPERATOR	OPERATOR NOTIFICATION
FCA960CE	1001001395	T	S	tok0	EXCESSIVE TOKEN-RING ERRORS
20188DE1	0928091195	P	H	tok0	WIRE FAULT
476B351D	0927132795	P	H	rmt0	TAPE DRIVE FAILURE
476B351D	0927132795	P	H	rmt0	TAPE DRIVE FAILURE
476B351D	0927132695	P	H	rmt0	TAPE DRIVE FAILURE
476B351D	0927132695	P	H	rmt0	TAPE DRIVE FAILURE
5537AC5F	0927132495	P	H	rmt0	TAPE DRIVE FAILURE

A14M0008

NUMBER	DESCRIPTION
1	Error ID
2	Timestamp
3	Error Type
4	Error Class
5	Resource Name
6	Error Description

ERROR CLASS	DESCRIPTION
H	Hardware
S	Software
O	Informational

ERROR TYPE	DESCRIPTION
PEND	The availability loss of a device or component is imminent.
PERF	The performance of a device or component has degraded to an unacceptable level.
PERM	A hardware or software condition that could not be recovered from.
TEMP	A hardware condition that was recovered from after several unsuccessful attempts.
UNKN	The severity of the condition could not be determined.

A21MMS16

Figure 23: AIX SMIT and ERRPT commands Error Log example - descriptions

Error Log Analysis - System i

To gain access to the System i problem logs and error logs, sign on at any available workstation with the **QSRV** logon and its security password (QSRV). After signon, the correct access authorization is granted and the **OS/400 MAIN MENU** opens.

System i with RISC processor

1. Type STRSST (Start System Service tools) command on the command entry line on the System i® main menu, and press **Enter**.
2. Select **Start a service tool**.
3. Select **Product activity log**.
4. Select **Analyze log**.
5. Specify the time period for searching the error log, then select **Magnetic media**.
6. On the **Select Analysis Report Options** menu, specify a device type of 3592, and press **Enter**. Leave all other options at their default value.
7. Use the **Log Analysis Report** menu to display the wanted error log entry.

Note: You might use the PF11 function key, which gives you a brief description of the error log entry. This information can be helpful when you are scanning the error logs.

8. The following figure is a sample **System i Error Log** display screen. It shows the 3592 error log data.

```

Display Detail Report for Resource
Name      Type      Model      Serial      Resource
TAP02     3592     J1A        13-10063    TAP34
Error log ID . . . . . : 004602D2      Sequence . . . . . : 178324
Date . . . . . : 10/21/03      Time . . . . . : 11:38:02
Reference code . . . . . : 9350      Secondary code . . . . . : 00000000
Table ID . . . . . : 35920J1A      IPL source/state . . . . . : B/3

Class . . . . . : Permanent
System Ref Code . . . . . : 35929300
Tape unit failure
SIM/MIM message . . . . . : 00000000137E42007730000086311531
                          1580000B013000000000007503592J1A

Press Enter to continue.

F3=Exit      F4=Additional Information  F6=Hexadecimal report
F9=Address Information  F10=Previous detail report  F12=Cancel

-----Hex-----Description-----
137E      Model and Microcode Level
42       Message Code (see "Message codes" on page 45)
86       FID (FRU Identifier)
3115     First FSC (fault symptom code)
3115     Last FSC (fault symptom code)
0000000075 Sequence Number (drive serial number)
03592    Device Type
J1A      Device Model Number
-----

```

Figure 24: System i example Error Log of SIM message

9. Press **F4** to display more information. See the example in [Figure 25 on page 65](#).

Display Additional Information for Resource

Name	Type	Model	Serial Number	Resource Name
TAP02	3592	J1A	13-10063	TAP34
SIM/MIM message : 00000000 137E42 0077300000 860311531 1580000B0130000000000007503592J1A				

```

-----Hex-----Description-----
      137E      Link and Microcode Level
      42      Message Code (see "Message codes" on page 45)
      86      FID (FRU Identifier)
     3115      First FSC (fault symptom code)
     3115      Last FSC (fault symptom code)
0000000075      Sequence Number (drive serial number)
     03592      Device Type
      J1A      Device Model Number
-----
  
```

Figure 25: System i example Error Log of SIM message

To display the hexadecimal error report, press **F6**. The following figure is an example of a 3592 hexadecimal error report that shows a permanent read/write error. Press **Page Up** or **Page Down** to display offset 01D0 to 020C in the error log.

Display Hexadecimal Report for Resource

Name	Type	Model	Serial Number	Resource Name
TAP02	3592	J1A	13-10063	DEVICE

Offset	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	EBCDIC
000180	F880	7800	6501	0001	0000	0270	1700	FFFF	8	.....	.....	.....	.....	.....	.....	.....	.....
000190	35920J1A	9350	0001	0063	1202	05D8	D5E6	.....	&	.....	Q	N	W	.....	.....	.....	.....
0001A0	F0F0	F5F0	4040	4250	0000	9200	0000	0000	0050	.	&	.....	.....	.....	.....	.....	.....
0001B0	0004	0000	0000	A0B0	0E22	3444	3244	0000	.....	.....	.....	.....	.....	.....	.....	.....	.....
0001C0	0000	F000	0300	0000	0040	0000	0000	0900	..	0	.....	.....	.....	.....	.....	.....	.....
0001D0	862A	3118	0001	0003	0130	0009	4249	4280	.....	.....	.....	.....	.....	.....	.....	.....	.....
0001E0	1000	1035	4200	0133	6B05	0433	5400	0000	.....	.....	.....	.....	.....	.....	.....	.....	.....
0001F0	0000	0003	0000	0040	0000	5A90	0000	0003	.....	.....	.....	.....	.....	.....	.....	.....	.....
000200	0000	0010	0000	2300	0000	3433	4120	2020	.....	.....	.....	.....	.....	.....	.....	.....	.....
000210	2000	1000	00 5051	52	3935	3000	0000	0600	.....	.....	.....	.....	.....	.....	.....	.....	.....
000220	0000	0000	0000	0000	0000	0000	0000	0000	.....	.....	.....	.....	.....	.....	.....	.....	.....
000230	0000	1000	0003	FFFF	FFFC	1200	0331	D9E2	.....	.....	.....	.....	.....	.....	.....	.....	.....RS

More...

Press Enter to continue.

F3=Exit F12=Cancel

Note: Figure 26 on page 66 provides an example of a typical System i report. Display contents varies by displacement, depending on the operating system release. If you do not find either F0, F1, 70, or 71 (locator byte) in Location 1C2, then browse around that area and adjust the displacement accordingly. Remember that the first FSC is directly below the located byte. Figure 27 on page 67 depicts a typical System i (OS/400) system report.

OFFSET	HEX	ASCII	DESCRIPTION
0184-0185	6501		IOP Type
018C-018D	1700		1 = IOP Port Used 700 = Drive Address
0190-0193	35920J1A		Device Type and Model
0194-0195	9350		SRC (system reference code)
01C4	03		Sense Key
01CE-01CF	0900		ASC/ASCQ (additional sense code/additional sense code qualifier)
(See "Sense Keys, ASC, and ASCQ information" on page 47 for error sense information.)			
01D0	86		FID (FRU identification number)
01D2-01D3	3118		First FSC (fault symptom code)
01E3-01E4	3542		Second FSC (fault symptom code)
01E7-01E8	336B		Next to Last FSC (fault symptom code)
01EB-01EC	3354		Last FSC (fault symptom code)
020A-020C	343341	43A	Microcode level
0215-021A	505152393530		VOLSER Number in ASCII or EBCDIC

Figure 26: System i hexadecimal Error Log (display)

Here is what the sense data would look like in the AS/400 Product Activity log for a model Jxx. The device type is shown as 63A0 instead of 3592 since 63A0 is the reported type.

```
-----
                Display Additional Information for Resource

Name           Type      Model      Serial      Resource
TAPMLB46      63A0      001       13-10016    TAP04

SENSE DATA FOLLOWS. . . . :
DATA OFFSET          0 1 2 3  4 5 6 7  8 9 A B  C D E F
000000             F0000300 00005058 00000000 3001FF02
000010             3A9F1000 02030191 00091040 00000800
000020             0033D00 00000000 00000000 00000000
000030             00000000 00000000 00000000 00000000
000040             00000000 49000000 36434220 20202000

Press Enter to continue.
F3=Exit           F12=Cancel
```

OFFSET	HEX	ASCII	DESCRIPTION
000002	03		Sense key of 3
000007	X'0A' or X'58"		18 bytes or 96 bytes of sense data are returned
00000C	3001		ASC and ASCQ
00000E	FF		FID (FRU identification number)
000010	3A9F		1st error code
000021	333D		2nd error code
000048	36434220	20202000	Microcode EC Number (in ASCII)

Figure 27: System i (AS/400) Product Activity Log (display)

For information about the sense bytes, see Request Sense X'03' in the *IBM Tape System 3592 Hardware Reference*.

Figure 28 on page 68 provides an example of an System i hexadecimal error report printout with an error type of **Permanent**.

The FID and FSC in the error log are in hexadecimal, while the microcode level is in ASCII. Use [Table 24 on page 43](#) to translate values from hexadecimal to ASCII.

```

Error Log Utility                               Page . . . :      2
                                               IBM      10/21/03 14:13:10
Partial Report for Resource

From . . . : 10/21/03 14:13:10 To . . . : 10/21/03 14:13:10

Resource   Type   Model   Serial      Address      Total Count
TAP02     3592   J1A     13-10063    0270-1700FFFF 286

Reference Code      Error Type      Count
9350                Permanent      3
9355                Permanent     21
FFF6                Statistic     262

Detail Report for Resource

Resource   Type   Model   Serial      Address
TAP02     3592   J1A     13-10063    0270-1700FFFF

Error Log ID . . . . . : 004602D2 Sequence . . . . . : 178324
Date . . . . . : 10/21/03 Time . . . . . : 11:38:02
Reference code . . . . . : 9350 Error Code . . . . . : 00000000
Table ID . . . . . : 35920J1A IPL Source . . . . . : B
Error Type . . . . . : Permanent
Description . . . . . :
Tape unit detected a read or write error on tape medium

00000000 0000 C5D3F0F2 000000F8 007000E0 787BB495 F50000D0 0002B894 20100103 3C000000 *EL02...B...#.5.....*
00000000 0020 92100000 11000000 00000000 01720000 F3F5F9F0 C2F1F140 F1F260F0 F0F0F0F0 *...3592J1A 12-00000*
00000000 0040 4040F6F5 00000000 00000001 00010000 00020000 00050001 0002FFFF 0000FFFF *..6501.....*
00000000 0060 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
00000000 0080 00000000 00000000 00000000 00000000 00000000 00000000 00000000 0000E3C1 *.....TA*
00000000 00A0 D7F0F740 40404040 00000000 00000000 00000000 00000000 40404040 40404040 *P07 .....*
00000000 00C0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 *.....*
00000000 00E0 F3F5F9F0 F0C2F1F1 0000E2D3 C9C3C9D6 4040E5F3 D9F6D4F0 40400000 00000000 *35920J1A..SLICIO V3R6M0 .....*
00000000 0100 00700000 00000000 00000170 00000000 00000000 01720000 00000000 00000000 *.....*
00000000 0120 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
00000000 0140 E3C1D7F0 F7404040 40400000 00000000 40404040 40404040 40404040 00070001 *TAP07 .....*
00000000 0160 00000000 10200003 00000000 00000000 00000000 00000000 0005001E 00000188 *.....*
00000000 0180 F8078000 65010001 00000120 12F0FFFF 35920J1A 92100000 00001202 06240000 *8.....0.....*
00000000 01A0 00000000 00004250 0000920E 00000000 00040000 0000A0B0 0E213234 433800B4 *.....&.....*
00000000 01C0 0000F000 03000000 00400000 00000000 862A3118 00010003 01300009 42494280 *..0.....*
00000000 01E0 10001035 42001133 00050433 54000000 00000003 00000400 00005A90 00000003 *.....!.....*
00000000 0200 00000100 00002300 00003433 41202020 20001000 00505152 39353000 00000600 *.....*
00000000 0220 03003900 00000300 00001000 00000000 00013100 03000000 00040000 00000900 *.....*
00000000 0240 FE2A3800 00171202 05D80000 00171202 05D81000 00050000 00171202 05D80600 *.....Q.....Q.....Q.....*
00000000 0260 10002000 02000000 00171202 05D80600 00000000 00000000 40404040 40404040 *.....*
00000000 0280 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
00000000 02C0 1 LINES 00000000 02A0 TO 00000000 02A0 SAME AS ABOVE *.....*
00000000 02E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000005 *.....N*
00000000 02F0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000500 *.....N*
00000000 0300 00000000 00000000 40404040 40404040 40404040 40404040 40404040 40404040 *.....*

***** END OF COMPUTER PRINTOUT *****
1 Offset into the error log
2 Hexadecimal error log
3 EBCDIC field

OFFSET   HEX      ASCII  DESCRIPTION
0184-0185 6501    IOP Type
018C-018D 12F0    1 = IOP Port Used
                2F0 = Drive Address
0190-0193 35920J1A Device Type and Model
0194-0195 9210    SRC (system reference code)
01C4      03      Sense Key
01CE-01CF 0900    ASC/ASCQ (additional sense code/additional sense code qualifier)
                (See "Sense Keys, ASC, and ASCQ information" on page 47
                for error sense information.)
01D0      86      FID (FRU identification number)
01D2-01D3 3118    First FSC (fault symptom code)
01E3-01E4 3542    Second FSC (fault symptom code)
01E7-01E8 336B    Next to Last FSC (fault symptom code)
01EB-01EC 3354    Last FSC (fault symptom code)
020A-020C 343341 43A    Microcode level
0215-021A 5095152393530 VOLSER Number in ASCII or EBCDIC

```

Figure 28: System i Hexadecimal Error Log (printout)

Note: Figure 28 on page 68 is an example of a typical System i report. Display contents varies by displacement, depending on the operating system release. If you do not find either F0, F1, 70, or 71 (locator byte) in Location 1C2, browse around that area and adjust the displacement accordingly. Remember that the first FSC is directly below the located byte. [Figure 27 on page 67](#) shows a typical System i system report.

Go to “Message codes” on page 45, and review the message codes for all SIM/MIMs before the **START** section is entered with the FID. Once you located the FID, go to “Maintenance starting point” on page 1 for problem determination.

Consult the System i documentation for detailed information about displaying and printing error logs.

Obtaining drive error information from Linux system

Notes:

- If your customer runs the recommended IBMtaped daemon that comes with the Linux device driver for the 3592, the system automatically captures trace data, error logs, volume logs, drive dumps, and

SIM/MIM data as these activities occur. The system places this data in appropriate areas of the system disk. Ask your customer to access this data for you, as you determine that it is necessary.

- The customer has the option of gathering several layers of trace data, and can disable automatic gathering of error logging, volume logging, drive dumps, and SIM/MM data. IBM recommends that you do not disable these items. Refer to the *IBM Tape Device Drivers Installation and User's Guide*, for information about setting these options, accessing these files, and gathering this data.

See [“TAPEUTIL in Linux system environment”](#) on page 278 for information about the host attachment software service tool *tapeutil* for Linux systems.

If the customer is not running the recommended IBMtaped daemon, some trace data, error data, and dumps are still available. These items must be accessed from the host console with IBMtapeutil, as follows -

Forcing a drive dump

This utility forces a dump operation on the tape drive. The customer or the service representative can save the dump data to a file by using the **Read Dump** utility.

To access this utility, start **IBMtapeutil**, and choose **Service Aids Command** and **Force Dump**. You also can issue the following command to access this utility:

```
IBMtapeutil -f /dev/IBMtape0 forcedump
```

Reading a dump

This utility transfers the dump data from the device to a file, a diskette, or a tape cartridge. It follows a **force drive dump** operation.

To access this utility, start **IBMtapeutil**, and choose **Service Aids Command** and **Dump Device**. Another option is to issue the command:

```
IBMtapeutil -f /dev/IBMtape0 dump [filename]
```

If the file name is not specified, you can use the default *dump0001.dmp*. All the dump files are stored under the current directory.

Automatically retrieved SIM/MIM data

If a condition occurs in the drive that creates drive SIM/MIM data, IBMtaped retrieves the data and saves it in a file named *IBMtaped.timestamp.simmim*. IBMtaped is the device special file (for example, *IBMtape1*, or *IBMtape2*). Timestamp reflects the time that the file was created. Each time SIM/MIM data is obtained, it is written to a new file. Your customer might forward SIM/MIM data to you for analysis.

The SIM/MIM data is stored in the */var/log* directory, by default. Your customer might specify another directory in the */etc/IBMtaped.conf* file.

For information on SIM/MIM analysis, see [“Service and Media Information messages \(SIMs and MIMs\)”](#) on page 39.

Error Log Analysis - Linux system

Error information is written into the error log file. The maximum capacity is 1 MB. The Linux command **ar** archives trace information when the file size increases to be greater than 1 MB. This Linux command creates the *IBMtape.a* file and places it in the same directory. In the archive, the file is renamed to **IBMtape.errorlog.timestamp**. *Timestamp* is the time that the file was archived.

Your customer might change the directory to which the error-logging information is written and the default maximum size of the error log file by modifying settings in the *IBMtaped.conf* file. Refer to the instructions in the *IBMtaped.conf* file for details.

When the IBMtaped daemon is running, error logging is enabled if tracing is enabled. The IBMtaped daemon, by default, is logged at */var/log/IBMtape.errorlog*, unless the customer placed it in

another location. Here is an example of an error log record for a device that is attached to a Linux operating system:

```
IBMtape0--E0029 Wed Jul 17 09:17:51 2002
  SCSI Path   : 01 00 00 00
  CDB Command : 1B 00 00 00 00 00
  Status Code : 08 00 00 01
  Sense Data  : 70 00 01 00 00 00 00 58 00 00 00 00 00 17 86 0B
                C9 4B 01 00 00 05 01 40 00 09 00 00 00 00 1B 00
                10 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00
                00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00
Description  : Recovered Error
```

```
-----Hex-----Description-----
01          Sense Key (Recovered Error)
00 17      ASC/ASCQ (Drive needs cleaning)
86         FRU (FID)
C94B      First Error Code
1B        SCSI Command (Load/Unload)
-----
```

Figure 29: Linux Error Log record example

The following information describes the various error log entries that are depicted in [Figure 29 on page 70](#).

First line

Provides the tape device special file name, the device serial, and the time stamp of when the error message was recorded.

SCSI Path

Identifies the SCSI path for the logical unit. This path matches the order of the SCSI/Channel/ID/LUN information in the `/proc/scsi/scsi` file.

CDB Command

The command data block of the SCSI command.

Status Code

The returned result from the Linux SCSI middle layer device driver `scsi_mod.o`. The 4 bytes represent `driver_byte`, `host_byte`, `msg_byte`, and `status_byte`.

Sense Data

The full SCSI data that is returned from the target.

Description

Human-readable text string that is obtained by parsing the sense key field of the sense data.

Obtaining drive error information from Solaris system

The Solaris system does not provide error logs for analysis. Therefore, you must use the device diagnostic tests and Device Error Log for problem determination. See [“CE Logs menu \(CE Offline Mode\)” on page 133](#). When you locate a FID, go to [“Maintenance starting point” on page 1](#).

See [“TAPEUTIL in Sun \(Solaris\) system environment” on page 263](#) for information about the host attachment software service tool **tapeutil** for Solaris systems.

Refer to the *IBM Tape Device Drivers Installation and User's Guide* for information about Solaris service and diagnostic aids.

Obtaining drive error information from HP-UX system

The HP-UX system does not provide error logs for analysis. Therefore, you must use the device diagnostic tests and Device Error Log for problem determination. See “CE Logs menu (CE Offline Mode)” on page 133. When you locate a FID, go to “Maintenance starting point” on page 1.

See “TAPEUTIL in HP-UX system environment” on page 269 for information about the host attachment software service tool **tapeutil** for HP systems.

Refer to the *IBM Tape Device Drivers Installation and User's Guide* for information about HP/UX service and diagnostic aids.

Obtaining drive error information from Windows system

See “TAPEUTIL in Windows system environment (NTUTIL)” on page 275 for information about the host attachment software service tool **tapeutil** for Windows systems.

Refer to *IBM Tape Device Drivers Installation and User's Guide* for information about Windows service and diagnostic aids.

Running NTUTIL

If **ntutil** is running and an error condition is detected, an error message is displayed. The error sense data has the format that is seen in Figure 30 on page 71. The **err 0 ERROR_SUCCESS**, or error number, is explained in “NTUTIL symbolic error and error number” on page 71.

```
enter selection: 39
Scsi status: 02h/Sense information Length 60h
Sense KEY/ASC/ASCQ = 02/3a/00
      KEY meaning is: not ready
Sense Info - - - consult SCSI spec for details

      00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
-----
0000 - 70 00 02 00 00 00 00 58 00 00 00 00 3a 00 86 02
0010 - c4 08 00 00 00 00 01 40 00 00 00 00 00 00 0a 00
0020 - 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0030 - 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0040 - 00 00 00 00 00 00 00 00 32 46 31 20 20 20 20 00
0050 - 00 00 00 50 51 52 39 35 30 00 00 00 00 00 00 00

analyze <> called with rc 1 err 0 <ERROR_SUCCESS> data 0
total elapsed time in seconds = 0.00
Return to continue:
```

HEX	ASCII	DESCRIPTION
86		FID (FRU identification number) Byte 14
C408		FSC (fault symptom code) Bytes 16 and 17
324631	2F1	Microcode level, Bytes 72-74
505152393530		VOLSER# in ASCII or EBCDIC

Figure 30: NTUTIL error sample

For further information on gathering error data, refer to the *IBM Tape Device Drivers Installation and User's Guide* and the *IBM Tape System 3592 Hardware Reference*. On certain errors, an **ntutil test_unit_ready** command (39) must be issued to display the sense information. Sense information can also be retrieved with a **Log_sense** command (83).

NTUTIL symbolic error and error number

Symbolic Error	NT Error Number
ERROR_SUCCESS	0
ERROR_INVALID_FUNCTION	1

ERROR_FILE_NOT_FOUND	2
ERROR_PATH_NOT_FOUND	3
ERROR_TOO_MANY_OPEN_FILES	4
ERROR_ACCESS_DENIED	5
ERROR_INVALID_HANDLE	6
ERROR_NOT_ENOUGH_MEMORY	8
ERROR_BAD_FORMAT	9
ERROR_INVALID_BLOCK	10
ERROR_BAD_ENVIRONMENT	11
ERROR_INVALID_ACCESS	12
ERROR_INVALID_DATA	13
ERROR_OUTOFMEMORY	14
ERROR_INVALID_DRIVE	15
ERROR_WRITE_PROTECT	19
ERROR_BAD_UNIT	20
ERROR_NOT_READY	21
ERROR_BAD_COMMAND	22
ERROR_CRC	23
ERROR_HANDLE_EOF	38
ERROR_NOT_SUPPORTED	50
ERROR_DEV_NOT_EXIST	55
ERROR_ALREADY_ASSIGNED	85
ERROR_INVALID_PARAMETER	87
ERROR_OPEN_FAILED	110
ERROR_INSUFFICIENT_BUFFER	122
ERROR_INVALID_NAME	123
ERROR_BUSY_DRIVE	142
DD_NO_SENSE	200
DD_DEVICE_DRIVER_FAILURE	201
DD_EEPROM_FAILURE	202
DD_MANUAL_INTERVENTION	203
DD_RECOVERED_ERROR	204
DD_SCSI_ADAPTER_ERROR	205
DD_SCSI_ERROR	206
DD_SCSI_BUSY	211
DD_ILLEGAL_REQUEST	207
DD_COMMAND_ABORTED	208
DD_HARDWARE_MICROCODE	209
DD_UNIT_ATTENTION	210
ERROR_MORE_DATA	234
DD_CARTRIDGE_ENTRY_FAILURE	300

Symbolic Error	NT Error Number
DD_CARTRIDGE_LOAD_FAILURE	301
DD_CARTRIDGE_IN_FAILED_DRIVE	302
DD_CAROUSEL_NOT_LOADED	303
DD_CHANGER_FAILURE	304
DD_DRIVE_FAILURE	305
DD_DRIVE_OR_MEDIA_FAILURE	306
DD_ENTRY_EXIT_FAILURE	307
DD_ENTRY_EXIT_NOT_PRESENT	308
DD_LIBRARY_AUDIT	309
DD_LIBRARY_FULL	310
DD_MEDIA_EXPORT	311
DD_SLOT_FAILURE	312
DD_SLOT_OR_MEDIA_FAILURE	313
DD_SOURCE_EMPTY	314
DD_DESTINATION_FULL	315
DD_CLENER_INST	316
DD_MEDIA_NOT_EJECTED	317
DD_IOPORT_NOT_CONFIG	318
DD_FIRST_DEST_EMPTY	319
DD_END_PHYSICAL_MEDIA	400
DD_MEDIA_BLANK	401
DD_MEDIA_CORRUPTED	402
DD_MEDIA_FAILURE	403
DD_MEDIA_INCOMPATIBILITY	404
DD_SECTOR_RELOCATION	405
DD_SECTOR_OUT_OF_RANGE	406
DD_WRITE_PROTECT	407
DD_CLEAN_MEDIA	408
DD_MEDIA_FAULT	409
DD_CLEANING_COMPLETE	410
DD_LOGICAL_END_OF_MEDIA	411
DD_MEDIA_NOT_PRESENT	412
DD_BEGINNING_OF_MEDIA	413
DD_ERASE_FAILURE	414
DD_WRITE_TO_WRITTEN_WORM	415

DD_WRONG_LENGTH_BLOCK	416
ERROR_IO_INCOMPLETE	996
ERROR_IO_PENDING	997
ERROR_NOACCESS	998
ERROR_CANTOPEN	1011
ERROR_CANTREAD	1012
ERROR_CANTWRITE	1013
ERROR_END_OF_MEDIA	1100

Symbolic Error	NT Error Number
ERROR_FILEMARK_DETECTED	1101
ERROR_BEGINNING_OF_MEDIA	1102
ERROR_SETMARK_DETECTED	1103
ERROR_NO_DATA_DETECTED	1104
ERROR_PARTITION_FAILURE	1105
ERROR_INVALID_BLOCK_LENGTH	1106
ERROR_DEVICE_NOT_PARTITIONED	1107
ERROR_UNABLE_TO_LOCK_MEDIA	1108
ERROR_UNABLE_TO_UNLOAD_MEDIA	1109
ERROR_MEDIA_CHANGED	1110
ERROR_BUS_RESET	1111
ERROR_NO_MEDIA_IN_DRIVE	1112
ERROR_IO_DEVICE	1117
ERROR_TOO_MANY_LINKS	1142

SCSI sense data

A tape drive failure can be reported to an attached open system host, by using the SCSI protocol. When the host detected the failure, it built the following SCSI sense data record. The error condition example that is provided in [Figure 31 on page 73](#) is for a COMMAND TIMEOUT. The likely cause is a drive that is failing to respond or a failing component of the Fibre Channel.

```
SENSE DATA
aabb xxxx ccdd eeee eeee eeee eeee eeee ffgg hxxx ssss ssss ssss ssss ssss ....
0600 0000 1200 0000 0000 0000 0000 0000 0000 0200 0300 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
```

Figure 31: SCSI sense data

Note: The area that is highlighted in [Figure 31 on page 73](#) represents the SCSI sense data that is presented by the host. The regular font data (for this example, many bytes of 'zero'), designated by 'sss' would normally contain device sense data. With the kind of failure that is depicted in this example (COMMAND TIMEOUT), the host cannot collect valid device sense data; zeros are the result and must be ignored. If the host is able to collect valid sense data from the drive, the first byte 'ss' is '70,' '71,' 'F0,' or 'F1,' and valid device sense data is included.

The beginning sense information for this example matches this format -

aabb xxxx ccdd eeee eeee eeee eeee eeee ffgg hxxx ssss ssss ssss....

aa

Length of the Command Descriptor Block (CDB) sent by the host (for this example, '06' bytes).

bb

SCSI target address (for this example, SCSI address '00').

xx

Unused or reserved.

cc

Start of CDB; cc is the operation code (byte 0) (for this example, '12,' which was an "Inquiry").

Valid SCSI Operation Codes for Tape Drives

X'00

Test unit ready.

X'01

Rewind.

X'03

Request sense data.

X'05

Read block limits.

X'08

Read.

X'0A

Write.

X'0D

Extended diagnostics.

X'10

Write filemark.

X'11

Space.

X'12

Inquiry.

X'13

Verify.

X'14

Recover buffered data.

X'15

Mode select.

X'16

Reserve.

X'17

Release.

X'18

Copy.

X'19

Erase.

X'1A

Mode sense.

X'1B

Load/unload.

X'1C

Receive diagnostics results.

X'1D

Send diagnostic test.

X'1E

Prevent/allow media removal.

X'1F

Read log.

X'34

Read position.

X'3B

Locate.

dd

Logical unit (byte 1) in the CDB (for this example, '00').

ee

Bytes 2 - 11 in the CDB. A maximum of 12 bytes (0 - 11) are reserved for the CDB, though not all the bytes are used every time. The "aa" tells how many bytes are used of the 12 available (for this example, '6').

ff

Status validity field.

X'01

SCSI BUS ERROR - Byte gg indicates the type of error.

X'02

ADAPTER ERROR - Byte hh indicates the type of error.

gg

This byte indicated the type of SCSI error that occurred.

X'02

CHECK CONDITION - Device reported a check condition.

X'08

BUSY STATUS - Target is busy.

X'18

RESERVATION CONFLICT - Target is reserved to another initiator.

X'22

COMMAND TERMINATED - Device terminated the command.

X'28

QUEUE FULL - Device's command queue is full.

hh

This byte indicated the type of adapter error that occurred.

For parallel SCSI adapters, the general_card status code as defined in /usr/include/sys/scsi.h.

X'01

HOST IO BUS ERROR - Host I/O bus error during data transfer.

X'02

SCSI BUS FAULT - SCSI bus protocol hardware error.

X'04

COMMAND TIMEOUT - Command that is timed out before completion.

X'08

NO DEVICE RESPONSE - Target did not respond to selection phase.

X'10

ADAPTER HARDWARE FAILURE - Adapter indicated a hardware failure.

X'20

ADAPTER SOFTWARE FAILURE - Adapter indicated a microcode failure.

X'40

FUSE OR TERMINAL PWR - Blown terminator fuse or bad termination.

X'80

SCSI BUS RESET - Adapter indicated SCSI bus was reset.

For FCP adapters, the adapter_status code as defined in /usr/include/sys/scsi_buf.h.

X'01

HOST IO BUS ERROR - Host I/O bus error during data transfer.

X'02

TRANSPORT FAULT - Failure in the transport layer.

X'03

COMMAND TIMEOUT - Command that is timed out before completion. AIX device driver (Atape). The example shows a failure.

X'04

NO DEVICE RESPONSE - Target did not respond to attempts to select it.

X'05

ADAPTER HARDWARE FAILURE - Adapter indicated a hardware failure.

X'06

ADAPTER SOFTWARE FAILURE - Adapter indicated a microcode failure.

X'07

WW NAME CHANGE - Adapter detected a new worldwide name for the device.

X'08

FUSE OR TERMINAL PWR - Blown terminator fuse or bad termination.

X'09

TRANSPORT RESET - Adapter detected an external SCSI bus reset.

X'0A

TRANSPORT BUSY - The transport layer is busy.

X'0B

TRANSPORT DEAD - The transport layer is inoperative.

ss...

X'00...

DEVICE SENSE DATA - Since the first byte is not '70,' '71,' 'F0,' or 'F1,' the area that is normally reserved for device sense data is not valid (and therefore contains zeros). If byte 'gg' indicates a check condition, the 'ss' byte contains '70,' '71,' 'F0,' or 'F1'. The remaining bytes are valid device sense data. See the appropriate device reference manual for the specific format and content of these bytes.

Chapter 4. Virtual Operator panel

Virtual Operator panel

The 3592 EH7, EH8, 55F, and 60F drives no longer use a physical **Operator** or **Service** panel, like the E07 and E08 models did. It is replaced by a **Virtual Operator** panel, as described here.

Note: Throughout this section (and the entire MI), any reference to the **Operator** panel, or **Service** panel, or **Virtual Service** panel, now refers to the **Virtual Operator** panel.

The **Virtual Operator** panel replicates the functions of the physical operator panel through an HTTP web page, and requires an Ethernet connection between the drive and a laptop. The display consists of an image of the physical operator panel, including working "buttons" for the main functions. The power-cycle button previously available on the physical operator panel is not supported. However, the drive can be power-cycled through menu functions .

To connect to the **Virtual Operator** panel, follow the steps in [“Connecting and disconnecting the laptop from the drive”](#) on page 186. Refresh your browser to update the page with the most current information. When set up correctly, the **Virtual Operator** panel appears in your browser as shown in [Figure 32](#) on page 77. A refresh button is provided to refresh the panel image if needed. The page does not automatically refresh.

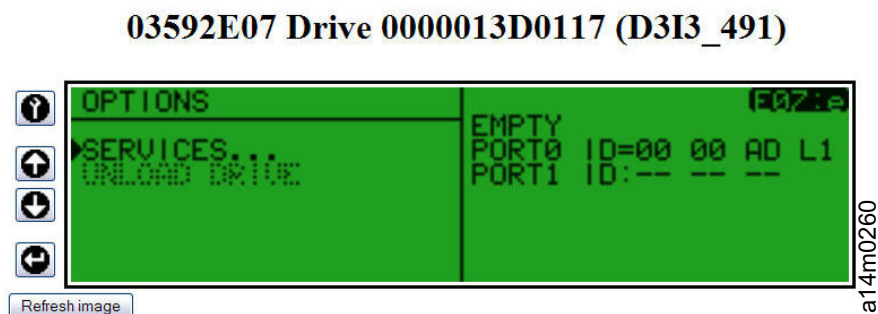


Figure 32: Virtual Operator panel

To use the "buttons" on the **Virtual Operator** panel, select them with your laptop mouse or pointer. Remember next to select **Refresh image** to see any resulting change to the display.

Note: If you repeatedly select buttons too quickly, you might receive a warning from the browser, instructing you to try again.


Virtual Operator panel indicators, icons, and message areas

This section describes the graphic and text indicators and the message areas of the 3592 drive Virtual Operator display. Use [“Virtual Operator panel controls”](#) on page 77 and [“Virtual Operator panel display”](#) on page 78 to locate the indicators and icons. See [Figure 32](#) on page 77 and [Figure 34](#) on page 85 for views of the message area of the Virtual Operator panel.

Virtual Operator panel controls

The Virtual Operator panel has four function buttons and a **Refresh** button.. [Figure 32](#) on page 77 shows these button controls and [Table 43](#) on page 78 describes the purpose of each.

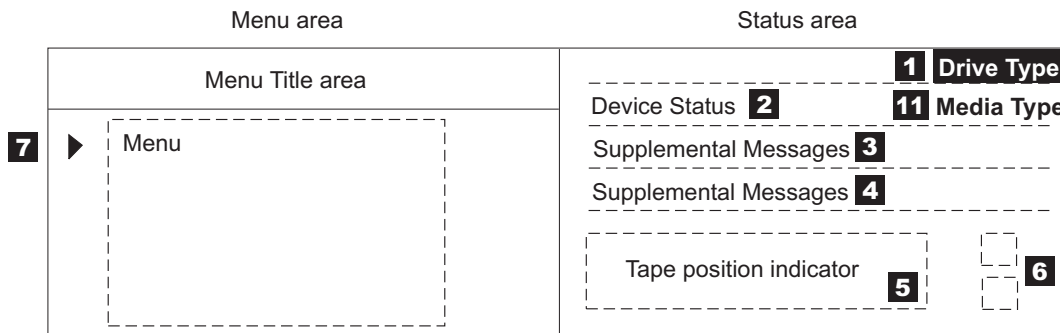
Table 43: Virtual Operator panel controls. Use with [Figure 32 on page 77](#).

Pushbutton/Indicator	Description
Change Mode	<p>Allows the CE to select Operator Mode, CE Offline Mode, or CE Online Mode.</p> <ul style="list-style-type: none"> • CE Offline Mode provides special menus on the service panel display, which are not available in operational mode. This mode can be selected at any time, but it does not become active until the drive completes all current operations. • Operator Mode or CE Online Mode can be selected at any time. Selecting Operator Mode returns the Virtual Operator panel menu to the operational menu (which provides status and conditions). <p>Change Mode is labeled by a symbol  which looks like a wrench.</p>
Up Arrow	Allows the CE to move up the cursor arrow through the menu options
Down Arrow	Allows the CE to move the cursor arrow down through the menu options
Enter	Allows the CE to select the menu option at the location of the cursor arrow
Refresh image	Allows the CE to refresh the Virtual Operator panel and display the current contents on their browser page. The page does not automatically refresh.

Virtual Operator panel display

Displays include service menus, device (or, drive) status, activities, error conditions, and data. Menus and messages display in English only. See [Figure 33 on page 79](#) for the locations of the display areas on the service panel, and use [Table 44 on page 79](#) for descriptions of these areas. The lower half of [Figure 33 on page 79](#) depicts an example of display information.

Note: Use with Table 44 on page 79, and see “Virtual Operator panel indicators, icons, and message areas” on page 77.



Example:

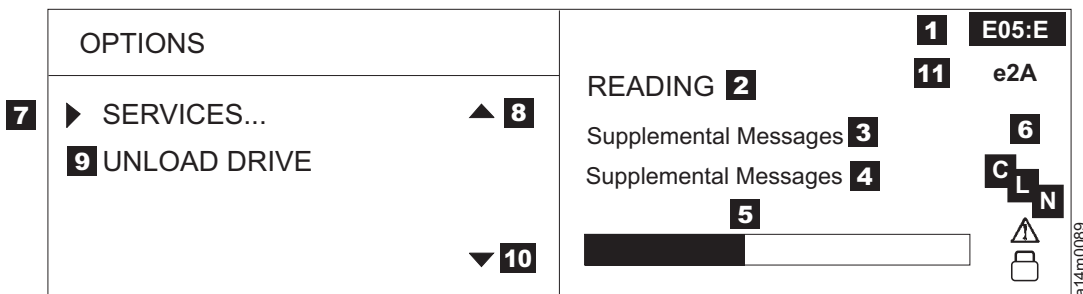


Figure 33: Virtual Operator panel display - Menu, status, and message areas

Table 44: Virtual Operator panel display - Menu, status, and message areas. Use with Figure 33 on page 79.	
Area	Description
1 Drive Type and Capability	<ul style="list-style-type: none"> Model E07 (standard), E07:e (encryption capable), E07:E (encryption enabled) (See “Drive type and capability indicator” on page 82.) Model E08 (standard), E08:e (encryption capable), E08:E (encryption enabled) (See “Drive type and capability indicator” on page 82.)

Table 44: Virtual Operator panel display - Menu, status, and message areas. Use with Figure 33 on page 79. (continued)

<p>2 Device (Drive) Status</p>	<ul style="list-style-type: none"> • Empty: No tape cartridge is loaded. • Cleaning...Left: nn: A cleaning cartridge is in the drive, and has 'nn' available cleaning uses remaining. • Ready: A ready message is generated by the drive when it is ready and other, higher-priority messages do not apply. The <i>ready</i> indicator is displayed only when the transport is not moving tape. When <i>ready</i> or <i>not ready</i>, the state of the drive is the same to both Fibre Channel busses. • Ready at load point: The media is at the beginning of tape and the drive is ready. Tape Not Loaded: Door Open sensor indicates partially loaded cartridge. • Unloaded: Cartridge is unloaded. • Loading: The cartridge is loaded into the drive. • Locating: The drive is moving the tape to a specific location. • Reading: The drive is reading data from the tape to the device buffer. • Writing: The drive is writing data to the tape from the device buffer. • Erasing: The drive is logically erasing data from the tape. • Rewinding: The drive is rewinding the tape to the beginning of the logical volume. • Unloading: The cartridge is being removed from the drive. • Midtape recovery: Power cycle or reset that occurred while cartridge was loaded. The drive is slowly rewinding the tape and ejects the cartridge. • Blank field • Not Loadable (AJAR)
---	---

Table 44: Virtual Operator panel display - Menu, status, and message areas. Use with Figure 33 on page 79. (continued)

<p>3 and 4, Supplemental Messages</p>	<p>Messages include -</p> <p>PORT0 ID=02 14 26 L2 (for example) PORT1 ID:aa bb cd ef ('a, b, c, and d' can be in the range 0–F).</p> <p>= Indicates that a Hard Address is used.</p> <p>: Indicates that a Soft Address is used.</p> <ul style="list-style-type: none"> • Portn ID=/:aa bb cd ef <pre>Port0 ID:aa bb cd ef Port1 ID=aa bb cd ef</pre> <p>- where -</p> <p>aa = Fibre Domain Address or Switch ID (on some switches) bb = Fibre Area Address or Switch Port (on some switches) cd = Arbitrated Loop Physical Address or AL_PA e = L for L-Port (Arbitrated Loop); N for N-Port (Fabric) f = : 1 for 1Gbps; 2 for 2Gbps; 4 for 4Gbps</p> <ul style="list-style-type: none"> • No connection (No light that is seen by drive). <pre>Port0 ID:-- -- -- (Soft) Port1 ID=-- -- cd (Hard)</pre> <ul style="list-style-type: none"> • Not communicating or did not establish a connection - but does indicate that the drive is seeing light. <pre>Port0 ID:?? ?? ?? (Soft) Port1 ID=?? ?? cd (Hard)</pre> <ul style="list-style-type: none"> • AL_PA is used by another device on the fibre loop. <pre>Port 0 ID=cd CONFLICT</pre> <p>Note: This condition can be initiated by another device on the loop or with the offline menu. The panel can be used to return the drive online if it was bypassed by another device on the loop. • Drive AL_PA is bypassed on the loop. <pre>Port 0 ID=cd OFFLINE</pre> <p><i>Supplemental messages</i> display in the two-line message area of the screens. These messages include general information, current drive activity, user feedback for control actions, and attention messages. For example, DIAGS RUNNING appears at 4 when the drive is running the internal diagnostic tests. If the drive is loading the microcode, LOADING CODE appears in this area.</p> </p>
<p>5 Horizontal Bar Indicators</p>	<p>A graphic representation of the logical or physical progress of the drive. See “Horizontal bar indicators” on page 83.</p>

Table 44: Virtual Operator panel display - Menu, status, and message areas. Use with Figure 33 on page 79. (continued)

<p>6 Status Icons</p>	<p>Displays different icons that represent the status of the drive. See:</p> <ul style="list-style-type: none"> • “Clean icon” on page 83 • “Dump icons” on page 83 • “Write-protected icons” on page 84
<p>7 Cursor (▸)</p>	<p>A symbol that moves when the up and down arrows are pressed. The item that is next to the cursor is chosen when Enter is pressed.</p>
<p>8 Up Arrow (▲)</p>	<p>A symbol that is displayed when a menu choice is available above the viewing area.</p>
<p>9 Option</p>	<p>When Enter is pressed, the item by the ▸ (cursor) is chosen.</p> <p>If an item is dotted in a lighter font, such as UNLOAD DRIVE, that item is not available for use. If Enter is pressed, the item is highlighted temporarily but is not activated.</p>
<p>10 Down Arrow (▼)</p>	<p>A symbol that is displayed when a menu choice is available below the viewing area.</p>
<p>11 Media Data Format</p>	<p>The media data area discloses certain data cartridge characteristics. This area does not become active until a cartridge is Ready @ load point (see Item 2 in this table).</p> <p>As many as 3 characters (such as, e7C) appear in this display area after a data cartridge is loaded. The character position in the string indicates the following cartridge information -</p> <p>First Character ('e' in this example) Encryption designator: e=encryption encoded cartridge, (blank)=encryption non-encoded cartridge.</p> <p>Second Character ('7' in this example) Drive type for which cartridge is formatted: E07</p> <p>Third Character ('C' in this example) Cartridge types: C=JC, D=JD, E=JE, K=JK, L=JL, M=JM, V=JV, Y=JY, Z=JZ (see “3592 data tape cartridge” on page 25).</p> <p>Notes:</p> <ul style="list-style-type: none"> • When a cleaning cartridge is loaded into the drive, this area displays one or two numeric characters. This number reflects the quantity of uses that remain on the cleaning cartridge (maximum=50).
<p>Reset Started: This message appears in the upper-left corner of the display to indicate that a Reset is processing.</p>	

Drive type and capability indicator

The drive type and capability indicator appears in the upper right (see **1** in Figure 33 on page 79) or the lower left (see Figure 34 on page 85) of the service panel display.

- Examples of drive types are E07 and E08.
- Examples of capability are denoted by the e in the term EH7:e (encryption capable), and E in the term EH7:E (encryption enabled).

See Table 44 on page 79 for a complete list of capabilities.

Media data indicator

The media data indicator appears in the upper right of the service panel display.

The information for **11** in the **Description** column of Table 44 on page 79 describes the variables for this field.


Horizontal bar indicators

See "Tape position indicator" (5) in Figure 33 on page 79 for the location of this indicator. This area of the service panel depicts the drive activity progress that is described in Table 45 on page 83.

This section of the indicator...	Reports on...
Top section	Logical position - Graphically depicts logical progress. During a full-tape write or reset, this section of the indicator travels once from left to right.
Bottom section	Physical position (volume or tape position) - Graphically depicts the physical position of the tape in the cartridge, relative to the beginning and end-of-volume (if processing) or the beginning and end-of-tape (if rewinding). During a full-tape write or reset, this section of the indicator travels back and forth multiple times, once for each serpentine wrap.


Clean icon

A **Clean** icon is in the status area of the service panel (see 6 in Figure 33 on page 79).

The **Clean** icon  displays when cartridge cleaning is required. It displays in the same position as the dump icon, and can be overlaid by the dump icon.

Dump icons


Either the **Dump** icon or the **flash dump** icon can display in the status area of the service panel (see Item 6 in Figure 33 on page 79). A dump icon displays, as either a solid image or a faint (disabled) image, when a dump is available. See "CE Dump menu" on page 113 to learn more about how to create or access dump icons.

The **Dump** icon  displays when a regular dump is available in memory, and remains on the screen to indicate that trace data is stored in the 3592 drive. The icon remains on the screen until one of the following occurs -

- The 3592 drive is powered OFF.
- A dump is taken over a fibre port.
- A dump is written to a tape cartridge or is saved to flash memory.
- Select **Reset** from the operator **Options** menu.



Attention: You can lose the dump if you reset the drive.

The **flash dump** icon  displays on the service panel when a CE-initiated dump is available in flash memory. The disabled **flash dump** icon displays on the service panel when an auto dump is available in flash memory.


Icon image	Meaning: This dump is associated with ...	Permanence
Solid Dump	Microcode logic error is stored in the drive. Automatically created or created by the CE for service calls	Disappears after power-cycling or a drive reset


Table 46: **Dump** icon images (continued)


Icon image	Meaning: This dump is associated with ...	Permanence
Faint Dump (disabled)	Write or read permanent error, or a microcode trap that is stored in the drive. Automatically created or created by the action of the microcode.	Disappears after power-cycling or a drive reset
Solid Flash Dump	Dump you requested (when the drive is removed or replaced) by selecting flash dump from the “CE Dump menu” on page 113. A flash dump is stored in flash memory.	Preserved over power cycles or after drive reset
Faint Flash Dump (disabled)	Dump because of permanent errors that are created by the action of the microcode. It is retrieved like any dump that is available in memory is retrieved. Use this dump when directed by your next level of support.	Preserved over the first power cycle or after drive reset
<p>Notes:</p> <ul style="list-style-type: none"> Flash memory is a repository for drive condition and status information. Flash dump memory is used primarily by Engineering and the IBM repair facility. You can remove a dump from flash memory to relieve the customer of responsibility concerns. See “Clearing flash dump memory” on page 211. While the dump is being transferred, no indication of progress displays until the dump icon reappears in the lower right of the service panel. 		

Write-protected icons

The write-protected icons are displayed in the status icons area of the service panel (see Item **6** in Figure 33 on page 79).

The write-protected icon (physical)  is a *read only* symbol that is displayed when the write-protect mechanism on the cartridge is set to the write-protected position.

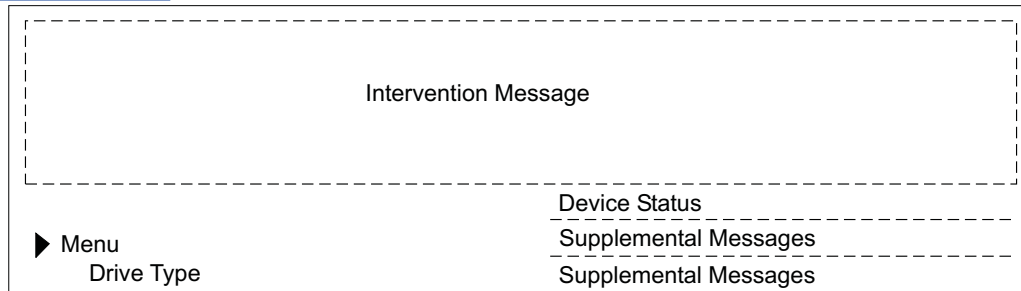
The write-protected icon (logical)  is a *read only* symbol that is displayed when the 3592 drive receives the Mode Select command from a host program that sets the volume to a logically write-protected state. Both **Write Once Read Many (WORM)** and **Persistent Write Protect** status leave a volume logically write-protected on subsequent loads. **Persistent Write Protection** can be turned OFF with a subsequent Mode Select, while WORM cannot be turned OFF. **Associated Write Protection** persists only while a logical volume is loaded or until a Mode Select changes the protection status. **Associated Write Protection** status is lost when a volume is unloaded or the drive is powered OFF. Write protection is temporarily inactive (and the icon reverts to write-unprotected) during loading and unloading when the drive updates the volume control region (VCR) on the tape.

The write-unprotected icon  is a *read/write* symbol that displays on the service panel when the write-protect mechanism on the cartridge is set to the ‘not write-protected’ position.

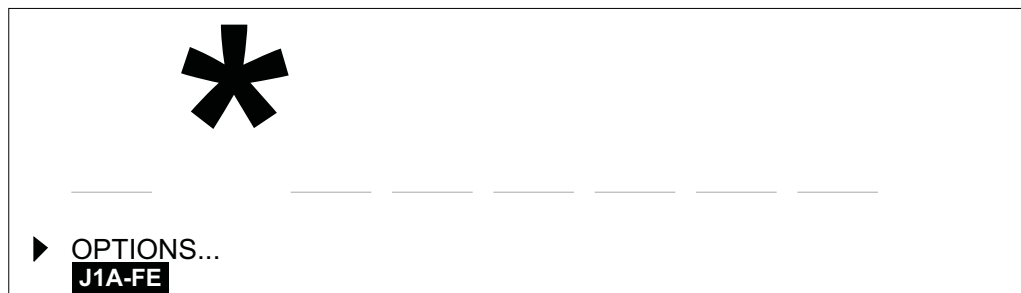
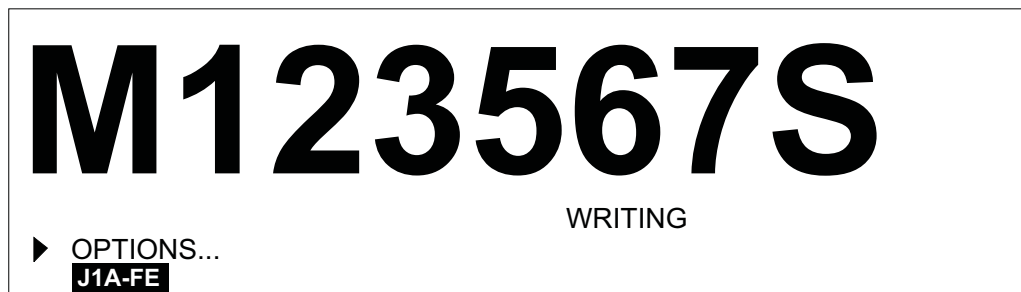
Intervention messages

Intervention messages display on the service panel in the intervention screen when the drive requires service attention. The intervention screen consists of an 8-character intervention message that is displayed in a large font, a prompt that indicates that the **Options** menu can be accessed by pressing **Enter**, a drive type and capability reminder, device status information, and a two-line message area. Figure 34 on page 85 shows the intervention screen followed by an example of a **Mount** command that requests that a tape cartridge with the volume serial number (VOLSER) **123567** be mounted. In this example, M means *mount* and S means *scratch*. The `_ * _____` message indicates that a tape cartridge was mounted, and the job was either canceled or abended. The host software wrote the message as

space, asterisk, space, space, space, space, space, space, space to the service panel. See “[Intervention messages](#)” on page 85.



Example:



a14m0098

Figure 34: **Intervention** screen, **Mount** screen, and **Abend** screen on service panel

Note:

1. If you press **Enter**, the messages are removed from the screen. When a FID message is displayed and you press **Enter**, the FID message is removed from the screen and deleted.
2. Intervention messages are one-part or two-part messages. Two-part messages consist of two 8-character message parts that alternate. The message types are FID1 messages, attention messages, routine messages, FID2 messages, FID3 messages, and FID4 messages.

Intervention messages

Table 47 on page 85 describes messages that might be displayed for the 3592 drive. “[Intervention messages description](#)” on page 86 provides further description.

Table 47: Intervention messages	
Message	Message meaning
FID 1 messages	

Table 47: Intervention messages (continued)

Message	Message meaning
FID1	These messages indicate device errors that require CE action. The device cannot complete any tasks. Go to “Maintenance starting point” on page 1 with the FID number.
ATTN messages	
Attention	These messages indicate error conditions that operators can resolve.
Routine messages	
CLEAN	This message, prefixed with an asterisk (), prompts the operator to load a cleaning cartridge into the drive. If the text CLEAN_REQUIRED is also present, a cleaning cartridge must be loaded before any other drive operations can be completed.
FID 2 messages	
FID2	These messages report a degraded device condition. Go to “Maintenance starting point” on page 1 with the FID number.
FID 3 messages	
FID3	These messages report a degraded device condition. Go to “Maintenance starting point” on page 1 with the FID number.
FID 4 messages	
FID4	These messages report a service circuitry failure. Go to “Maintenance starting point” on page 1 with the FID number.
Note: The following are informational messages, not intervention conditions.	
Device activity or status messages	
Device activity	These messages are displayed in the supplemental message area. These messages include <i>reading</i> , <i>writing</i> , and <i>locating</i> .

Intervention messages description

A brief description of each message type that appeared in [“Intervention messages” on page 85](#) follows -

- FID1 Messages

An FID1 message is generated by the drive when a hardware failure occurs within the drive. This message has priority over all other types of messages, and persists until the error condition is corrected. The FID code is used by maintenance personnel to identify the failing units within the drive. (FID messages might be temporarily overwritten by menu selections.) Messages are in a **bold** font.

The format of these messages is 'FID1 xy', where 'FID1' indicates to the operator that a failure occurred, and 'xy' is the portion of the device to replace. [Figure 35 on page 87](#) shows an example of FID1 87 (which might display on the service panel) and indicates a cartridge or drive canister problem.

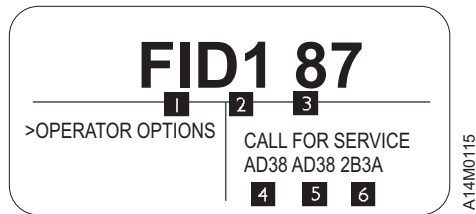


Figure 35: Error message example

When the FRU identifier (FID) **1** and the severity code **2** are presented, the CE uses the FID number **3** as a starting point to begin “FID entry point” on page 6. See “Service and Media Information messages (SIMs and MIMs)” on page 39 for a description of the severity codes. The message area **4**, **5**, and **6** hex data is support information to determine whether the fault is caused by microcode. **4** represents the first FSC that caused the FID. **5** represents either the last FSC or the flag data. The first character in **6** represents part of the model number. The last 3 characters represent the microcode link. A corresponding SIM is transmitted to the initiator. Also, a TapeAlert is available to the initiator.

- Attention messages

Attention (ATTN) messages indicate error conditions that customer personnel might be able to resolve.

- Routine messages

Routine messages consist of messages that are received from the host, for example, **Mount**, and messages from the device (for example, ***CLEAN**).

To generate the Clean message, the device monitors the number of megabytes processed and the number of mounts for each drive. When either of these factors reach a threshold, the device displays a Clean message. The clean message is maintained across device power-on reset conditions.

The routine messages that are received through the **Display Message** command consist of mount messages, demount messages, and general (custom) messages.

- FID2 messages **2**

An FID2 message indicates that the drive is in a degraded state. For example, FID2 84 can indicate degraded hardware performance. The drive can still be used, but is in a less available state.

- FID3 messages **2**

An FID3 message indicates that the drive is in a degraded state. The drive can still be used, but is in a more available state than for an FID2 type of fault.

- FID4 messages **2**

An FID4 message indicates that some service circuitry failed. For example, FID4 85 can indicate that a parity-check circuit failed.

Virtual Operator panel menus

The Virtual Operator panel displays drive information for the CE's consideration, and allows the CE to communicate with the drive. The CE is presented with menu-driven options for drive operation.

The remainder of this chapter is divided in the following manner -

- “Virtual Operator panel menu trees” on page 88
- “Operator Mode menus” on page 97 (available to operator and CE)
- “CE Offline Mode menus” on page 107
- “CE Online Mode menus” on page 151 (available only to CE)

Note: The service panel menus are intended only for CEs. You access the menu groups by pressing **Change Mode** **I** on the service panel.

Options that are unavailable are displayed in a lighter, dotted font and cannot be selected. The first example in Figure 36 on page 88 shows the **Unload Drive** option **1** when there is no cartridge in the drive. The option is displayed in a lighter, dotted font, which indicates that it cannot be selected. The second example in Figure 36 on page 88 shows the **Unload Drive** option **2** when there is a cartridge in the drive. The option is displayed in a darker font, which indicates that it can be selected.

► **SERVICES**

UNLOAD DRIVE **1**

► **SERVICES**

UNLOAD DRIVE **2**

Figure 36: Selection options example

If you move the cursor (►) to **1** and press **Enter**, the selection responds with the normal font **2** momentarily and then returns to the lighter font. The 3592 drive does not complete any action because the drive did not contain a tape cartridge.

Become familiar with the terms and indications in Table 48 on page 88 to help you use the service panel menus with the service panel information in this section.

<i>Table 48: Menu terms and display icons</i>	
Item	Indicates
Table Caption	Menu Name, which displays on the service panel
...	Selecting this menu item gives you access to more menus or subordinate selections
▲ or ▼	There are other menu options either above (▲) or below (▼) this item on the service panel
*	Advanced encryption configuration options
**	An encryption decommission action. See “ Crypto Officer menu (Encryption) ” on page 123 for information.
Default	The default values appear in the menu trees in a bold font

These menus are available from the Virtual Operator panel after the successful completion of the power-on self-test (POST). The “[Options menu](#)” on [page 97](#) is the default menu. Bold text that is shown in some menu options depicts the default values. For example, **Off** is the default for Force Er Log On/**Off** in “[CE Config/Install menu](#)” on [page 118](#).

Virtual Operator panel menu trees

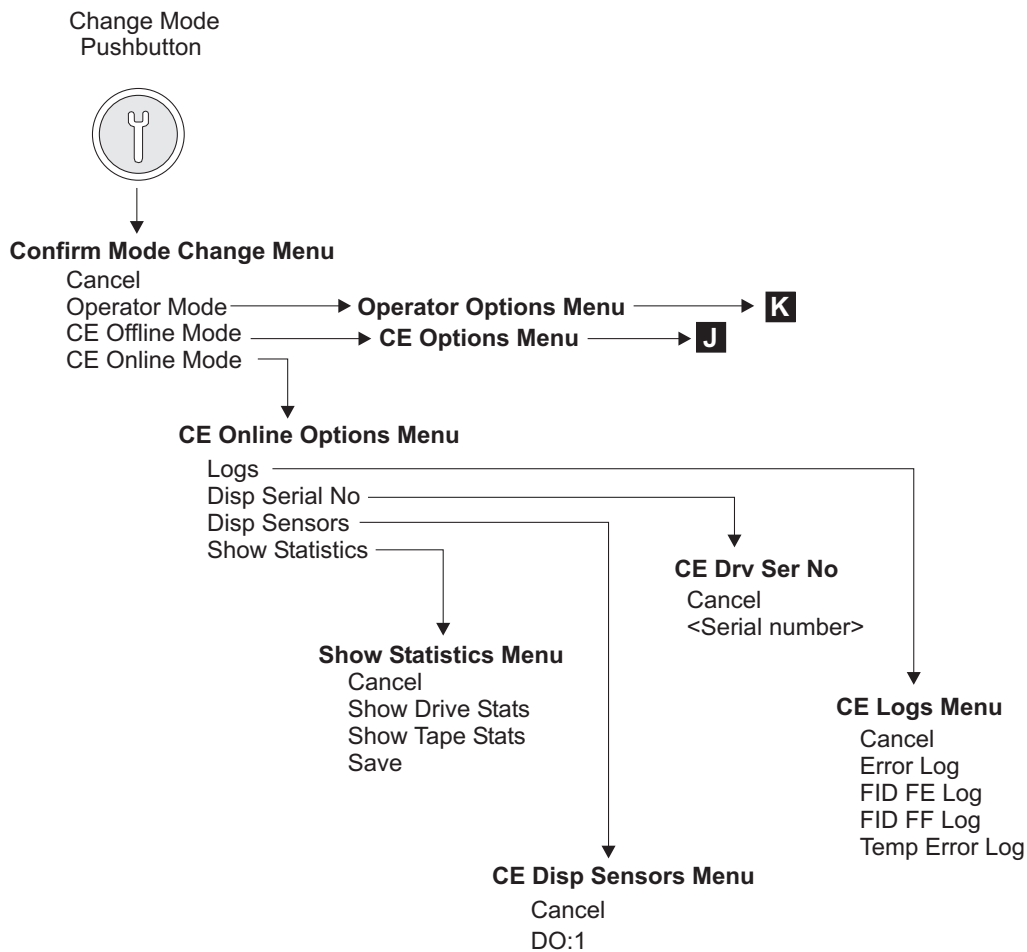
The Virtual Operator panel menu trees provide a graphical view of the relationship between (and the path through) the service-accessed functions. [Table 49 on page 89](#) provides an overview of starting points for the menu groups.

Table 49: Virtual Operator panel menu trees guide

This figure...	Depicts	For detailed information, see the...
Figure 37 on page 89	Entry point to the service panel menus, and includes the CE Online Mode menus	“CE Online Mode menus” on page 151
Figure 38 on page 90	Starting point for operator functions	“Operator Mode menus” on page 97
Figure 39 on page 91	Starting point for offline service functions	“CE Offline Mode menus” on page 107

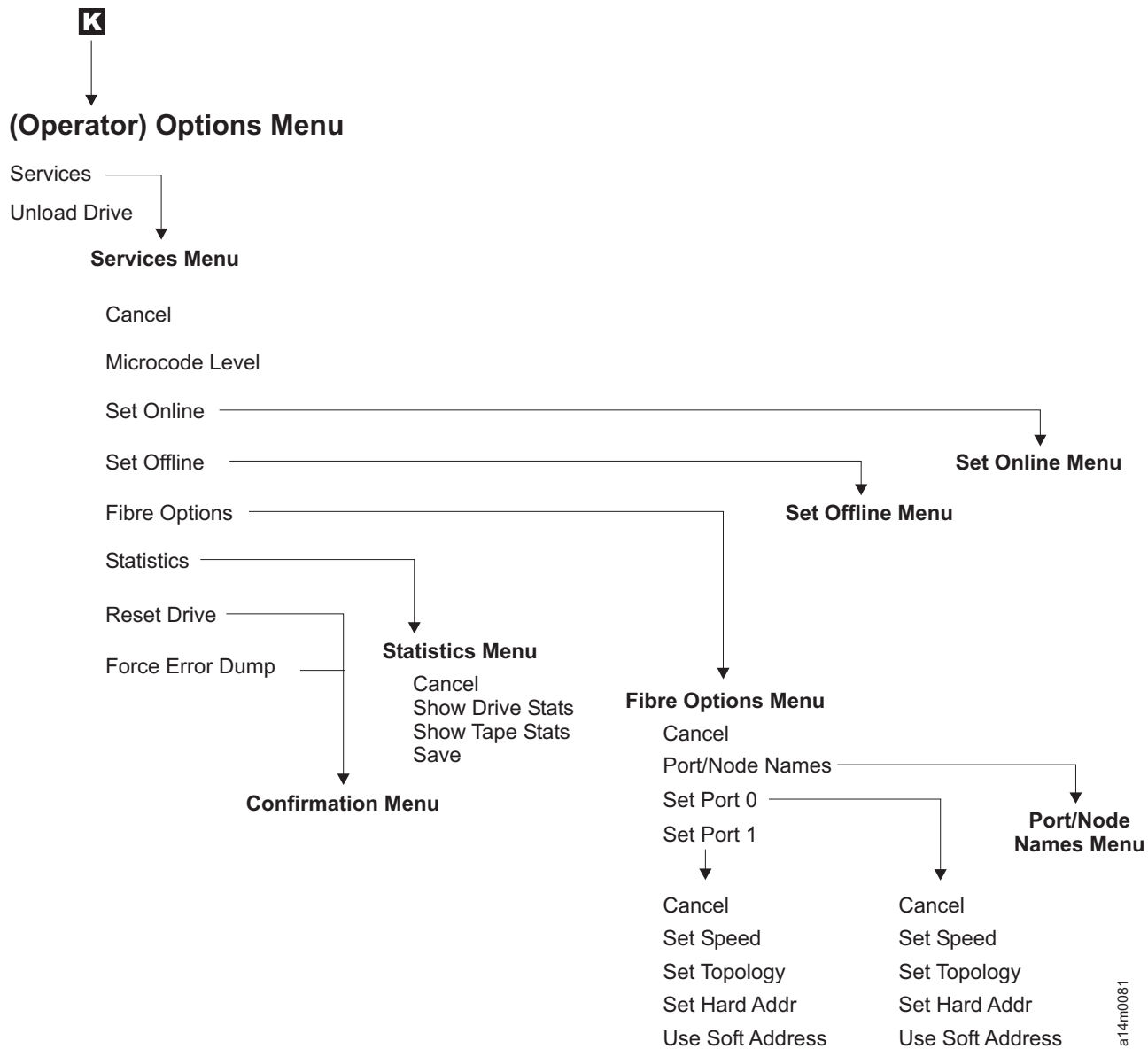
Notes:

- **Bold** text in the figures shows the names of the menus (as in, **Confirm Mode Change menu**) or shows default values (as in, HSARS **Enabled**/Disabled), where **Enabled** is the default.
- A single asterisk (*) in front of menu item entries indicates advanced encryption configuration options.
- A double asterisk (**) in front of an entry indicates an encryption decommission action. See [“Crypto Officer menu \(Encryption\)” on page 123](#) for information.
- Some menus or menu options that appear in these menu trees might not be available for your drive model.



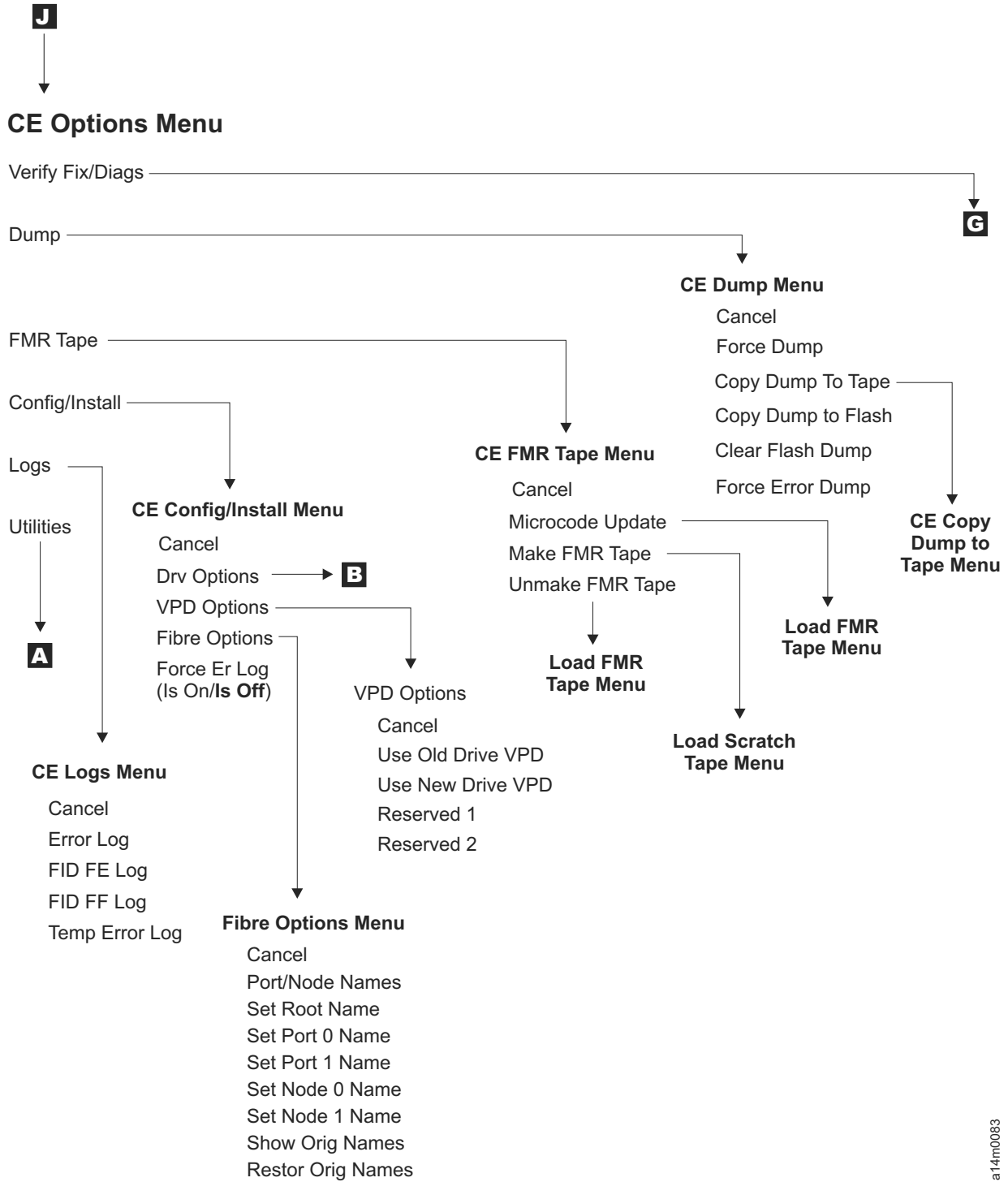
a14m0082

Figure 37: Confirm mode change and **CE Online Mode** menus



a14m0081

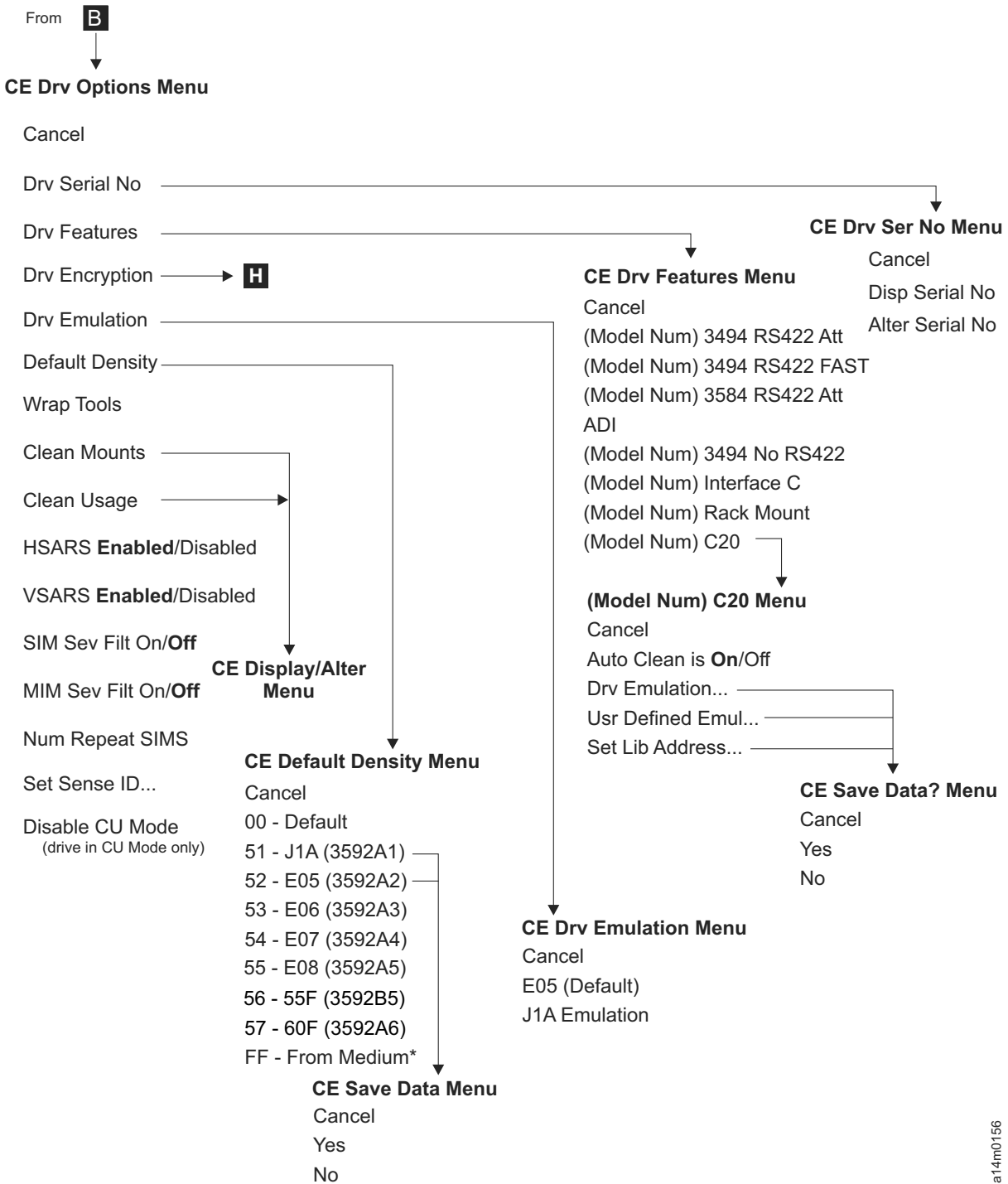
Figure 38: **Operator Options** menus - **Operator Mode**



a14m0083

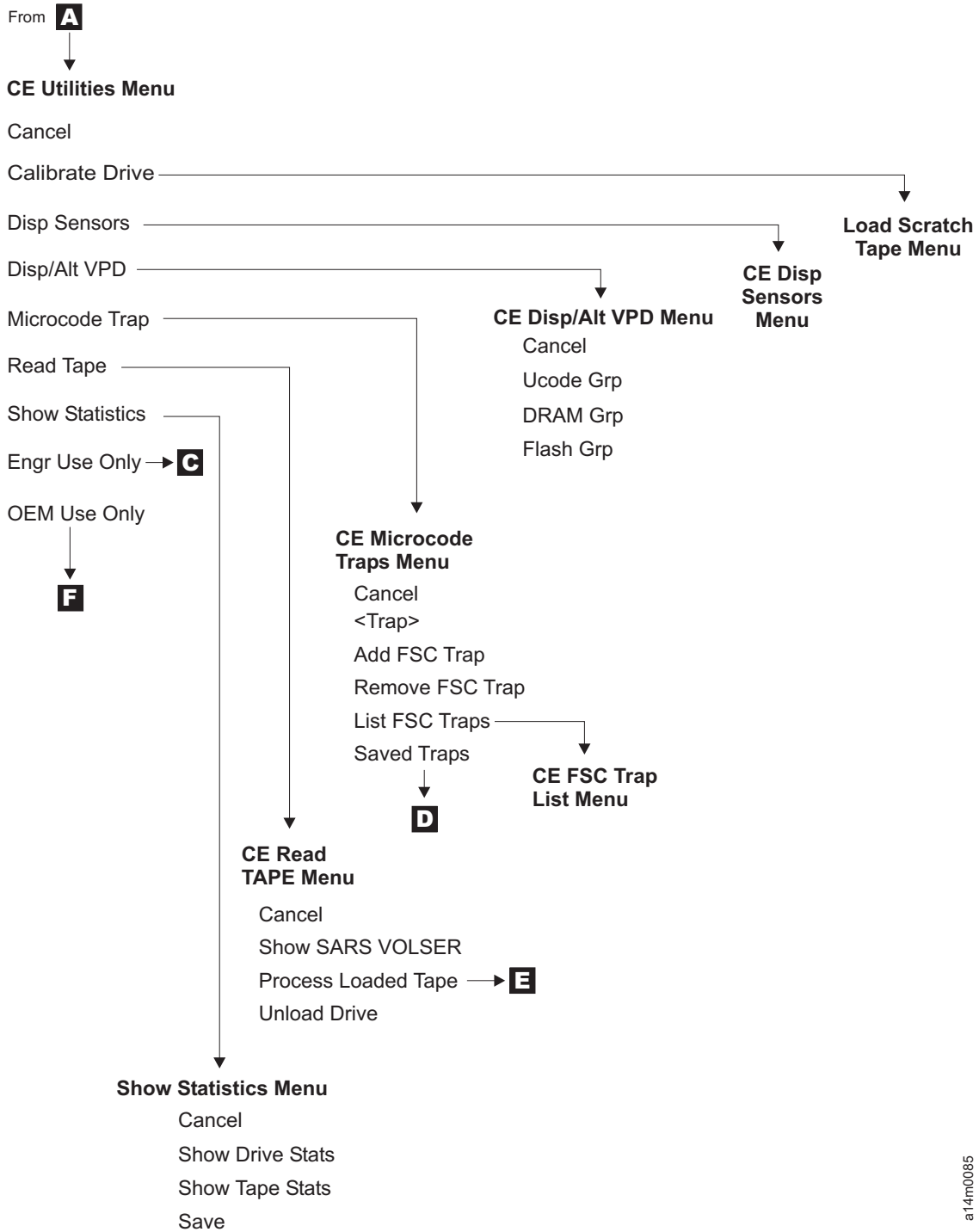
Figure 39: **CE Options** menu - **CE Offline Mode** (Part 1 of 6)

CE Options Menu (continued)



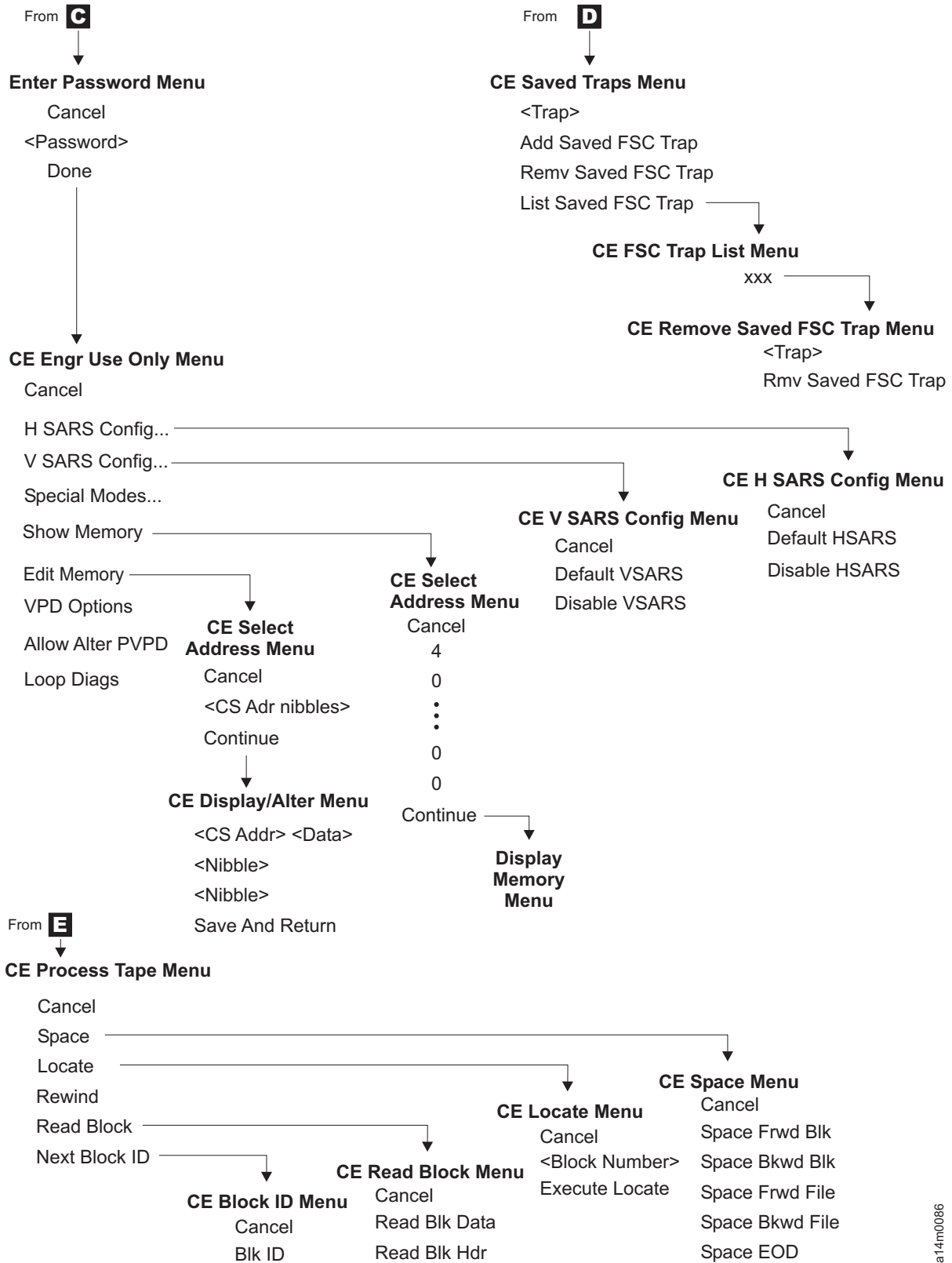
a14m0156

Figure 40: **CE Options** menu - **CE Offline Mode** (Part 2 of 6)



a14m0085

Figure 41: **CE Options** menu - **CE Offline Mode** (Part 3 of 6)



at14m0086

Figure 42: **CE Options** menu - **CE Offline Mode** (Part 4 of 6)

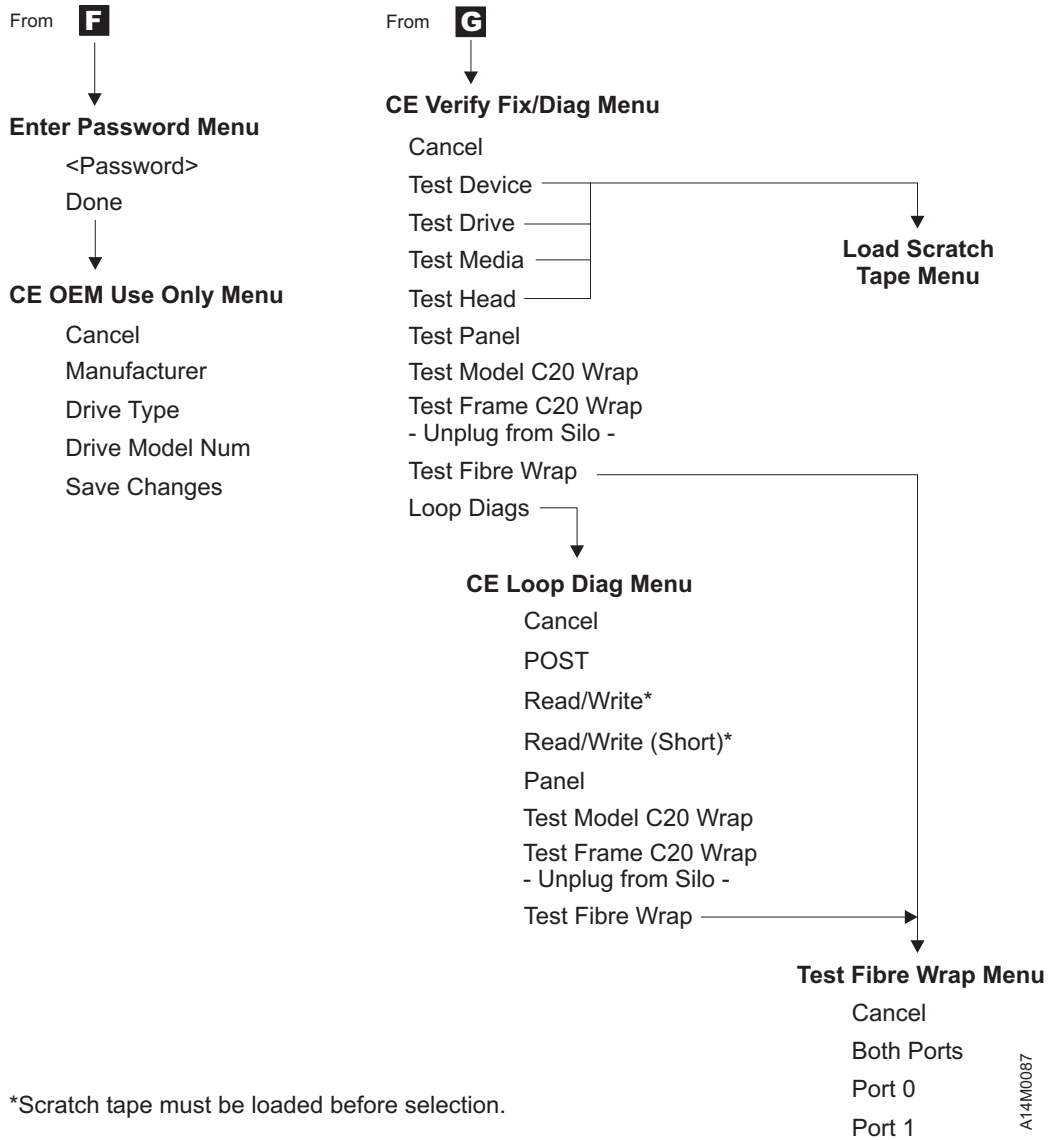


Figure 43: **CE Options** menu - **CE Offline Mode** (Part 5 of 6)

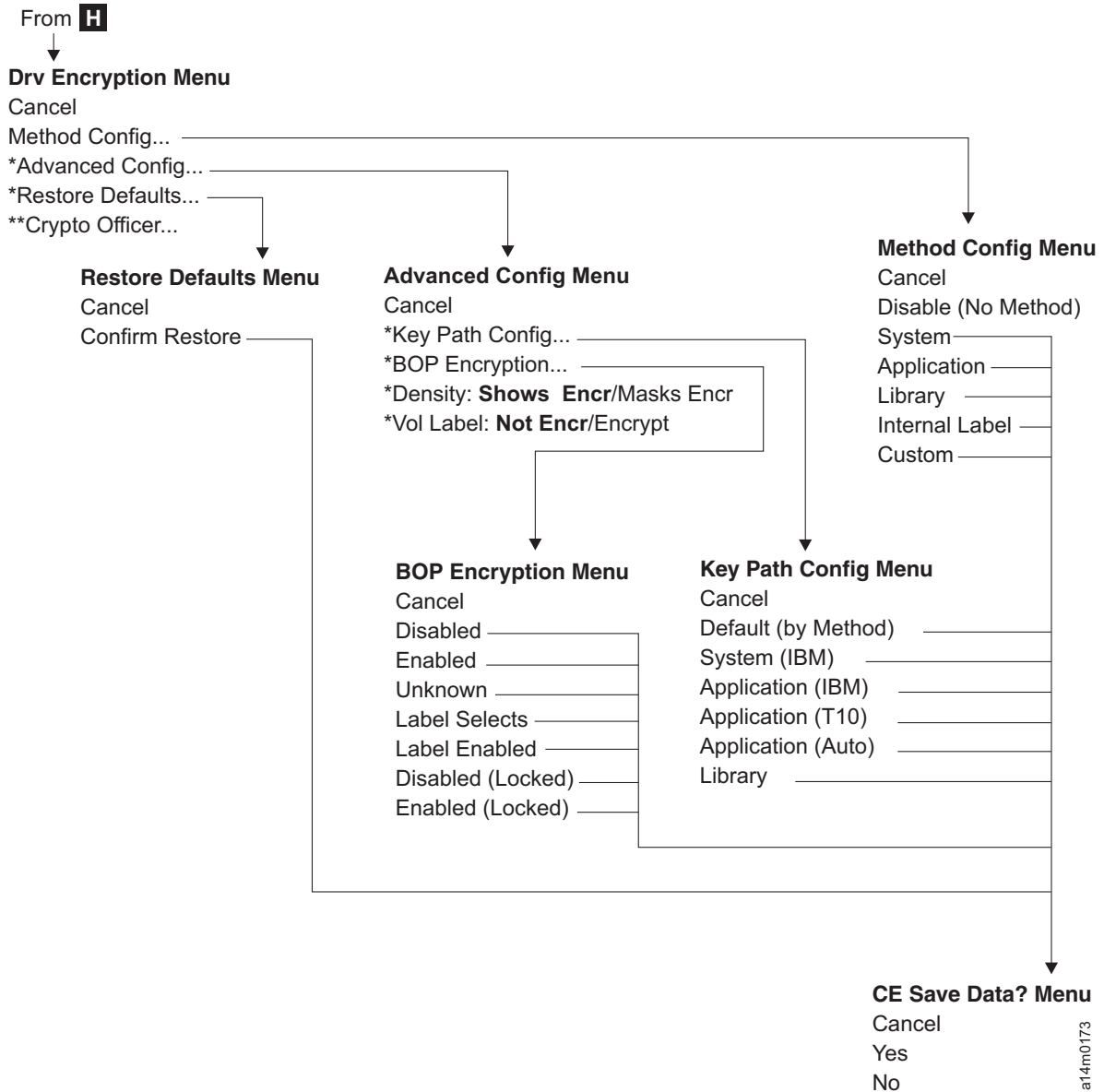


Figure 44: **CE Options** menu - **CE Offline Mode** (Part 6 of 6)

Confirm Mode Change menu

This is the entry point for service activity that uses the service panel. Press **Change Mode I** to access the menu groups in [Table 50](#) on page 96.

Table 50: Confirm Mode Change menu	
Function	Next menu
Cancel	Previous menu
Operator Mode	“Options menu” on page 97
CE Offline Mode	“CE Options menu” on page 107 if no job is in progress, or “Confirm Offline menu” on page 100 is displayed if a job is in progress.
CE Online Mode	“CE Online Options menu” on page 151

Table 50: **Confirm Mode Change** menu (continued)

Function	Next menu
Note:	
1. Supplemental Message Line 1: DATA LOSS RISK	
2. Supplemental Message Line 2: none	



Attention: The device must be quiesced by the host (varied offline) before the device is reset or **CE Offline** mode is entered.

The online status of the ports is restored when you are changing from a CE mode to the operator mode.

If you are switching from operator to a CE mode or from a CE to operator mode, and you press **Change Mode**, the **Confirm Mode Change** menu might display (dependent on job activity).

Cancel

Displays the previous menu that was active before **Change Mode** was pressed.

Operator Mode

Restores the online status of the ports when you are changing from CE mode to operator mode. This mode is a path to selections that are available to the operator from a host or library interface.

CE Offline Mode

Forces the ports offline if you are going to CE mode and no job was in progress. If a job is active at the time, “[Confirm Offline menu](#)” on page 100 displays

CE Online mode

Forces the ports to CE Online mode.

Operator Mode menus

The **Operator Mode** is the default mode for the drive. The drive returns to this mode after the successful completion of the POST. Or, you can select **Operator Mode** to return to the “[Options menu](#)” on page 97.

Options menu

[Table 51 on page 97](#) shows the **Options** menu items.

Table 51: **Options** menu (operator mode)

Function	Next menu
Services...	“ Services menu ” on page 97
Unload Drive	-

Services

Allows the operator to complete configuration tasks, such as setting the fibre channel online and offline.

Unload Drive

Causes the drive to rewind and to unload the cartridge from the drive.

Services menu

[Table 52 on page 98](#) shows the **Services** items.

Function	Next menu
Cancel	“Options menu” on page 97
Microcode Level...	Figure 45 on page 98. After selection, to “Services menu” on page 97
Set Online...	“Set Online menu” on page 99
Set Offline...	“Set Offline menu” on page 99
Fibre Options...	“Fibre Options menu (Services menu)” on page 100
Statistics...	“Statistics menu (Operator Mode)” on page 106
Reset Drive...	Figure 46 on page 99. After selection, to “Services menu” on page 97
Force Error Dump...	Figure 46 on page 99. After selection, to “Services menu” on page 97 . Use this only when directed by your next level of support.

Cancel

Causes the [“Options menu” on page 97](#) to display.

Microcode Level...

Displays the microcode EC levels that are in DRAM. [Figure 45 on page 98](#) shows an example.

```
MICROCODE LEVEL
▶CANCEL
EC      aaaaaaa
LINK   bbcd_ddd
      mmm dd yyyy hh:mm
LINK   bbcd_ddd OLD
      mmm dd yyyy hh:mm
```

Figure 45: **Microcode Level** menu

```
Legend
aaaaaaa = Engineering change level
bb       = Product identifier
c        = Link identifier
d_ddd    = Link number
mmm dd yyyy = month day year
hh:mm    = hours:minutes
```

Set Online...

Logically enables the drive to communicate on the fibre channel bus. Activate **Set Online** at the drive first, then have the host place the device online (vary online).

Set Offline...

Logically disables the device from the fibre channel bus. Select **Set Offline** only after the host takes the device offline (vary offline) first.

Fibre Options...

Provides the two fibre addresses to be selected; one address that is associated with each device port. Each address consists of two hexadecimal digits that specify the Fibre Port address for that interface. After the address is set, modify the host information to include the correct addresses. See [“Fibre Channel worldwide names history log” on page 206](#).

Statistics...

Displays the number of times certain events occurred.

Reset Drive...

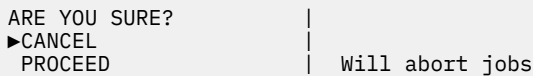
Aborts the operation and causes the drive microcode to restart. If dump data is in the drive, it is not lost.

Note: Current operation (for example, Locate) is completed before **Reset Drive** runs. This action might cause a delay before **Reset Drive** is run.

Force Error Dump...

Use this only when directed by your next level of support. Aborts the operation, causes a recovery of the functional microcode, and forces a microcode dump. After the dump is completed, select **Reset Drive**.

Choosing **Reset Drive** or **Force Error Dump** causes the menu that is shown in [Figure 46 on page 99](#) to display.



ARE YOU SURE? |
▶CANCEL |
PROCEED | Will abort jobs

Figure 46: **Confirmation** menu

Cancel

Causes the microcode to ignore the selection and causes the **Services** menu to display.

Proceed

Causes the microcode to complete the chosen operation (**Reset Drive** or **Force Error Dump**) from the **Services** menu.

Set Online menu

Table 53 on page 99 shows the **Set Online** menu items.

Function	Next menu
Cancel	“Services menu” on page 97
Port 0	“Options menu” on page 97
Port 1	“Options menu” on page 97
Both	“Options menu” on page 97

Cancel

Causes the [“Services menu” on page 97](#) to display.

Port 0

Causes Fibre Port 0 to be set online.

Port 1

Causes Fibre Port 1 to be set online.

Both

Causes both Fibre Port 0 and Fibre Port 1 to be set online.

Note: The host also must vary the device online.

Set Offline menu

Table 54 on page 99 shows the **Set Offline** menu items.

Function	Next menu
Cancel	“Services menu” on page 97
Port 0	“Confirm Offline menu” on page 100 or “Options menu” on page 97

<i>Table 54: Set Offline menu (continued)</i>	
Function	Next menu
Port 1	“Confirm Offline menu” on page 100 or “Options menu” on page 97
Both	“Confirm Offline menu” on page 100 or “Options menu” on page 97

Cancel

Causes the [“Services menu” on page 97](#) to display.

Port 0

Causes fibre port 0 to be set offline.

Port 1

Causes fibre port 1 to be set offline.

Both

Causes both fibre port 0 and fibre port 1 to be set offline.

Notes:

- The device must be quiesced by the host (vary the device offline from the host) before the device is taken offline.
- If the device interface successfully goes offline, the [“Options menu” on page 97](#) displays; otherwise the operator can proceed to [“Confirm Offline menu” on page 100](#) for further options.
- The device must complete all activity currently on the interface before it can go offline. If the device or the initiator cannot complete activity before it goes offline, [“Confirm Offline menu” on page 100](#) is displayed to allow the operator an override and to force the ports offline.

Confirm Offline menu

[Table 55 on page 100](#) shows the **Confirm Offline** menu items.

<i>Table 55: Confirm Offline menu</i>	
Function	Next menu
Cancel	“Set Offline menu” on page 99
Proceed	“Options menu” on page 97
Note:	
1. Supplemental Message line 1: Caution: Data loss	
2. Supplemental Message line 2: risk	

Cancel

Cancels the offline request and causes the [“Set Offline menu” on page 99](#) to display.

Proceed

Forces the ports offline. If write activity exists, any write data in the device is lost. The **Proceed** option causes the job to terminate.

Fibre Options menu (Services menu)

[Table 56 on page 100](#) shows the **Fibre Options** menu items.

<i>Table 56: Fibre Options menu (Services menu)</i>	
Function	Next menu
Cancel	“Services menu” on page 97

<i>Table 56: Fibre Options menu (Services menu) (continued)</i>	
Function	Next menu
Port/Node Names...	“Port/Node Names menu (Services menu)” on page 101
Set Port 0...	“Set Port 0 {or 1} menu (Services menu)” on page 101
Set Port 1...	“Set Port 0 {or 1} menu (Services menu)” on page 101
Note:	
1. Supplemental Message Line 1: Port0 ID=aa bb cd	
2. Supplemental Message Line 2: Port1 ID=aa bb cd	

Cancel

Causes the [“Services menu” on page 97](#) to display.

Port/Node Names

Displays the Port/Node Name that is assigned to the drive.

Set Port 0...

Causes the [“Set Port 0 {or 1} menu \(Services menu\)” on page 101](#) to display.

Set Port 1...

Causes the [“Set Port 0 {or 1} menu \(Services menu\)” on page 101](#) to display.

Note: Refer to “Messages and supplemental messages (Fibre Channel only)” in [Table 44 on page 79](#) for fibre-addressing information.

Port/Node Names menu (Services menu)

[Table 57 on page 101](#) shows the **Port Names** and **Node Names** menu items.

<i>Table 57: Port/Node Names menu (Services menu)</i>	
Function	Next menu
Port Names/WWID 0=5005076302400143 1=5005076302800143	“Fibre Options menu (Services menu)” on page 100
Node Name/WWID 0=5005076302000143 1=5005076302C00143	“Fibre Options menu (Services menu)” on page 100
Note:	
1. Supplemental Message Line 1: Port0 ID=aa bb cd	
2. Supplemental Message Line 2: Port1 ID=aa bb cd	

Port 0 Name

Displays the 16-byte Port Name that is assigned to the Port.

Port 1 Name

Displays the 16-byte Port Name that is assigned to the Port.

Note: Refer to “Messages and Supplemental Messages (Fibre Channel Only)” in [Table 44 on page 79](#) for fibre-addressing information.

Set Port 0 {or 1} menu (Services menu)

[Table 58 on page 102](#) shows the **Set Port 0** menu and the **Set Port 1** menu items.

Table 58: **Set Port 0 {or 1} Menu (Services menu)**

Function	Next menu
Cancel	“Fibre Options menu (Services menu)” on page 100
Set Speed...	“Set Port 0 {or 1} (Speed) menu” on page 102
Set Topology...	“Set Port 0 {or 1} (Topology) menu” on page 103
Set Hard Addr...	“Set Hard Address menu” on page 104
Use Soft Address...	“Use Soft Address menu” on page 105 (not recommended)
<p>Note:</p> <ol style="list-style-type: none"> Supplemental Message Line 1 Port0 ID=aa bb cd Supplemental Message Line 2 Port1 ID=aa bb cd 	

Cancel

Causes the [“Fibre Options menu \(Services menu\)” on page 100](#) to display.

Set Speed...

- For up to 55F: Allows setting to 1 GB, 2 GB, 4 GB, 8 GB, or auto-negotiate.
- For 60F: Allows setting to 4 GB, 8 GB, 16 GB, or auto-negotiate.

Set Topology...

- For up to 55F: Allows service representative to set Topology (N or L).
- For 60F: Supports N-Port only.

Set Hard Addr...

Takes you to the **Set Hard Address** menu. Selecting the hard address option allows selection of the Arbitrated Loop Physical Address (AL_PA). The higher the number, the lower the priority.

Use Soft Addr...

Not recommended. Allows the port to use the system default value. The soft address feature allows the drive to arbitrate the AL_PA number with other fibre devices.

Note:

- Soft addressing is not recommended.
- Refer to **Messages and Supplemental Messages** (Fibre Channel only) in [Table 44 on page 79](#) for fibre-addressing information.

Set Port 0 {or 1} (Speed) menu

[Table 59 on page 102](#) shows the **Set Speed** menu items. Use this menu to select from among speeds, or allow the device to auto-negotiate the port speed for Port 0 or Port 1. An EH7, EH8, 55F, or 60F drive can operate at all speeds. Auto-negotiate allows the device to choose a faster speed, when available.

Table 59: **Set Port 0 {or 1} (Speed) menu**

Function	Model	Next menu
Cancel	----	“Set Port 0 {or 1} menu (Services menu)” on page 101
1 GB	EH7/ EH8/55F	“CE Save Data menu (Speed and Topology)” on page 104, then “Set Port 0 {or 1} menu (Services menu)” on page 101
2 GB	EH7/ EH8/55F	“CE Save Data menu (Speed and Topology)” on page 104, then “Set Port 0 {or 1} menu (Services menu)” on page 101

Function	Model	Next menu
4 GB	EH7/ EH8/55F/ 60F	“CE Save Data menu (Speed and Topology)” on page 104, then “Set Port 0 {or 1} menu (Services menu)” on page 101
8 GB	EH7/ EH8/55F/ 60F	“CE Save Data menu (Speed and Topology)” on page 104, then “Set Port 0 {or 1} menu (Services menu)” on page 101
16 GB	60F	“CE Save Data menu (Speed and Topology)” on page 104, then “Set Port 0 {or 1} menu (Services menu)” on page 101
Auto Negotiate	-----	“CE Save Data menu (Speed and Topology)” on page 104, then “Set Port 0 {or 1} menu (Services menu)” on page 101

Note: The SI standard is not applied to some industry-recognized terms.

Cancel

Causes “Set Port 0 {or 1} menu (Services menu)” on page 101 to display.

1 GB

Allows CE to set speed to 1 GB (for 1 Gbps).

2 GB

Allows CE to set speed to 2 GB (for 2 Gbps).

4 GB

Allows CE to set speed to 4 GB (for 4 Gbps).

8 GB

Allows CE to set speed to 8 GB (for 8 Gbps).

16 GB

Allows CE to set speed to 16 GB (for 16 Gbps) - 60F only.

Auto Negotiate

Allows CE to set Fibre Channel circuitry to negotiate its own speed (default).

Set Port 0 {or 1} (Topology) menu

Table 60 on page 103 shows the **Set Topology** menu items. Use this menu to select whether you want each port of the drive to auto-negotiate Port 0 or Port 1 port topology.

Allows the customer to tailor or automate the device for either an arbitrated loop (L-port) or for fabric (N-port).

Function	Next menu
Cancel	“Set Port 0 {or 1} menu (Services menu)” on page 101
L-Port	“CE Save Data menu (Speed and Topology)” on page 104, then “Set Port 0 {or 1} menu (Services menu)” on page 101
N-Port	“CE Save Data menu (Speed and Topology)” on page 104, then “Set Port 0 {or 1} menu (Services menu)” on page 101
L->N Negotiate	“CE Save Data menu (Speed and Topology)” on page 104, then “Set Port 0 {or 1} menu (Services menu)” on page 101
N->L Negotiate	“CE Save Data menu (Speed and Topology)” on page 104, then “Set Port 0 {or 1} menu (Services menu)” on page 101

Important: 60F is capable of N-Port ONLY.

Cancel

Causes “Set Port 0 {or 1} menu (Services menu)” on page 101 to display.

L-Port

Allows CE to set port as an L-Port. This option must be selected if the drive is attached to a supported tape controller.

N-Port

Allows CE to set port as an N-Port.

L -> N Negotiate

Allows CE to set port to negotiate port setting: L first, then N (default).

N -> L Negotiate

Allows CE to set port to negotiate port setting: N first, then L. Select **L -> N Negotiate** if you are uncertain.

CE Save Data menu (Speed and Topology)

Table 61 on page 104 shows the **Save Data** menu items. This menu allows the CE to save or decline saving the data that was entered at the previous menu.

<i>Table 61: CE Save Data menu (Speed and Topology)</i>	
Function	Next menu
Cancel	Previous menu
Yes	Previous menu
No	Previous menu

Cancel

Displays the previous menu that was active before **Save Data** was selected.

Yes

Causes the **Set Port 0 {or 1} Speed and Topology** settings to be saved.

No

Prevents the **Set Port 0 {or 1} Speed and Topology** settings from being saved.

Set Hard Address menu

Table 62 on page 104 shows the **Set Hard Address** menu items.

<i>Table 62: Set Hard Address menu</i>	
Function	Next menu
Cancel	<u>“Set Port 0 {or 1} menu (Services menu)” on page 101</u>
c	-
d	-
Save Data	<u>“Set Port 0 {or 1} menu (Services menu)” on page 101</u>

Table 62: **Set Hard Address** menu (continued)

Function	Next menu
<p>Note:</p> <ol style="list-style-type: none"> Supplemental Message Line 1: <PORT n:cd> <ul style="list-style-type: none"> n = the port number. (0 or 1) cd = the last AL_PA value saved. Supplemental Message Line 2: <ll - Valid Addr/Invalid - hh > <ul style="list-style-type: none"> ll = the next lower valid address. Valid Addr/Invalid = indicates the cd address is valid or invalid. hh = the next higher valid AL_PA. 	

Cancel

Causes the [“Fibre Options menu \(Services menu\)”](#) on page 100 to display.

c

Causes the high order number (c) to increment. This hexadecimal number wraps from F to 0.

d

Causes the low order number (d) to increment. This hexadecimal number wraps from F to 0.

Save Data

Causes the port addresses to be saved, then returns to [“Fibre Options menu \(Services menu\)”](#) on page 100.

This menu allows selection of the AL_PA for the port. As the "c" and "d" options are incremented, the supplemental message lines indicate whether the new value is valid or not. The lines also indicate the next higher and lower valid addresses. Select only a valid address for the AL_PA. If the drive cannot configure (LIP) with this AL_PA, try a different one.

Note: Refer to [“Messages and supplemental messages \(Fibre Channel only\)”](#) in Table 44 on page 79 for fibre-addressing information.

Use Soft Address menu

Table 63 on page 105 shows the **Use Soft Address** menu items.

Table 63: **Use Soft Address** menu

Function	Next menu
Continue...	“Set Port 0 {or 1} menu (Services menu)” on page 101
<p>Note:</p> <ol style="list-style-type: none"> Supplemental Message Line 1: Port0 ID=aa bb cd Supplemental Message Line 2: Port1 ID=aa bb cd 	

Continue...

The action was successful and operation complete. The [“Fibre Options menu \(Services menu\)”](#) on page 100 opens.

Note:

- Soft addressing is not recommended.
- Refer to [“Messages and supplemental messages \(Fibre Channel only\)”](#) in Table 44 on page 79 for fibre-addressing information.

Statistics menu (Operator Mode)

Table 64 on page 106 shows the **Statistics** menu items.

<i>Table 64: Statistics menu (Operator Mode)</i>	
Function	Next menu
Cancel	“Services menu” on page 97
Show Drive Stats...	“Drive Statistics menu (Operator Mode)” on page 106
Show Tape Stats...	“Tape Statistics menu (Operator Mode)” on page 107
Save	“Statistics menu (Operator Mode)” on page 106

Cancel

Causes the [“Services menu” on page 97](#) to display.

Show Drive Stats...

Causes [“Drive Statistics menu \(Operator Mode\)” on page 106](#) to display.

Show Tape Stats...

Causes [“Tape Statistics menu \(Operator Mode\)” on page 107](#) to display.

Save

Causes the statistics to be saved in nonvolatile storage.

Note: The statistics are displayed in decimal form and not in hexadecimal form.

Drive Statistics menu (Operator Mode)

Table 65 on page 106 is an example of the **Drive Statistics** menu items.

<i>Table 65: Drive Statistics menu (Operator Mode)</i>	
Function	Next menu
Cancel	“Statistics menu (Operator Mode)” on page 106
Drv Mounts 0000008963	“Statistics menu (Operator Mode)” on page 106
Drv MB Written 00000002AC	“Statistics menu (Operator Mode)” on page 106
Drv MB Read 0000000000	“Statistics menu (Operator Mode)” on page 106
Power On Hours 000000041F	“Statistics menu (Operator Mode)” on page 106

Cancel

Causes the [“Statistics menu \(Operator Mode\)” on page 106](#) to display.

Drive Mounts

Displays the total number of times a cartridge was mounted in the drive.

Drv MB Written

Shows the total number of megabytes written to tape.

Drv MB Read

Shows the total number of megabytes read from tape.

Power On Hours

Displays the total number of hours the device was powered ON.

Note:

1. When the drive canister is replaced, the **Power On Hrs** (time stamp) is reset to Day = 0000.
2. The statistics are displayed in decimal and not in hexadecimal.

Tape Statistics menu (Operator Mode)

Table 66 on page 107 is an example of the **Tape Statistics** menu items.

<i>Table 66: Tape Statistics menu (Operator Mode)</i>	
Function	Next menu
Cancel	“Statistics menu (Operator Mode)” on page 106
Tape Mounts 0000008963	“Statistics menu (Operator Mode)” on page 106
Tape MB Written 00000002AC	“Statistics menu (Operator Mode)” on page 106
Tape MB Read 0000000000	“Statistics menu (Operator Mode)” on page 106

Cancel

Causes the [“Statistics menu \(Operator Mode\)” on page 106](#) to display.

Tape Mounts

Displays the total number of times a tape volume was mounted in a drive.

Tape MB Written

Displays the total number of megabytes written on the tape cartridge.

Tape MB Read

Displays the total number of megabytes read on the tape cartridge.

Power On Hours

Displays the total number of hours the device was powered ON.

Note:

1. When the canister is replaced, the **Power On Hrs** (time stamp) is reset to Day = 0000.
2. The statistics are displayed in decimal and not in hexadecimal.

CE Offline Mode menus

Attention: Entering CE mode causes the device to immediately go offline to all initiators on both interfaces. Therefore, any current read/write activity results in job termination. In general, the device must be quiesced by the host (varied offline) before the device is taken offline, powering OFF the device, or entering CE mode.

To access the following menus, press **Change Mode** , then select **CE Offline Mode**.

CE Options menu

Table 67 on page 108 shows the **CE Options** menu items.

Table 67: **CE Options menu (CE Offline mode)**

Function	Next menu
Verify Fix/Diags...	“CE Verify Fix/Diag menu” on page 108
Dump...	“CE Dump menu” on page 113
FMR Tape...	“CE FMR Tape menu” on page 115
Config/Install...	“CE Config/Install menu” on page 118
Logs...	“CE Logs menu (CE Offline Mode)” on page 133
Utilities...	“CE Utilities menu” on page 138

Verify Fix/Diags...

Allows the CE to check correct machine operation.

Dump...

Allows the CE to move dump data.

FMR Tape...

Allows the CE to complete microcode updates and to make or unmake an FMR tape.

Config/Install...

Allows the CE to customize the device to meet the customer's requirements at installation.

Logs...

Allows the CE to view the error logs.

Utilities...

Allows the CE to display control store and register data from any valid address. Use this option with assistance from support personnel.

CE Verify Fix/Diag menu

Table 68 on page 108 shows the **CE Verify Fix/Diag** menu items. This menu allows the CE to select diagnostic tests to run.

Table 68: **CE Verify Fix/Diag menu**

Function	Next menu
Cancel	“CE Options menu” on page 107
Test Device	“Status menus” on page 109 , then “Load Scratch Tape menu” on page 117
Test Drive	“Load Scratch Tape menu” on page 117
Test Media	“Load Scratch Tape menu” on page 117
Test Head	“Load Scratch Tape menu” on page 117
Test Panel	“Status menus” on page 109
Test Wrap	“Status menus” on page 109
Test Frame Wrap - Unplug From Silo -	“Status menus” on page 109
Test Fibre Wrap	“Test Fibre Wrap menu” on page 112
Loop Diag	“CE Loop Diag menu” on page 111

Table 68: **CE Verify Fix/Diag** menu (continued)

Function	Next menu
Note:	
1. Supplemental Message Line 1: Load scratch (conditional)	

Cancel

Causes the **CE Options** menu to display.

Notes for Test Device, Test Drive, Test Media, and Test Head:

- If the message **Use Unlabeled Tape** displays, it indicates that a customer tape cartridge was loaded. Do not use this customer tape cartridge because it might contain customer data. Instead, use a CE scratch tape to run this test.
- If the message **Wrong Tape Type - Cannot use WORM** displays, it indicates that a WORM tape was loaded. You cannot use this tape cartridge type. Instead, use a CE scratch tape to run this test.

Test Device

Runs most of the tests that normally occur when the drive is powered ON (POST). Also, the CE is requested to load a CE scratch tape to run the calibrate drive, read/write, and tape motion tests. These tests calibrate the read/write channel to optimum settings, run the long read/write test with all servo positions, and exercise all of the tape motion functions of the drive. This test takes approximately 18 minutes to run.

Test Drive

This test is a shortened version of the **Test Device** diagnostic test. It does not include the POST diagnostic test, calibrate drive test, or unique tape motion test. It checks the motors and head, by running write and read tests on a shortened section of tape, both inbound and outbound. This test takes approximately 4 minutes to run.

Note: Certain errors that are detected while this diagnostic test run automatically starts a drive calibration. This procedure is followed by a rerun of the short write and read test. For these errors, the diagnostic run time is increased from 4 to 9 minutes.

Test Media

Run this test when requested by the customer. This test overwrites any customer data on a data tape cartridge. Runs **Read/Write** tests on the outer tracks of the tape to verify the media tracking and performance. This test takes approximately 9 minutes to run.

Test Head

Runs **Read/Write** tests on the inner tracks of the tape to verify the head performance. This test takes approximately 6 minutes to run.

Test Panel

This test always fails on a Rack Mount drive, since a physical service panel cannot be connected.

Test Wrap

Runs test on a drive pair in one row of the 3592 frame.

Test Frame Wrap

This test cannot be run on a Rack Mount drive, since no library is connected.

Test Fibre Wrap

Runs tests on the Fibre Channel through the Fibre Channel wrap plug.

Loop Diag

Allows the CE to loop the diagnostic tests from [“CE Loop Diag menu” on page 111](#).

Status menus

When a single-pass diagnostic test starts to run, the **Status** menu displays.

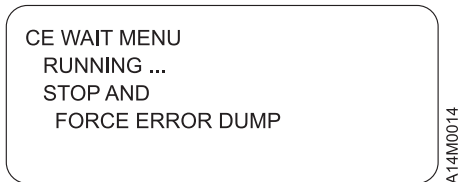


Figure 47: **Status** menu

When a **Loop Diag** test starts to run, the **Status** menu that is shown in [Figure 48 on page 110](#) displays.

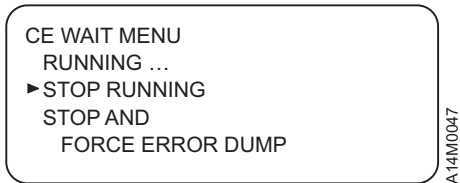


Figure 48: **Loop Status** menu - from **CE Loop Fix** menu



Attention: Do not select **Force Error Dump** from the menu when the tests are running unless you are certain that the 3592 drive is in a hung condition. Also, when the tests are running, do not change to operator mode by pressing **Change Mode** **I**. Aborting a test can cause undesirable results.

When the test needs a tape cartridge, “Load Scratch Tape menu” on [page 117](#) displays.

When you load a tape cartridge and select **Process Loaded Tape**, [Figure 47 on page 110](#) displays until the test is completed or until an error is detected. If the service panel shows the file-protected icon, the tape is either physically write-protected or the wrong format scratch tape is loaded.

Allow the tests to run to completion. When a test ends, the results display, as in [Figure 49 on page 110](#) (the second screen shows an example of a failure).

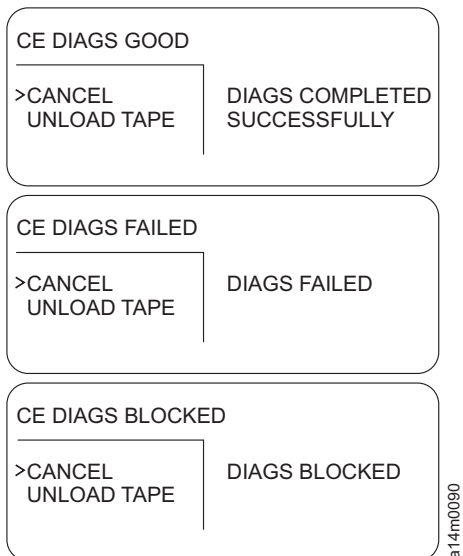


Figure 49: **Final Status** display

The **CE DIAGS BLOCKED** menu, the third screen in [Figure 49 on page 110](#), can occur if the drive goes through microcode recovery. To recover from this condition, press **Reset**.

The **CE DIAGS BLOCKED** status also might occur when diagnostic tests are called after a tape cartridge is already loaded. To recover from this condition unload the tape cartridge, then complete a drive reset from

the service panel. Go to “FID entry point” on page 6, and use the FID that displayed to analyze the condition.

The **CE Action** menus, Figure 50 on page 111 and Figure 51 on page 111, display the result of a completed action.

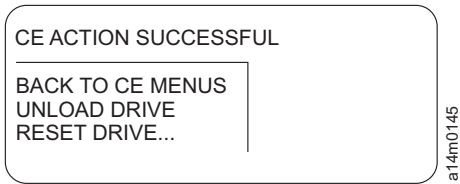


Figure 50: **CE Action Successful** display

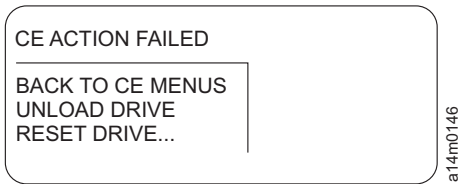


Figure 51: **CE Action Failed** display

CE Loop Diag menu

Table 69 on page 111 shows the **CE Loop Diag** menu items. This menu allows the CE to select tests to run in loop mode. A looptest runs until you stop that test.

Function	Next menu
Cancel	<u>“CE Verify Fix/Diag menu” on page 108</u>
POST	<u>“Status menus” on page 109</u>
Read/Write	<u>“Status menus” on page 109</u>
Read/Write (Short)	<u>“Status menus” on page 109</u>
Panel	<u>“Status menus” on page 109</u>
Test Wrap	<u>“Status menus” on page 109</u>
Test Frame Wrap – Unplug From Silo –	<u>“Status menus” on page 109</u>
Compliance	–
Compactor Diag	–
Test Fibre Wrap	<u>“Test Fibre Wrap menu” on page 112</u>
Note:	
1. Supplemental Message Line 1: Please be patient	
2. Supplemental Message Line 2: when stopping diag.	

Cancel

Causes the **CE Verify Fix/Diag** menu to display.

POST

Power-On Self Test (POST) runs most of the tests that normally occur when the drive is powered ON. The test checks motors, sensors, memory, and other electronic circuitry in the drive.

Read/Write

Runs a Read/Write test. This test takes approximately 10 minutes for each cycle. A CE scratch tape must be loaded before you select this test.

Read/Write (Short)

Runs a 4 minute Read/Write test. A CE scratch tape must be loaded before this test is selected.

Note: If the message **Use Unlabeled Tape** displays, it indicates that the customer tape cartridge contains data. Do not use this tape cartridge. Instead, use a CE scratch tape to run this test.

Panel

Runs tests on the service panel. Allows the CE to visually check all pixels on the service panel display.

To stop the Panel test, select **STOP RUNNING** between test cycles.

Test Wrap

Runs test on a drive pair in one row of the 3592 frame. This test ensures that the drive can communicate to the SDLC cable in the library frame.

Test Frame Wrap (Unplugged From Silo)

This test cannot be run on a Rack Mount drive, since no library is connected.

Compliance

This write-only test runs for 20 minutes. Only available from [“CE Engr Use Only menu” on page 145](#).

Compactor Diag

This test runs internal compactor electronic tests. Only available from [“CE Engr Use Only menu” on page 145](#).

Test Fibre Wrap

Runs tests on the Fibre Channel by using the wrap plug.



Attention: If the service panel shows the file-protected icon, the tape cartridge is either physically write-protected or the customer used a command to logically write-protect the tape.

When a test starts to run, the **Status** menu that is shown in [Figure 48 on page 110](#) displays. The tests run continuously. To stop a test, select **STOP RUNNING**, and allow the test to finish the test cycle that is in process. When a test ends, the results are displayed on [Figure 49 on page 110](#) (the second screen shows an example of a failure).



Attention: Do not select **Force Error Dump** from the menu when the tests are running unless you are sure that the 3592 drive is in a hung condition. Also, when the tests are running, do not change to operator mode by pressing **Change Mode** \bar{Y} . Aborting a test can cause unexpected results.

The **CE DIAGS BLOCKED** menu, the third screen in [Figure 49 on page 110](#), can occur if the drive goes through microcode recovery. To recover from this condition, complete a **Reset Drive**. See [“Services menu” on page 97](#).

Test Fibre Wrap menu

[Table 70 on page 113](#) shows the **Fibre Wrap** menu items. This menu allows the CE to wrap both fibre ports, or each individually.

Note: Fibre wrap plugs must be attached to the drive or to the end of the cables (with the duplex adapter) before these tests are run. Running tests without the wrap plug might cause performance or I/O problems on the fibre loop.

Function	Next menu
Cancel	“CE Verify Fix/Diag menu” on page 108 or “CE Loop Diag menu” on page 111
Both Ports	“Status menus” on page 109
Port 0	“Status menus” on page 109
Port 1	“Status menus” on page 109

Cancel

Causes the [“CE Verify Fix/Diag menu” on page 108](#) or [“CE Loop Diag menu” on page 111](#) to display.

Both Ports

Runs **Port 0 and Port 1 Wrap** test. See [“Fibre wrap test” on page 236](#).

Port 0

Runs **Port 0 Wrap** test. See [“Fibre wrap test” on page 236](#).

Port 1


Runs **Port 1 Wrap** test. See [“Fibre wrap test” on page 236](#).

CE Dump menu

Table 71 on page 113 shows the **CE Dump** menu items. This menu allows the CE to force a dump or to copy a dump from dynamic random access memory (DRAM) to a cartridge.


Function	Next menu
Cancel	“CE Options menu” on page 107
Force Dump	-
Copy Dump to Tape	“CE Copy Dump to Tape menu” on page 114
Copy Dump to Flash	“Status menus” on page 109
Clear Flash Dump (Also used to clear an auto dump to flash)	“Status menus” on page 109
Force Error Dump	-

When the drive is writing data on the tape, the **Tape Position Indicator** (see [Figure 33 on page 79](#)) displays a graphical representation of the position of the device relative to the tape.

The **dump** icon  displays when the dump is available, and remains on the screen to indicate that trace data is stored in the drive. The icon is not displayed after the host requests a dump or the dump is written to tape. While the dump is transferred, there is no indication of progress until the dump icon reappears in the lower right of the service panel. See [“Dump icons” on page 83](#) for information about the flash dump icon.



Attention: Trace data in a new dump is volatile and is lost if you press **Reset** or you remove power from the device.

The **flash dump** icon  displays when a dump is available in flash memory. This dump is preserved over power cycles.

Cancel

Causes the **CE Options** menu to display.

Force Dump

Causes a dump to control-store DRAM to occur. The initiator can retrieve the data with a **Read Buffer** command to the control store DRAM.



Attention: Do not use this option if an FID1 condition already caused a dump to be created. For this case, the dump data of interest is lost if you run the **Force Dump** function. The dump that is caused by using this option writes over an existing dump. Do not use **Force Dump** if the bus is in a hung state; instead, use **Force Error Dump**.


Copy Dump to Tape

Copies the dump data to a cartridge. A menu prompts the CE to load a scratch tape.



Attention: Data on the tape can be overwritten. The **CE Actions** menus ([Figure 50 on page 111](#) and [Figure 51 on page 111](#)) indicate the status of the copy to tape (either, successful copy or unsuccessful copy).

Copy Dump to Flash

Copies dump data to flash memory. The **flash dump** icon  displays when a dump is available in flash memory. Saving the dump to flash memory preserves the dump over power cycles. FID ED is reported after POST when a dump is saved in flash memory (also see [“Offloading the dump to flash memory” on page 211](#)).

Clear Flash Dump

Allows CE to clear the flash dump memory and the auto dump flash memory (also see [“Clearing flash dump memory” on page 211](#)).

Force Error Dump

Causes a recovery procedure in which the microcode is reloaded. This option is used if a microcode-hang condition exists (that is, the host cannot communicate with the drive and no hardware fault is detected). When a hang condition exists, the host can attempt to request a microcode dump through a port, but does not receive it from the drive. This option is also used if a microcode dump is needed and the **Force Dump** option on this menu cannot provide a dump. The host is then able to successfully request the dump information with the port, or the CE can use the **Copy Dump to Tape** option on this menu.



Attention: Using this option causes an existing dump to be overwritten.

CE Copy Dump to Tape menu

[Table 72 on page 114](#) shows the **CE Copy Dump To Tape** menu items.

Function	Next menu
Cancel	“CE Options menu” on page 107
Write Dump at BOT	“Load Scratch Tape menu” on page 117
Write Dump at EOD	“Load Scratch Tape menu” on page 117

Cancel

Allows CE to abort menu, and returns to [“CE Dump menu” on page 113](#).

Write Dump at BOT

Writes dump to the Beginning of Tape.

Write Dump at EOD

Writes dump at the End of Data section of tape.

CE FMR Tape menu

Table 73 on page 115 shows the **FMR Tape** menu items.

<i>Table 73: CE FMR Tape menu</i>	
Function	Next menu
Cancel	“CE Options menu” on page 107
Microcode Update...	“Load FMR Tape menu” on page 115
Make FMR Tape...	“Load Scratch Tape menu” on page 117
Unmake FMR Tape...	“Load FMR Tape menu” on page 115
Note: 1. Supplemental Message Line 1: <status> 2. Supplemental Message Line 2: <status>	

Cancel

Allows the CE to abort one of the FMR commands and return to the **CE Options** menu.

Microcode Update...

Allows the CE to replace the microcode in the device from a field microcode replacement (FMR) tape (cartridge) and to update the FMR tape with the microcode. A menu prompts the CE to load the FMR tape into the device. When the 3592 drive reads the FMR tape, it checks the EC level on the tape cartridge. If the tape does not contain the EC level of the drive, it automatically writes the microcode to the FMR tape. It then displays the EC level with the [“CE Select Level menu” on page 116](#).

Make FMR Tape...

Allows the CE to create a field microcode replacement (FMR) tape (cartridge) from a scratch tape. The FMR tape contains the current level of microcode that is active in the device. A menu prompts the CE to load a scratch tape in the device. After the tape is written, the final status menu indicates whether the operation was successful.

Note: You cannot use this FMR tape to run diagnostic tests until you unmake the FMR tape.

Unmake FMR Tape...

Allows the CE to convert an FMR tape (cartridge) to a scratch tape. A menu prompts the CE to load an FMR tape in the device. After the tape changes the header information, the final status menu indicates whether the operation was successful.



Attention: If the service panel shows the write-protected icon. The tape cartridge is either physically write-protected or the customer used a command to logically write-protect the tape.

Load FMR Tape menu

Table 74 on page 115 shows the menu that prompts the CE to process or unload an FMR tape.

<i>Table 74: Load FMR Tape menu</i>	
Function	Next menu
Cancel	“CE FMR Tape menu” on page 115
Process Loaded Tape	“CE Select Level menu” on page 116
Unload Drive	-

Table 74: **Load FMR Tape** menu (continued)

Function	Next menu
<p>Note:</p> <ol style="list-style-type: none"> Supplemental Message Line 1: Use FMR tape Supplemental Message Line 2: <ul style="list-style-type: none"> Expected FMR tape Tape not at load pt Tape write prot'd 	

Cancel

Allows the CE to return to the **CE Options** menu.

Process Loaded Tape

If an FMR tape is loaded and at ready point, a new menu might display, depending on the previous menu.

Unload Drive

Allows the CE to unload the cartridge from the drive.

Note: See messages that appear on **Supplemental Message Line 2:**

- **Expected FMR tape** - Scratch tape was loaded.
- **Tape not at load pt** - Not at ready point, wait for tape cartridge to finish loading.
- **Tape write prot'd** - If the service panel shows the file-protected icon, the tape cartridge is either physically write-protected or the customer used a command to logically write-protect the tape cartridge.

CE Select Level menu

Table 75 on page 116 shows the **CE Select** menu items. This menu displays when the device loads an FMR tape (cartridge). The device reads all the EC levels, and displays them on this menu. The invalid EC levels are displayed in a lighter font. The message lines display the EC level that runs in the device. The ECs are displayed in the same order as they appear on tape. The CE chooses which EC level to load into the device.

To activate the drive microcode after you load it, you must complete a power-on reset or a CE reset.

Operational Note: If you insert the FMR cartridge, and the EC level of the microcode is not on the cartridge, the microcode is copied automatically from the drive to the cartridge.

Table 75: **CE Select Level** menu

Function	Next menu
Cancel	“CE Options menu” on page 107
EC=aaaaaaa LL=bbbb	“Status menus” on page 109
EC=ccccccc LL=dddd	“Status menus” on page 109
EC=eeeeeee LL=ffff	“Status menus” on page 109
<p>Note:</p> <ol style="list-style-type: none"> Supplemental Message Line 1: Current EC Level: Supplemental Message Line 2: <EC Level q> 	

Cancel

Allows the CE to abort an FMR tape and return to the **CE Options** menu.

EC Level

Allows the CE to choose which EC level to load into the device.

The latest EC level is determined by the link level (LL), as the EC level might not always increment to a higher number. The following example shows that the second entry is the latest level microcode.

```
EC=6C56789 LL=243A
EC=3C56789 LL=243B (latest EC level)
```

Load Scratch Tape menu

Table 76 on page 117 shows the menu items that prompt the CE to process a loaded CE scratch tape or to unload a CE scratch tape.



Attention:

- Use a CE scratch tape that shipped with a drive. Do not use a customer's tape cartridge.
- If you use a customer's tape cartridge with a VOLSER written on the tape, the VOLSER is overwritten.

Function	Next menu
Cancel	Previous menu
Process Loaded Tape	"Status menus" on page 109
Unload Tape	"Load Scratch Tape menu" on page 117

Note:

1. Supplemental Message Line 1 (see descriptions) -
 - **Use unlabeled tape**
 - **Wrong tape type**
2. Supplemental Message Line 2 (see descriptions) -
 - **Expected scratch tape**
 - **Cannot use WORM**
 - **Tape not at load pt**
 - **Tape write prot'd**

Cancel

Allows the CE to return to the **CE Options** menu.

Process Loaded Tape

If the CE scratch tape is loaded and at ready point, a new menu displays, depending on the previous menu. See [Figure 39 on page 91](#) for details.

Unload Tape

Allows the CE to unload the tape cartridge from the drive.

Added description for notes in [Table 76 on page 117](#), Supplemental Message Line 1.

- **Use unlabeled tape** - Cannot run diagnostic tests with labeled cartridges.
- **Wrong tape type** - Cannot run diagnostic tests with WORM cartridges.

Added description for notes in [Table 76 on page 117](#), Supplemental Message Line 2.

- **Expected scratch tape** - FMR tape was loaded.
- **Cannot use WORM** - Cannot run diagnostic tests with WORM cartridges.
- **Tape not at load pt** - Not at ready point, wait for tape cartridge to finish loading.
- **Tape write prot'd** - If the service panel shows the write-protected icon, the tape cartridge is either physically write-protected or the customer used a command to logically write-protect the tape cartridge.

Unload Tape menu

Table 77 on page 118 shows the menu that prompts the CE to unload a CE scratch tape.

<i>Table 77: Unload Tape menu</i>	
Function	Next menu
Unload Tape First	-
Unload Tape	-
Back to CE Menus	Previous menu

Unload Tape First

Allows the CE to rewind the tape into the cartridge.

Unload Tape

Allows the CE to unload the tape cartridge from the drive.

Back to CE Menus

Allows the CE to return to the previous menu.

CE Config/Install menu

Table 78 on page 118 shows the **Config/Install** menu items. The default values are in a bold font.

Note: The **Force Error Log On/Off** function displays the status. For example, when **Forced Error Log Off** appears in the display, forced error logging is OFF. To turn it ON, select the option. The option changes to show the new status 'Forced Error Log On.'

<i>Table 78: CE Config/Install menu</i>	
Function	Next menu
Cancel	"CE Options menu" on page 107
Drv Options...	"CE Drv Options menu" on page 119
VPD Options...	"VPD Options menu" on page 128
Fibre Options...	"Fibre Options menu (CE Offline Mode)" on page 129
Force Er Log On/ Off	-
Note:	
1. Supplemental Message Line 1: Drive fenced! or Loading code	
2. Supplemental Message Line 2: Fix previous error Try again	

Cancel

Causes the **CE Options** menu to display. If any of the VPD options are updated, the **CE WAIT** message might be displayed momentarily while the flash memory is being rewritten.

Drv Options...

Allows the CE to set items from [“CE Drv Options menu” on page 119](#).

VPD Options...

This option is not available for Rack Mount drives.

Fibre Options...

Allows the CE to view the drive node name and port names. See [“Fibre Channel worldwide names history log” on page 206](#).

Force Er Log On/Off

Use this only when directed by your next level of support. - Allows the CE to turn error-logging ON. When set to ON, deferred-check conditions are reported to the host. Therefore, temporary errors are reported in the sense data. The default is **Off**.

CE Drv Options menu

[Table 79 on page 119](#) shows the **CE DRV (Drive) Options** menu items.

This menu allows the CE to set specific drive information that is needed during the installation of the drive. The default values appear in [Table 79 on page 119](#) in a **bold** font.

Note: The **CE DRV (Drive) Options** menu displays the status. For example, if the HSARS Enabled/Disabled option says ‘HSARS Disabled,’ that means that HSARS is disabled. To enable HSARS, select the option. The option changes to show the new status, ‘HSARS Enabled.’

Function	Next menu
Cancel	“CE Config/Install menu” on page 118
Drv Serial No...	“CE DRV Ser No menu (CE Offline Mode)” on page 121
Drv Features...	“CE DRV Features menu” on page 150
Drv Encryption	“DRV Encryption menu” on page 121
Clean Mounts	CE Display/Alter (not shown)
Clean Usage	CE Display/Alter (not shown)
HSARS Enabled/Disabled	-
VSARS Enabled/Disabled	-
SIM Sev Filt On/Off	-
MIM Sev Filt On/Off	-
Num Repeat SIMs	“CE VPD Data menu” on page 127
Set Sense ID	-
Disable CU Mode	-
Note: 1. Supplemental Message Line 1: When done, select 2. Supplemental Message Line 2: CANCEL option 3. Highlighted functions, such as Enabled , are the default values.	

Cancel

Causes the [“CE Config/Install menu” on page 118](#) to display. If any of the VPD options are updated, the **CE WAIT** message might be displayed momentarily while the flash memory is being rewritten.

Drv Serial No...

Allows the CE to enter the drive's serial number (maximum of 12 bytes). See [“CE DRV Ser No menu \(CE Offline Mode\)”](#) on page 121.

Drv Features...

You can specify the configuration for the drive you are installing. See [“CE DRV Features menu”](#) on page 150.

Drv Encryption

Allows the CE to set a drive to encrypt data. See [“DRV Encryption menu”](#) on page 121 and [“Setting drive encryption”](#) on page 250. The default is **Disabled**.

Default Density

Allows the CE to set a drive, for example an EH8 drive, to write from the BOT of a cartridge in a different format, such as EH7 format. See [“Setting default density”](#) on page 249.

Clean Mounts

Allows the CE to change the microcode counter specifying the number of mounts that are required for the drive before a **clean** operation is requested.

Note: When '0' is displayed, the default value of 5 000 mounts is used. Change this value only when instructed by your next level of support.

Clean Usage

Allows the CE to change the microcode counter specifying the number of bytes processed by the drive before a **clean** operation is requested.

Note: When '0' is displayed, the default value of 6 terabytes is used. Change this value only when instructed by your next level of support.

HSARS Enabled/Disabled

Allows the CE to enable the hardware statistical analysis and reporting system (HSARS). Hardware SARS can be enabled or disabled while the drive is operating. Enabling this option allows the drive to indicate potential hardware problems. See [“Statistical Analysis and Reporting System \(SARS\)”](#) on page 43 for details. The default is **Enabled**.

VSARS Enabled/Disabled

Allows the CE to enable the volume statistical analysis and reporting system (VSARS). Volume SARS can be enabled or disabled while the drive is operating. Enabling this option allows the drive to flag bad tape media. See [“Statistical Analysis and Reporting System \(SARS\)”](#) on page 43 for details. The default is **Enabled**.

SIM Sev Filt On/Off

Allows the CE to filter the messages sent to the host. When this option is set to ON, only *acute* and *serious* severity service information messages (SIMs) are sent. *Moderate* and *service-related* severity SIMs are not sent. When this option is set to **Off**, all SIMs are displayed. The default state is **Off**.

MIM Sev Filt On/Off

Allows the CE to filter the messages sent to the host. When this option is set to ON, only *acute* severity media information messages (MIMs) are sent. *Serious*, *moderate*, and *service-related* severity MIMs are not sent. When this option is set to Off, all MIMs are displayed. The default is **Off**.

Num Repeat SIMs

Allows the CE to determine how many times to repeat sending the same SIMs to the host. For example, if you set the value to 3, the SIM is sent to the host when a SIM is generated, then again 8 hours later, then again after another 8-hour period. You cannot change the eight-hour time interval between the presentation of SIMs. The default value is **zero** (do not repeat SIMs). The maximum value that is allowed is 255.

Set Sense ID

This function is for use only with controller attachments. The instructions for what value to put into this field are described in a controller *Installation Instruction*, and in the procedure 'Drive Setup For External Switch' in the appropriate controller MI. The value to which this field is set is reported in Byte 19 of the drive's **Request Sense** data.

Disable CU Mode

This function is automatic on the 3592 drive. Do not change this function unless directed by your next level of support. If the drive is attached to a controller, the controller automatically enables the **Control Unit** mode, and this option displays in a **bold** font.

CE DRV Ser No menu (CE Offline Mode)

This menu appears in both **CE Online Mode** and **CE Offline Mode**.

Function	Next menu
Cancel	“CE Drv Options menu” on page 119
Disp Serial No...	“CE DRV Ser No menu” on page 152
Alter Serial No...	“CE VPD Data menu” on page 127

Cancel

Cancels the operation and returns to the previous menu.

Disp Serial...

Causes [“CE DRV Ser No menu” on page 152](#) to display.

Alter Serial...

Causes [“CE VPD Data menu” on page 127](#) to display.

DRV Encryption menu

Notes:

- Your drive must be encryption-capable to use this menu item.
- A feature code might need to be installed to use this menu item.
- Any data cartridge that is marked for encryption can contain only encrypted data.

Table 81 on page 121 shows the **Drv Encryption** menu items, which allows the drive encryption options to be set to manage access to data by encrypting data in the data cartridges. Also, see the [“Setting drive encryption” on page 250](#) procedure.

Function	Next menu
Cancel	“CE Drv Options menu” on page 119
Method Config...	“Method Config menu (Encryption) ” on page 122
*Advanced Config...	“Advanced Config menu (Encryption) ” on page 123
*Restore Defaults...	“Restore Defaults menu (Encryption)” on page 125
**Crypto Officer...	“Crypto Officer menu (Encryption) ” on page 123

Cancel

Cancels the operation and returns to the previous menu.

Method Config...

Allows the choice of whether encryption is managed by a system, an application, or a library. You also can select **Disable** (for no method) or **Custom**. The default is **Disable**.

*Advanced Config...

Allows the choice of

- Path for passing encryption key.
- How to manage access for encrypting data.

***Restore Defaults...**

Returns the encryption capabilities to the default settings.

****Crypto Officer...**

Allows the purging of any data encryption key from memory. (An encryption security measure).

Method Config menu (Encryption)

Notes:

- Use this only when directed by your next level of support.
- Your drive must be encryption-capable to use this menu item.
- A feature code must be installed to use this menu item.

This menu allows the selection of a method to modify data encryption.

<i>Table 82: Method Config menu (Encryption)</i>	
Function	Next menu
Cancel	“DRV Encryption menu” on page 121
Disable (No Method)	“DRV Encryption menu” on page 121
System	“CE Save Data menu (Encryption)” on page 126
Application	“CE Save Data menu (Encryption)” on page 126
Library	“CE Save Data menu (Encryption)” on page 126
Internal Label	-
Custom	“CE Save Data menu (Encryption)” on page 126

Cancel

Cancels the operation and returns to the previous menu.

Disable (No Method)

Allows encryption to be disabled. The default.

System

Allows a system to manage encryption.

Application

Allows an application to manage encryption.

Library

Allows a library to manage encryption. Though provided here for completeness, this setting is enabled through the library user interface.

Internal Label

Allows encryption management to be based on the contents of the tape label. Though provided here for completeness, this setting is enabled through the library user interface.

Custom

Allows changes that the customer requested to be made. Use this menu item when directed by an *Installation Instruction* or by your next level of support.

Note: You must change the Custom setting to **Yes** to modify the following selections.

- *Key Path Config...
- *BOP Encryption...
- *Density: Shows Encr

Advanced Config menu (Encryption)

Notes:

- Use this only when directed by your next level of support.
- Your drive must be encryption-capable to use this menu item.
- A feature code must be installed to use this menu item.

Table 83 on page 123 shows the **Advanced Config** menu items, which allow drive encryption options to be set to manage access to data, by encrypting data in the data cartridges. Also, see the [“Setting drive encryption”](#) on page 250 procedure.

Function	Next menu
Cancel	“CE Drv Options menu” on page 119
*Key Path Config...	“Key Path Config menu (Encryption)” on page 124
*BOP Encryption...	“BOP Encryption menu” on page 125
*Density: Shows Encr/Masks Encr	-
*Vol Label: Not Encr/Encrypt	-

Cancel

Cancels the operation and returns to the previous menu.

*Key Path Config...

Allows a path to be chosen for passing an encryption key from among a system, an application, or a library.

*BOP Encrypting...

Allows the encryption of the data from the beginning of a partition to be enabled, disabled, locked, or unlocked. A drive can lock-in or lock-out encryption, regardless of commands or keys.

*Density: **Shows Encr/Masks Encr**

Allows the broadcast or subduing of encryption disclosure. The default is **Shows Encr**.

*Vol Label: **Not Encry/Encrypt**

Allows encryption of the Vol Label to be enabled or disabled. When enabled, the Vol Label contents are encrypted with a 0 or 'clear key'. Though provided here for completeness, this feature is enabled through the library user interface. The default is **Not Encr**.

Crypto Officer menu (Encryption)

Notes:

- Use this only when directed by your next level of support.
- Your drive must be encryption-capable to use this menu item.
- A feature code must be installed to use this menu item.

This menu allows the force-purging of any data encryption key from memory (as an encryption security measure). You might complete this procedure to remove the drive from the customer's site.



Attention: If you exercise the Crypto Officer option, encryption is permanently and irrevocably disabled. The drive reports FID1 50 after each power-on cycle. Use this irreversible action before the drive is returned only if the customer requires all critical security parameters (CSPs) to be zeroized before the drive can be removed from the customer site. Cartridges with encrypted data can no longer be read when inserted in this drive.

<i>Table 84: Crypto Officer menu (Encryption)</i>	
Function	Next menu
Cancel	“DRV Encryption menu” on page 121
<first password character>	-
<second password character>	-
<third password character>	-
Done	“CE Save Data menu (Encryption)” on page 126

Cancel

Cancels the operation and returns you to the previous menu.

<password character>

Set the three-password characters. Use the **Enter** key to increment the alphanumeric character that is next to the cursor. You scroll from A through Z and 0 - 9. The character in each register wraps from 9 to A.

Done

Causes the **Crypto Officer** menu to display. Select ***Zeroize Keys+CSPs** to remove any active encryption key, or **Cancel** to maintain the existing encryption keys in the drive.

Key Path Config menu (Encryption)

[Table 85 on page 124](#) shows the **Key Path Config** menu items.

<i>Table 85: Key Path Config menu (Encryption)</i>	
Function	Next menu
Cancel	Previous menu
Default (by Method)	“CE Save Data menu (Encryption)” on page 126
System (IBM)	“CE Save Data menu (Encryption)” on page 126
Application (IBM)	“CE Save Data menu (Encryption)” on page 126
Application (T10)	“CE Save Data menu (Encryption)” on page 126
Application (Auto)	“CE Save Data menu (Encryption)” on page 126
Library	“CE Save Data menu (Encryption)” on page 126

Cancel

The encryption settings are not returned to the default settings.

Default (by Method)

Returns encryption to the default settings for the method you chose in [“Advanced Config menu \(Encryption\)” on page 123](#).

System (IBM)

Manually configure the key path to be system-managed (IBM mode).

Application (IBM)

Manually configure the key path to be application-managed (IBM mode).

Application (T10)

Manually configure the key path to be application-managed (T10/SSC-3 mode). Use this feature for receiving and validating encryption keys.

Application (Auto)

Manually configure the key path to be application-managed [dynamic auto-selection between Application (IBM) and Application (T10)]

Library

Manually configure the key path to be library-managed.

BOP Encryption menu

Table 86 on page 125 shows the **BOP (beginning of partition) Encryption** menu items.

<i>Table 86: BOP Encryption menu</i>	
Function	Next menu
Cancel	Previous menu
Disabled	“CE Save Data menu (Encryption)” on page 126
Enabled	“CE Save Data menu (Encryption)” on page 126
Unknown	“CE Save Data menu (Encryption)” on page 126
Label Selects	-
Label Enabled	-
Disabled (Locked)	“CE Save Data menu (Encryption)” on page 126
Enabled (Locked)	“CE Save Data menu (Encryption)” on page 126

Cancel

Cancels the operation (BOP encryption settings are not changed) and returns to the previous menu.

Disabled

The BOP settings are disabled. Data is not encrypted from the beginning of a partition. The default setting.

Enabled

The BOP settings are enabled. Data can be encrypted from the beginning of a partition when requested.

Unknown

The source of the request cannot be determined.

Label Selects

Encryption policy is managed (enabled/disabled) based on the contents of the **Vol Label** contents. Though provided here for completeness, this feature is enabled through the library user interface.

Label Enabled

Encryption is enabled regardless of **Vol Label** contents. Though provided here for completeness, this feature is enabled through the library user interface.

Disabled (Locked)

Prevents the drive from encrypting data, regardless of requests or other settings. Allows encrypted data to be decrypted.

Enabled (Locked)

Requires all data to be encrypted. Data is encrypted from BOP.

Restore Defaults menu (Encryption)

Table 87 on page 126 shows the **Restore Defaults** menu items.

<i>Table 87: Restore Defaults menu (Encryption)</i>	
Function	Next menu
Cancel	Previous menu
Confirm Restore	“CE Save Data menu (Encryption)” on page 126

Cancel

The encryption settings are not returned to the default settings.

Confirm Restore

Returns settings to the default.

CE Save Data menu (Encryption)

Table 88 on [page 126](#) shows the **CE Save Data** menu items. This menu allows the CE to save or decline the saving of data that was entered at the previous menu.

<i>Table 88: CE Save Data menu (Encryption)</i>	
Function	Next menu
Cancel	Previous menu
Yes	Previous menu
No	Previous menu

Cancel

The encryption settings are not saved.

Yes

Saves the encryption settings.

No

Does not save the encryption settings.

CE Default Density menu

Table 89 on [page 126](#) shows the **CE Default Density** menu items. These menu items allow the CE to set the default density for a drive to write from the beginning of tape in that format. You choose one of these options to change the way that a drive prepares a tape cartridge to be written on from the beginning of tape (BOT). Also, see the [“Setting default density” on page 249](#) procedure.

The term 'density' refers to the number of simultaneous tracks that can be written and how many linear bits are written per millimeter of tape (or, the track count and bit density). A higher density has more tracks and more bits per millimeter.

<i>Table 89: CE Default Density menu</i>	
Function	Next menu
Cancel	“CE Drv Options menu” on page 119
00 - Default	“CE Save Data menu (Root, Port, and Node names)” on page 132
54 - E07 (3592A4)	“CE Save Data menu (Root, Port, and Node names)” on page 132
55 - E08 (3592A5)	“CE Save Data menu (Root, Port, and Node names)” on page 132
56 - 55F (3592B5)	“CE Save Data menu (Root, Port, and Node names)” on page 132
57 - 60F (3592A6)	“CE Save Data menu (Root, Port, and Node names)” on page 132

<i>Table 89: CE Default Density menu (continued)</i>	
Function	Next menu
FF - From Medium*	“CE Save Data menu (Root, Port, and Node names)” on page 132

Cancel

Causes the [“CE Drv Options menu” on page 119](#) to display.

00 - Default

Allows the CE to maintain the native write density for the drive model that you are using. The default.

54 - E07 (3592A4)

Allows the CE to set a drive to E07 density. Thus, the drive can write from BOT on supported tape cartridges in E07 format.

55 - E08 (3592A5)

Allows the CE to set a drive to E08 density. Thus, the drive can write from BOT on supported tape cartridges in E08 format.

56 - 55F (3592B5)

Allows the CE to set a drive to 55F density. Thus, the drive can write from BOT on supported tape cartridges in 55F format.

57 - 60F (3592A6)

Allows the CE to set a drive to 60F density. Thus, the drive can write from BOT on supported tape cartridges in 60F format.

FF - From Medium*

Allows the CE to use the currently recorded density. Use '00 - Default' for uninitialized tape cartridges.

Note: See [Table 13 on page 26](#) for supported cartridges and [Table 156 on page 249](#) for supported density modes.

CE Wrap Tools menu

[Table 90 on page 127](#) depicts the **CE Wrap Tools** menu items.

<i>Table 90: CE Wrap Tools menu</i>	
Function	Next menu
Cancel	“CE Drv Options menu” on page 119
RS422 : (Not) Prsnt	“CE DRV Ser No menu” on page 152
RS422 : Present	“CE VPD Data menu” on page 127

Cancel

Cancels the operation and returns to the previous menu.

RS422 : (Not) Prsnt

An RS-422 wrap plug is not attached.

RS422 : Present

An RS-422 wrap plug is attached.

CE VPD Data menu

[Table 91 on page 128](#) depicts some CE VPD data.

Function	Next menu
Cancel	“CE Config/Install menu” on page 118
1	-
0	-
0	-
0	-
...	-
1	-
Save and Continue	“CE Save Data menu (Ser No)” on page 128

Cancel

Causes the [“CE Drv Options menu” on page 119](#) to display

0123456789ABCDEF

Use the **Enter** key to increment the hexadecimal character next to the cursor. The number wraps from 'F' to '0'.

Save and Continue

Causes [“CE Save Data menu \(Ser No\)” on page 128](#) to display. This action confirms the storing of data.

CE Save Data menu (Ser No)

Table 92 on page 128 shows the **CE Save Data** menu.

This menu allows the CE to save or decline saving the data that was previously entered.

Function	Next menu
Cancel	“CE DRV Ser No menu (CE Offline Mode)” on page 121
Yes	“CE DRV Ser No menu (CE Offline Mode)” on page 121
No	“CE DRV Ser No menu (CE Offline Mode)” on page 121
Note:	
1. Supplemental Message Line 1: Sequence Number	
2. Supplemental Message Line 2: <none>	

Cancel

Causes the [“CE DRV Ser No menu \(CE Offline Mode\)” on page 121](#) to display. The serial number is not saved.

Yes

Saves the serial number and returns to [“CE DRV Ser No menu \(CE Offline Mode\)” on page 121](#).

No

Does not save the serial number, and returns to [“CE DRV Ser No menu \(CE Offline Mode\)” on page 121](#).

VPD Options menu

These options are not available for Rack Mount drives.

Fibre Options menu (CE Offline Mode)

Table 93 on page 129 shows the **Fibre Options** menu items.

<i>Table 93: Fibre Options menu (CE Offline Mode)</i>	
Function	Next menu
Cancel	“CE Config/Install menu” on page 118
Port/Node Names...	“Port/Node Names menu (CE Offline Mode)” on page 129
Set Root Name...	“Set Root Name menu” on page 130
Set Port 0 Name...	“Set Port 0 {or 1} Name menu” on page 131
Set Port 1 Name...	“Set Port 0 {or 1} Name menu” on page 131
Set Node 0 Name...	“Set Node 0 {or 1} Name menu” on page 131
Set Node 1 Name...	“Set Node 0 {or 1} Name menu” on page 131
Show Orig Names...	“Show Orig Names (CE Offline Mode)” on page 132
Restor Orig Names...	“Restor Orig Names (CE Offline Mode)” on page 132
Note: 1. Supplemental Message Line 1: Port0 ID=aa bb cd 2. Supplemental Message Line 2: Port1 ID=aa bb cd	

Cancel

Causes the [“CE Config/Install menu” on page 118](#) to display.

Port/Node Name...

Causes the [“Port/Node Names menu \(Services menu\)” on page 101](#) to display.

Set Root Name...

Causes the [“Set Root Name menu” on page 130](#) to display.

Set Port 0 Name...

Causes the [“Set Port 0 {or 1} Name menu” on page 131](#) to display.

Set Port 1 Name...

Causes the [“Set Port 0 {or 1} Name menu” on page 131](#) to display.

Set Node 0 Name...

Causes the [“Set Node 0 {or 1} Name menu” on page 131](#) to display.

Set Node 1 Name...

Causes the [“Set Node 0 {or 1} Name menu” on page 131](#) to display.

Show Orig Names...

Causes the [“Show Orig Names \(CE Offline Mode\)” on page 132](#) to display.

Restor Orig Names...

Causes the [“Restor Orig Names \(CE Offline Mode\)” on page 132](#) to display.

Note: Refer to “Messages and supplemental messages (Fibre Channel only)” in [Table 44 on page 79](#) for fibre-addressing information.

Port/Node Names menu (CE Offline Mode)

[Table 94 on page 130](#) shows the **Port Names** menu items.

<i>Table 94: Port/Node Names menu (CE Offline Mode)</i>	
Function	Next menu
Port Names/WWID 0=5005076302400143 1=5005076302800143	“Fibre Options menu (CE Offline Mode)” on page 129
Node Names/WWID 0=5005076302000143 1=5005076302C00143	“Fibre Options menu (CE Offline Mode)” on page 129

Cancel

Causes the [“Fibre Options menu \(Services menu\)” on page 100](#) to display.

Port 0 / Port 1 Name

Both Fibre port 0 and Fibre port 1 names are displayed.

Node 0 / Node 1 Name

Both Fibre node 0 and Fibre node 1 names are displayed.

Set Root Name menu

Table 95 on page 130 shows the **Set Root Name** menu items. This menu allows the drive Root name to be set.

<i>Table 95: Set Root Name menu (CE Offline Mode)</i>	
Function	Next menu
Cancel	“Fibre Options menu (Services menu)” on page 100
5	-
0	-
0	-
5	-
...	-
Save and Continue	“CE Save Data menu (Root, Port, and Node names)” on page 132
Note:	
1. Supplemental Message Line 1: Port0 ID=aa bb cd	
2. Supplemental Message Line 2: Port1 ID=aa bb cd	

Note: If you alter any name, you must save or alter all the names. For example, if you alter the **Node Name** only, at minimum, you must save Port 0 and Port 1.

Cancel

Causes the [“Fibre Options menu \(Services menu\)” on page 100](#) to display.

0123456789ABCDEF

Selecting this option increments the hexadecimal character. The number wraps from ‘F’ to ‘0’.

Save and Continue

Causes [“CE Save Data menu \(Root, Port, and Node names\)” on page 132](#) menu to display to allow or disallow saving data in DRAM.

Set Port 0 {or 1} Name menu

Table 96 on page 131 shows the **Set Port 0 Name** and the **Set Port 1 Name** menu items. This menu allows the drive to set the **Port 0 Name** and the drive **Port 1 Name**.

Function	Next menu
Cancel	“Fibre Options menu (CE Offline Mode)” on page 129
5	-
0	-
0	-
5	-
...	-
Save and Continue	“CE Save Data menu (Root, Port, and Node names)” on page 132

Note: If you alter any name, you must save or alter all the names. For example, if you alter the **Port Name** only, you must at least save Port 0 and Port 1.

Cancel

Causes the [“Fibre Options menu \(CE Offline Mode\)” on page 129](#) to display.

0123456789ABCDEF

Selecting this option increments the hexadecimal character. The number wraps from ‘F’ to ‘0’.

Save and Continue

Causes [“CE Save Data menu \(Root, Port, and Node names\)” on page 132](#) menu to display to allow or disallow saving data in DRAM.

Set Node 0 {or 1} Name menu

Table 97 on page 131 shows the **Set Node 0 Name** and the **Set Node 1 Name** menu items. This menu allows the drive to set **Node 0 Name** and the **Node 1 Name**.

Function	Next menu
Cancel	“Fibre Options menu (CE Offline Mode)” on page 129
5	-
0	-
0	-
5	-
...	-
Save and Continue	“CE Save Data menu (Root, Port, and Node names)” on page 132

Note: If you alter any name, you must save or alter all the names. For example, if you alter the **Node Name** only, you must at least save Node 0 and Node 1.

Cancel

Causes the [“Fibre Options menu \(CE Offline Mode\)” on page 129](#) to display.

0123456789ABCDEF

Selecting this option increments the hexadecimal character. The number wraps from 'F' to 0'.

Save and Continue

Causes [“CE Save Data menu \(Root, Port, and Node names\)”](#) on page 132 menu to display to allow/disallow saving data in DRAM.

Show Orig Names (CE Offline Mode)

Table 98 on page 132 shows the **Show Orig Names** menu items. This menu displays the current and original root name/WWID for port 0. The names do not necessarily match, depending on the current configuration and what configurations the drive was previously used in.

<i>Table 98: Show Orig Names menu (CE Offline Mode)</i>	
Function	Next menu
Orig Root Name/WWID 0=5005076302400143	“Fibre Options menu (CE Offline Mode)” on page 129
Curr Root Name/WWID 0=5005076302400143	“Fibre Options menu (CE Offline Mode)” on page 129

Orig Root Name

The Original Root Name/WWID for port 0 is displayed.

Curr Root Name

The Current Root Name/WWID for port 0 is displayed.

Restor Orig Names (CE Offline Mode)



Attention: Do not use this function unless instructed to by your next level of support.

Table 99 on page 132 shows the **Restor Orig Names** menu items. Use the **Save and Continue** function to restore the original root name/WWIDs. See [“Show Orig Names \(CE Offline Mode\)”](#) on page 132 for information on viewing the current and original names.

<i>Table 99: Restor Orig Names menu (CE Offline Mode)</i>	
Function	Next menu
Cancel	“Fibre Options menu (CE Offline Mode)” on page 129
Save and Continue	“CE Save Data menu (Root, Port, and Node names)” on page 132

Cancel

Causes the [“Fibre Options menu \(Services menu\)”](#) on page 100 to display.

Save and Continue

Causes the [“CE Save Data menu \(Root, Port, and Node names\)”](#) on page 132 menu to display to allow/disallow saving data in DRAM.

CE Save Data menu (Root, Port, and Node names)

Table 100 on page 133 shows the **CE Save Data** menu items. This menu allows the CE to save or decline saving the data that was entered at the previous menu.

<i>Table 100: CE Save Data menu (Root, Port, and Node names)</i>	
Function	Next menu
Cancel	Previous menu
Yes	Previous menu
No	Previous menu
Note:	
1. Supplemental Message Line 1: FC NODE/PORT NAME	
2. Supplemental Message Line 2: <none>	

Cancel

Causes the “[Fibre Options menu \(CE Offline Mode\)](#)” on page 129 to display. The name is not saved.

Yes

Saves the root name and node/port name, and returns to “[Fibre Options menu \(CE Offline Mode\)](#)” on page 129.

No

Does not save name and returns to “[Fibre Options menu \(CE Offline Mode\)](#)” on page 129.

CE Logs menu (CE Offline Mode)

Table 101 on page 133 shows the **CE Logs** menu items. This menu allows the CE to access the CE error logs.

<i>Table 101: CE Logs menu (CE Offline mode)</i>	
Function	Next menu
Cancel	“ CE Options menu ” on page 107
Error Log...	“ CE Error Log menu ” on page 134
FID FE Log...	“ CE FID FE Log menu ” on page 135
FID FF Log...	“ CE FID FF Log menu ” on page 136
Temp Error Log...	“ CE Temp Error Log menu ” on page 137

Cancel

Causes the “[CE Options menu](#)” on page 107 to display.

Error Log...

Allows the CE to view the **Error Log**.

FID FE Log...

Allows the CE to view the **FID FE** log.

FID FF Log...

Allows the CE to view the **FID FF** log.

Temp Error Log...

Allows the CE to view the **Temp Error** log.

Notes:

- The **CE Error Log** logs every FID or ATTN message posted to the service panel.
- The **FID FE Log** logs a filtered subset of all sense data sent to the host with a FID of **FE**.
- The **FID FF Log** logs a filtered subset of all sense data sent to the host with a FID of **FF**.

- The **Temp Error Log** logs a filtered subset of all sense data sent to the host with a sense key of **1** (see [“Sense Key 1 \(Recovered Error\)”](#) on page 48).

CE Error Log menu

The **CE Error Log** logs every FID or ATTN message posted to the service panel.

<i>Table 102: CE Error Log menu</i>	
Function	Next menu
Cancel	“CE Logs menu (CE Offline Mode)” on page 133
Clear Log	“CE Logs menu (CE Offline Mode)” on page 133
Current Timestamp dddd Days hh:mm:ss -- OR -- yyyy:mm:dd hh:mm:ss	“CE Logs menu (CE Offline Mode)” on page 133
FID1 87 VS:142M95 3130 0030 243A 0001 04:33:32	“CE Logs menu (CE Offline Mode)” on page 133
FID1 82 VS:UNKNOWN 311A 311A 243A 0001 05:37:04	“CE Logs menu (CE Offline Mode)” on page 133

Cancel

Causes the [“CE Logs menu \(CE Offline Mode\)”](#) on page 133 to display.

No Entries

Indicates that no entries are in the error log. Choosing this option causes [“CE Logs menu \(CE Offline Mode\)”](#) on page 133 to display.

Clear Log

Allows the CE to erase the error log. This option is displayed only when there is at least one entry in error log. Choosing this option causes [“CE Logs menu \(CE Offline Mode\)”](#) on page 133 to display.

Current Timestamp

Provides a current time stamp that depicts when the error occurred. For a full description of this field, see [“Time stamp for CE Error Log”](#) on page 135

FID1 87

Indicates a possible fault with one of the drives or cartridges. The Volume Serial number is 142M95. The fault symptom codes are 3130 and 0030. The next character (2 in 243A) represents the 3592 drive, followed by the microcode level (43A). Choosing this option causes [“CE Logs menu \(CE Offline Mode\)”](#) on page 133 to display.

FID1 82

Indicates a possible drive-voltage-not-within-spec problem. The Volume Serial number is Unknown. The fault symptom codes are 311A. The next character (2 in 243A) represents the 3592 drive, followed by the microcode level (43A). Choosing this option causes [“CE Logs menu \(CE Offline Mode\)”](#) on page 133 to display.

A maximum of the last 30 entries in the log are displayed. If a fault is detected and the log contains 30 entries, the oldest entry is scrolled off the end and the newest error is put in position 1 (the first position in the list).

[Table 102](#) on page 134 shows an example of the menu when the log contains entries. The format is -

FIDx yy VS:nnnnnn
 aaaa bbbb cccc
 dddd Days hh : mm : ss

The volume serial number (or unknown) is listed after the FID number.

Support data

Twelve hex characters of support data (or a detailed message) are included in the error log.

aaaa Fault Symptom Code
 bbbb Fault Symptom Code (FSC)
 cccc Model number (c) and microcode link (ccc)

Time stamp for CE Error Log

A time stamp accompanies each error log entry. The time stamp can be displayed in either relative time, or real time if available. Relative time is associated with the approximate number of power-on hours for the drive canister. Real-time clock input can be provided to the drive by the host application, the library, an IBM device driver, or the Fibre Channel switch.

When the drive canister is replaced, the relative time stamp is reset to dddd=00000. A clock counter is started with power ON, and is saved in VPD every 8 hours.

<i>Table 103: Time stamp for CE Error Log</i>	
Relative time format	
dddd Days hh:mm:ss	dddd Number of days the drive is powered ON. hh:mm:ss Amount of time the drive is powered ON.
Real-time format	
yyyy:mm:dd hh:mm:ss	yyyy:mm:dd Date when the time stamp was recorded (year/month/day). hh:mm:ss Time when the time stamp was recorded (hours:minutes:seconds).

EXAMPLE
 DRV eee
 LOAD/UNLOAD ERROR
 0001 05:01:10

The ‘eee’ in the example is the number of times, if more than once, that the ATTN message was called out during a 5-second interval. The error in this example occurred on the 1st day, 5th hour, 1st minute, and 10th second in “relative time.”

CE FID FE Log menu

The **FID FE Log** creates and holds a filtered subset of all sense data sent to the host with a FID of **87** or **FE**.

Table 104 on page 136 shows an example of the menu when the log contains entries. See “[CE Error Log menu](#)” on page 134 for format information. The format is

FID 87 FID FE
 aaaa bbbb cccc
 ddddd Days hh:mm:ss
 --OR--
 yyyy:mm:dd VOLSER: nnnnnn

<i>Table 104: CE FID FE Log menu</i>	
Function	Next menu
Cancel or No Entries	“CE Logs menu (CE Offline Mode)” on page 133
CLEAR LOG	“CE Logs menu (CE Offline Mode)” on page 133
CURRENT TIMESTAMP ddddd Days hh:mm:ss -- OR -- yyyy:mm:dd	“CE Logs menu (CE Offline Mode)” on page 133
FID 87 FID FE 3601 3335 243A 0010 13:05:12 VOLSER: 156M95	“CE Logs menu (CE Offline Mode)” on page 133

Cancel

Causes the [“CE Logs menu \(CE Offline Mode\)” on page 133](#) to display.

No Entries

Indicates that no entries are in the error log. Choosing this option causes [“CE Logs menu \(CE Offline Mode\)” on page 133](#) to display.

CLEAR LOG

Allows the CE to erase the error log. This option is displayed only when there is at least one entry in the error log. Choosing this option causes [“CE Logs menu \(CE Offline Mode\)” on page 133](#) to display.

CURRENT TIMESTAMP

Provides a current time stamp that depicts when the error occurred. For a full description of this field, see [“Time stamp for CE Error Log” on page 135](#).

FID yy yy

This example indicates a possible fault with the device associated with a FID yy. The characters of support data include the fault symptom codes (aaaa and bbbb), and the model number (c), followed by the microcode link (ccc). A time stamp follows. The last entry is the Volume Serial number. If the Volume Serial number is not known, it shows "UNKNOWN". Choosing this option causes [“CE Logs menu \(CE Offline Mode\)” on page 133](#) to display.

Only the last 10 entries in the log are displayed. If a fault is detected and the log contains 10 entries, the oldest entry is dropped from the end and the newest error is put in position 1 (the first position in the list).

CE FID FF Log menu

The **FID FF Log** creates and holds a filtered subset of all sense data sent to the host with a FID of **FF**.

[Table 105 on page 137](#) shows an example of the menu when the log contains entries. See [“CE Error Log menu” on page 134](#) for format information. The format is:

FID 85 FID FF
 aaaa bbbb cccc
 ddddd Days hh:mm:ss
 -- OR --
 yyyy:mm:dd VOLSER: nnnnnn

<i>Table 105: CE FID FF Log menu</i>	
Function	Next menu
Cancel or No Entries	“CE Logs menu (CE Offline Mode)” on page 133
CLEAR LOG	“CE Logs menu (CE Offline Mode)” on page 133
CURRENT TIMESTAMP dddd Days hh:mm:ss --OR-- yyyy:mm:dd	“CE Logs menu (CE Offline Mode)” on page 133
FID 85 FID FF 0062 003D 243A 0244 15:34:07	“CE Logs menu (CE Offline Mode)” on page 133

Cancel

Causes the [“CE Logs menu \(CE Offline Mode\)” on page 133](#) to display.

No Entries

Indicates that no entries are in the Error log. Choosing this option causes [“CE Logs menu \(CE Offline Mode\)” on page 133](#) to display.

CLEAR LOG

Allows the CE to erase the error log. This option is displayed only when there is at least one entry in error log. Choosing this option causes [“CE Logs menu \(CE Offline Mode\)” on page 133](#) to display.

CURRENT TIMESTAMP

Provides a current time stamp that depicts when the error occurred. For a full description of this field, see [“Time stamp for CE Error Log” on page 135](#).

FID yy yy

Provides the FID identifier (yy yy), characters of support data, and the current time stamp. The characters of support data include the fault symptom codes (aaaa, bbbb), the model number (c), and the microcode link (ccc).

Only the last 10 entries in the log are displayed. If a fault is detected and the log contains 10 entries, the oldest entry is scrolled off the end and the newest error is put in position 1 (the first position in the list).

CE Temp Error Log menu

The **Temp Log** creates and holds a filtered subset of all sense data sent to the host with a sense key of **1** (see [“Sense Key 1 \(Recovered Error\)” on page 48](#)).

Table 106 on page 137 shows an example of the menu when the log contains entries. See [“CE Error Log menu” on page 134](#) for format information. The format is

```
FID 85 FID FF
aaaa bbbb cccc
dddd Days hh:mm:ss
-- OR--
yyyy:mm:dd VOLSER: nnnnnn
```

<i>Table 106: CE Temp Error Log menu</i>	
Function	Next menu
Cancel or No Entries	“CE Logs menu (CE Offline Mode)” on page 133

<i>Table 106: CE Temp Error Log menu (continued)</i>	
Function	Next menu
CLEAR LOG	“CE Logs menu (CE Offline Mode)” on page 133
CURRENT TIMESTAMP dddd Days hh:mm:ss --OR-- yyyy:mm:dd	“CE Logs menu (CE Offline Mode)” on page 133
FID 85 FID FF 3626 3341 22C3 0021 08:00:05 VOLSER: UNKNOWN	“CE Logs menu (CE Offline Mode)” on page 133

Cancel

Causes the [“CE Logs menu \(CE Offline Mode\)” on page 133](#) to display.

No Entries

Indicates that no entries are in the Error log. Choosing this option causes [“CE Logs menu \(CE Offline Mode\)” on page 133](#) to display.

CLEAR LOG

Allows the CE to erase the error log. This option is displayed only when there is at least one entry in error log. Choosing this option causes [“CE Logs menu \(CE Offline Mode\)” on page 133](#) to display.

CURRENT TIMESTAMP

Provides a current time stamp that depicts when the error occurred. For a full description of this field, see [“Time stamp for CE Error Log” on page 135](#).

FID yy yy

Provides the FID identifier (yy yy), characters of support data, and the current time stamp. The characters of support data include the fault symptom codes (aaaa, bbbb), the model number (c), and the microcode link (ccc). A time stamp follows. The last entry is the Volume Serial number. If the Volume Serial number is not known, it shows "UNKNOWN". Choosing this option causes [“CE Logs menu \(CE Offline Mode\)” on page 133](#) to display.

Only the last 10 entries in the log are displayed. If a fault is detected and the log contains 10 entries, the oldest entry is scrolled off the end and the newest error is put in position 1 (the first position in the list).

CE Utilities menu

[Table 107 on page 138](#) shows the **CE Utilities** menu items.

<i>Table 107: CE Utilities menu</i>	
Function	Next menu
Cancel	“CE Options menu” on page 107
Calibrate Drive	“Load Scratch Tape menu” on page 117
Disp Sensors...	“CE Disp Sensors menu (CE Online Mode)” on page 154
Disp/Alt VPD...	“CE Disp/Alt VPD menu” on page 139
Microcode Trap...	“CE Microcode Traps menu” on page 140
Read Tape...	“CE Read Tape menu” on page 141
Show Statistics...	“Show Statistics menu (CE Online Mode)” on page 154

Table 107: **CE Utilities** menu (continued)

Function	Next menu
Engr Use Only...	“Enter Password menu” on page 144
OEM Use Only...	“Enter Password menu” on page 144

Cancel

Causes the [“CE Options menu” on page 107](#) to display.

Calibrate Drive

Allows the CE to calibrate the drive read/write channel to optimum settings for the tape cartridge that currently is loaded.

Disp Sensors...

Causes the [“CE Disp Sensors menu \(CE Online Mode\)” on page 154](#) to display, which allows the CE to exercise sensors in the device and observe feedback from the operation.

Disp/Alt VPD...

Allows the CE to display or change the vital product data (VPD). Changing the VPD must be done only with assistance from support personnel.

Microcode Trap...

Allows the CE to set a specific FSC trap (error microcode match) in microcode to force a microcode dump.

Read Tape...

Allows the CE to display a portion of the data on the tape cartridge.

Show Statistics...

Allow the CE to display internal counts of activities.

Engr Use Only...

Password required. Allows support personnel to access selected utilities.

OEM Use Only...

Password required. Allows OEM support personnel to customize VPD data.

CE Disp/Alt VPD menu

Note: Use this only when directed by your next level of support.

Table 108 on page 139 shows the **CE Disp/Alt VPD** menu items. This menu allows the CE to select the vital product data (VPD) group that contains the specific **VPD** field to be displayed or altered. You can display all the contents in each of the groups, but can alter some of the contents in only the flash group.

Table 108: **CE Disp/Alt VPD** menu

Function	Next menu
Cancel	“CE Utilities menu” on page 138
CE Ucode Grp	CE Ucode Grp menu (not shown)
CE DRAM Grp	CE DRAM Grp menu (not shown)
CE Flash Grp	CE Flash Grp menu (not shown)
<p>Note:</p> <ol style="list-style-type: none"> Supplemental Message Line 1: Select VPD field Supplemental Message Line 2: <none> 	

Cancel

Causes the [“CE Utilities menu” on page 138](#) to display.

CE Ucode Grp

The link level and size of the microcode.

CE DRAM Grp

The EC levels of the module. These fields are maintained only in DRAM, not in flash EPROM or in the microcode.

CE Flash Grp

The Fibre Channel addresses and the other setup choices you can make from the service panel (the dynamic information). This information is in flash EPROM.

CE Microcode Traps menu

Note: Use this only when directed by your next level of support.

Table 109 on page 140 shows the **CE Microcode Traps** menu items. This menu allows the CE to set a specific trap in microcode to force a microcode dump.

<i>Table 109: CE Microcode Traps menu</i>	
Function	Next menu
Cancel	“CE Utilities menu” on page 138
0 0 0 0	-
Add FSC Trap	-
Remove FSC Trap	-
List FSC Traps	“CE FSC Trap List menu” on page 141
Saved Traps...	“CE Saved Traps menu” on page 140
Note:	
1. Supplemental Message Line 1: Trap set, Trap removed, or Select FSC	
2. Supplemental Message Line 2: <none>	

Cancel

Causes [“CE Utilities menu” on page 138](#) to display. Address is not saved.

Trap

Allows CE to select a specific hex value. To change value of nibble, select nibble, which causes menu to display where you can select ‘0’ to ‘F’.

Add FSC Trap

Allows the CE to add an FSC trap.

Remove FSC Trap

Allows the CE to remove an FSC trap.

List FSC Traps

Causes all FSC traps to be displayed in [“CE FSC Trap List menu” on page 141](#).

Saved Traps...

Causes the [“CE Saved Traps menu” on page 140](#) to display.

CE Saved Traps menu

Note: Use this only when directed by your next level of support.

Table 110 on page 141 shows the **CE Saved Traps** menu items. This menu allows the CE to add, remove, or list saved FSC traps.

<i>Table 110: CE Saved Traps menu</i>	
Function	Next menu
Cancel	“CE Microcode Traps menu” on page 140
Trap (4 characters that are displayed vertically)	-
Add Saved FSC Trap	-
Rmv Saved FSC Trap	-
List Saved FSC Trap	“CE Saved FSC Trap List menu” on page 151
Note:	
1. Supplemental Message Line 1: Trap set, Trap remove, or Select FSC	
2. Supplemental Message Line 2: <none>	

Cancel

Causes the [“CE Microcode Traps menu” on page 140](#) to display. The address is not saved.

Trap

Allows the CE to select a specific hex value. To change the value of the nibble, select the nibble, which causes a menu to display where you can select ‘0’ through ‘F’.

Add Saved FSC Trap

Allows the CE to add a Saved FSC trap.

Rmv Saved FSC Trap

Allows the CE to remove a Saved FSC trap.

List Saved FSC Trap

Causes the [“CE Saved FSC Trap List menu” on page 151](#) to be displayed.

CE FSC Trap List menu

Note: Use this only when directed by your next level of support.

Table 111 on page 141 shows the **CE FSC Trap List** menu items. This menu allows the CE to select a (normal) FSC to be removed from a list of (normal) FSC traps.

<i>Table 111: CE FSC Trap List menu</i>	
Function	Next menu
Cancel	“CE Microcode Traps menu” on page 140
Note:	
1. Supplemental Message Line 1: Trap set, Trap remove, or Select FSC	
2. Supplemental Message Line 2: <none>	

Cancel

Causes the [“CE Microcode Traps menu” on page 140](#) to display.

CE Read Tape menu

Notes:

- Use this only when directed by your next level of support.
- A tape cartridge must be loaded to run this function.

Table 112 on page 142 shows the **CE Read Tape** menu items. This menu allows the CE to select portions of the tape to be displayed on the service panel.

<i>Table 112: CE Read Tape menu</i>	
Function	Next menu
Cancel	“CE Utilities menu” on page 138
Show SARS VOLSER	-
Process Loaded Tape	“CE Process Tape menu” on page 142
Unload Drive	-

Cancel

Causes the [“CE Utilities menu” on page 138](#) to display.

Show SARS VOLSER

Displays SARS volume serial number (VOLSER).

Process Loaded Tape

Allows CE to move and read tape.

Unload Drive

Allows the CE to unload the cartridge from the drive.

CE Process Tape menu

Note: Use this only when directed by your next level of support.

Table 113 on page 142 shows the **CE Process Tape** menu items. This menu allows the CE to select portions of the tape to be displayed on the service panel.

<i>Table 113: CE Process Tape menu</i>	
Function	Next menu
Cancel	“CE Utilities menu” on page 138
Space...	“Space menu” on page 143
Locate...	CE Locate menu (not shown)
Rewind...	-
Read Block...	“Read Block menu” on page 143
Next Block ID...	“CE Block ID menu” on page 144

Cancel

Causes the [“CE Utilities menu” on page 138](#) to display.

Space...

Allows CE to move to different parts of tape.

Locate...

Allows the CE to locate to any block on the tape.

Rewind...

Allows CE to rewind tape.

Read Block...

Allows the CE to read data or header information from tape.

Next Block ID...

Displays the next block ID on tape.

Space menu

Note: Use this only when directed by your next level of support.

Table 114 on page 143 shows the **Space** menu items. This menu allows the CE to select portions of the tape to be displayed on the service panel.

<i>Table 114: Space menu</i>	
Function	Next menu
Cancel	“CE Utilities menu” on page 138
Space FRWD BLK...	Number of blocks
Space BKWD BLK...	Number of blocks
Space FRWD File...	Number of files
Space BKWD File...	Number of files
Space EOD	-

Cancel

Causes the [“CE Utilities menu” on page 138](#) to display.

Space FRWD BLK...

Allows CE to space forward on tape the number of blocks specified.

Space BKWD BLK...

Allows CE to space backward on tape the number of blocks specified.

Space FRWD File...

Allows CE to space forward on tape the number of files specified.

Space BKWD File...

Allows CE to space backward on tape the number of files specified.

Space EOD

Allows CE to space to the end of data.

Read Block menu

Note: Use this only when directed by your next level of support.

Table 115 on page 143 shows the **Read Block** menu items. This menu allows the CE to run a read block command.

<i>Table 115: Read Block menu</i>	
Function	Next menu
Read Blk Data	-
Read Blk HDR	-

Read BLK Data

Displays the first 80 characters of blocks data. At bottom of menu, you can go to next 80 character and up to 16 K.

Read BLK HDR

Displays the first 80 characters of blocks header. By scrolling down, you can display the next 16 characters.

CE Block ID menu

Note: Use this only when directed by your next level of support.

Table 116 on page 144 shows the **CE (Next) Block ID** menu items. This menu allows the CE to show the next block ID.

Function	Next menu
Cancel	“CE Process Tape menu” on page 142
Block ID :xxxxxxx	-

Cancel

Causes the [“CE Process Tape menu” on page 142](#) to display.

Block ID

Displays the ID of the next block.

Enter Password menu

Note: Use this only when directed by your next level of support.

Table 117 on page 144 shows the **Enter Password** menu input areas.

This menu is displayed when you choose the **Engr Use Only**, **Special Mode**, or **OEM Use Only** menu.

Function	Next menu
Cancel	Previous menu
A...	-
B...	-
C...	-
Done...	<ul style="list-style-type: none">• “CE Engr Use Only menu” on page 145• “CE Special Modes menu” on page 147• “CE OEM Use Only menu” on page 147
Note: <ol style="list-style-type: none">1. Supplemental Message Line 1: Password:2. Supplemental Message Line 2: <password>	

Cancel

Causes the previous menu to display (see [Figure 39 on page 91](#)).

<character>

Provides an input area for the current password character that you must enter in each field. Use the **Down Arrow** to enter each field and use **Enter** to advance through the available characters in each field. After the last letter is entered, press the **Down Arrow**, and select **Done...** The [“CE Engr Use Only menu” on page 145](#), the [“CE Special Modes menu” on page 147](#), or the [“CE OEM Use Only menu” on](#)

page 147 displays, depending on which path you used to access this menu. If the password is not correct, the previous menu displays.

The message area indicates that a password is being entered. Every character that you enter in the password field displays in the message area.

CE Engr Use Only menu

Note: Use this only when directed by your next level of support.

Table 118 on page 145 shows the **CE Engr Use Only** menu items. This menu allows Engineering to access the menu items, after a password is entered.

<i>Table 118: CE Engr Use Only menu</i>	
Function	Next menu
Cancel	“CE Utilities menu” on page 138
H SARS Config...	“CE H SARS Config menu” on page 146
V SARS Config...	“CE V SARS Config menu” on page 146
Special Modes...	“CE Special Modes menu” on page 147
Show Memory	“CE Select Address menu” on page 148 , then “Display Memory menu” on page 149
Edit Memory	“CE Select Address menu” on page 148 , then “CE Display/Alter menu” on page 150
VPD Options...	“VPD Options menu” on page 128
Allow Alter PVPD	-
Loop Diags	“CE Loop Diag menu” on page 111
<p>Note:</p> <ol style="list-style-type: none"> Supplemental Message Line 1: Caution: Supplemental Message Line 2: data might be lost 	

Cancel

Causes the [“CE Utilities menu” on page 138](#) to display.

H SARS Config...

Allows Engineering to display and change the HSARS configuration.

V SARS Config...

Allows Engineering to display and change the VSARS configuration.

Special Modes...

Password required. Allows Engineering to enter password-protected functions.

Show Memory

Allows Engineering to read any address in nonvolatile storage and in control store DRAM

Edit Memory

Allows Engineering to read and write any address in nonvolatile storage and in control store DRAM.



Attention: The message area warns that damage can occur to the machine. The machine can be configured improperly and made inoperable with this option.

VPD Options...

This menu provides the same function as described in “CE Config/Install menu” on page 118, but with the addition of the **Clear All BVPD** function. It is a Manufacturing-only function that is used to reset all BVPD information.

Allow Alter PVPD

Conditions the microcode to allow access and altering of the privileged vital product data.

Loop Diags

Allows the CE to run read/write, read/write (short), compactor diag, or compliance tests.

CE H SARS Config menu

Notes:

- Use this only when directed by your next level of support.
- A password is required to gain access to this menu item.

Table 119 on page 146 shows the **HSARS Configuration** menu items. This menu allows CEs and engineering staff to display the **HSARS Configuration**.

The possible HSARS config options are displayed. The current selection displays in a lighter, dotted font, which indicates that it is active. Selecting another option lightens that option (indicating that it is now active) and darken the originally active option. The current config selection also is shown on the right side of the service panel.

<i>Table 119: HSARS Config menu</i>	
Function	Next menu
Cancel	“CE Engr Use Only menu” on page 145
Default HSARS	-
Disable HSARS	-

Cancel

Causes the “CE Engr Use Only menu” on page 145 to display.

Default HSARS

Enables HSARS. Default is **Enabled**.

Disable HSARS

Causes the HSARS function to be disabled.

CE V SARS Config menu

Notes:

- Use this only when directed by your next level of support.
- A password is required to gain access to this menu item.

Table 120 on page 147 shows the **VSARS Configuration** menu items. This menu allows Engineering to display and configure the VSARS area after the password is entered.

The possible **VSARS Config** options are displayed. The current selection displays in a lighter, dotted font, which indicates that it is active. Selecting another option lightens that option (indicating that it is now active) and darken the originally active option. The current config selection also is shown on the right side of the service panel.

<i>Table 120: VSARS Config menu</i>	
Function	Next menu
Cancel	“CE Engr Use Only menu” on page 145
Default VSARS	-
Disable VSARS	-

Cancel

Causes the [“CE Engr Use Only menu” on page 145](#) to display.

Default VSARS

Enables VSARS. Default is **Enabled**.

Disable VSARS

Causes the VSARS function to be disabled.

CE Special Modes menu

Note: Use this only when directed by your next level of support.

Table 121 on page 147 shows the **Special Modes** menu items. This menu allows Engineering to access password-protected functions. Some of these menu items and their function might not be available on your drive.

<i>Table 121: Special Modes menu</i>	
Function	Next menu
Cancel	“CE Engr Use Only menu” on page 145
Media Mode ON/OFF	-
Normal /Quick Clean Cycle	-
Allow /Prev Export Tape	-
Tape Wipe Enabled/ Disabled	-

Cancel

Causes the [“CE Engr Use Only menu” on page 145](#) to display.

Media Mode ON/OFF

Allows Engineering to set Media Mode Off or On. When this option is set **On**, the drive is placed in a special mode to test the media. Any media that are written in this mode can be read only by a device in media mode. If the device that is reading the media is not in media mode, the cartridge displays as a scratch. The default is **Off**.

Normal/Quick Clean Cycle

Allows Engineering to set the cleaning cycle to normal or quick. The default is **Normal**.

Allow/Prev Export Tape

Allows Engineering to allow or prevent the export of a tape cartridge. The default is **Allow**.

Tape Wipe Enabled/Disabled

Allows Engineering to enable or disable the tape wipe function. The default is **Disabled**.

CE OEM Use Only menu

Note: Use this only when directed by your next level of support.

Table 122 on page 148 shows the **OEM Use Only** menu items. This menu allows OEM support personnel to access certain password-protected functions.

<i>Table 122: OEM Use Only menu</i>	
Function	Next menu
Cancel	“CE Utilities menu” on page 138
Manufacturer	CE VPD Data menu (not shown)
Drive Type	VPD Field Offset menu (not shown)
Drive Model Num	CE VPD Data menu (not shown)
Save Changes	-

Cancel

Causes the [“CE Utilities menu” on page 138](#) to display.

Manufacturer

Allows OEM support personnel to customize the **Manufacturer** field in the **VPD Data** menu.

Drive Type

Allows OEM support personnel to customize the **Drive Type** field, with the **VPD Field Offset** menu and the **VPD Data** menu.

Drive Model Num

Allows OEM support personnel to customize the **Drive Model Number** field in the **VPD Data** menu.

Save Changes

Stores the changes into nonvolatile storage (NVS).

Show Statistics menu (CE Offline Mode)

Table 123 on page 148 shows part of the **Statistics** menu items. This menu displays in both **CE Offline Mode** and **CE Online Mode**.

<i>Table 123: Show Statistics menu (CE Offline Mode)</i>	
Function	Next menu
Cancel	“CE Utilities menu” on page 138
Show Drive Stats...	“DRV Statistics menu (CE Online Mode)” on page 153
Show Tape Stats...	“Tape Statistics menu (CE Online Mode)” on page 153
Save	-

Cancel

Causes the [“CE Utilities menu” on page 138](#) to display.

Show Drive Stats...

Allows CE to view statistics for drive mounts, megabytes written, megabytes read, and power-on hours.

Show Tape Stats...

Allows CE to view statistics for tape mounts, megabytes written, and megabytes read.

Save

Causes the statistics to be saved in non-volatile storage, and returns to the **Show Statistics** menu.

CE Select Address menu

Note: Use this only when directed by your next level of support.

Table 124 on page 149 shows the **CE Select Address** menu items. This menu allows the CE to select an address in control store. The byte is read from the selected address. The message line indicates that the **Control Store** option was selected on the previous screen.

<i>Table 124: CE Select Address menu</i>	
Function	Next menu
Cancel	“CE Utilities menu” on page 138 or “CE Engr Use Only menu” on page 145
CS Adr (8 characters that are displayed vertically)	-
Continue...	“Display Memory menu” on page 149 or “CE Display/Alter menu” on page 150
Note:	
1. Supplemental Message Line 1: Control store	
2. Supplemental Message Line 2: <none>	

Cancel

Causes the [“CE Utilities menu” on page 138](#) or [“CE Engr Use Only menu” on page 145](#) to display.

<CS Adr>

Defines the address to be chosen. To change the value of the nibble, select the nibble, which causes a new menu to display where you can select '0 - F'.

Continue...

Uses the address that is displayed and goes to [“Display Memory menu” on page 149](#) or [“CE Display/Alter menu” on page 150](#).

Display Memory menu

Note: Use this only when directed by your next level of support.

Table 125 on page 149 shows the **Display Memory** menu items. This menu allows the CE to display the byte in the specified address. The message line indicates the current control store address and value.

<i>Table 125: Display Memory menu</i>	
Function	Next menu
Cancel	“CE Utilities menu” on page 138
Scroll Up	-
<CS ADR+0> <CS Data>	-
<CS ADR+4> <CS Data>	-
<CS ADR+8> <CS Data>	-
<CS ADR+...0> <CS Data>	-
Scroll Down	-
Note:	
1. Supplemental Message Line 1: SC Adrs: <CS Adrs>	
2. Supplemental Message Line 2: SC Value: <CS Data>	

Cancel

Causes the “[CE Utilities menu](#)” on page 138 to display.

Scroll Up

Causes the previous addresses to display (scrolling up through memory).

<CS Adr> <data>

Shows data that is contained in word, starting at the specified address; causes the **CE Select Address** menu to display.

Scroll Down

Causes the next address to display (scrolling down through memory).

CE Display/Alter menu

Note: Use this only when directed by your next level of support.

Table 126 on page 150 shows the **CE Display/Alter** menu items. This menu allows a Product Engineer to display the byte in the specified address and to update the data in that address. The message lines indicate the control store address that is selected and the value at that address.

<i>Table 126: Display/Alter menu</i>	
Function	Next menu
Cancel	“ CE Engr Use Only menu ” on page 145
<CS Address><CS Data>	-
<CS Hi Nibble>	-
<CS Low Nibble>	-
Save and Return	“ CE Engr Use Only menu ” on page 145
Note:	
1. Supplemental Message Line 1: CS Addr: <CS Addr>	
2. Supplemental Message Line 2: CS Val: <CS Data>	

Cancel

Causes the “[CE Engr Use Only menu](#)” on page 145 to display. Any modifications to the byte are canceled.

<address> <data>

Shows the data that is contained in the selected 4-byte word. This display cannot be selected, and is for information purposes only.

<CS Nibble>

Shows the current nibble (hex number) in the selected byte. To change the value of the nibble, select the nibble, which causes a menu to display from which you can select 0 through F.

Save and Return

Saves the updated byte in the address and returns to the “[CE Engr Use Only menu](#)” on page 145.

CE DRV Features menu

Table 127 on page 151 shows the **Drive Features** menu items. This menu specifies the configuration for the drive you are installing.

Note: A drive model number such as 'EH7' displays at the beginning of the option in the display. Various levels of drive microcode might produce other model numbers.

<i>Table 127: CE DRV Features menu</i>	
Function	Next menu
Cancel	“CE Drv Options menu” on page 119
(Drive Model Number) Rack Mount	“CE Save Data menu (Root, Port, and Node names)” on page 132

Cancel

Causes the [“CE Drv Options menu” on page 119](#) to display.

(Drive Model Number) Rack Mount

CE can select this option if 3592 drive is installed in a rack or if it is a standalone drive.

CE Saved FSC Trap List menu

Note: Use this only when directed by your next level of support.

[Table 128 on page 151](#) shows the **CE Saved FSC Trap List** menu items. This menu allows the CE to select a saved FSC to be removed from a list of saved FSC traps.

<i>Table 128: Saved FSC Trap List menu (CE Offline Mode)</i>	
Function	Next menu
Cancel	“CE Saved Traps menu” on page 140
Note:	
1. Supplemental Message Line 1: Trap set, Trap remove, or Select FSC	
2. Supplemental Message Line 2: <none>	

Cancel

Causes the [“CE Saved Traps menu” on page 140](#) to display.

Note: Only 3 saved traps can be active at a time.

CE Online Mode menus


CE Online Mode menu allows the CE and customer to use the drive concurrently. Only limited operations are allowed. Some panels have partial displays, such as display sensors. The CE operations might interfere with customer operation.

To access the following menus, press **Change Mode** , then select **CE Online Mode**.



Attention: Any accidental operation of **Reset** can severely affect customer operation.

CE Online Options menu

The following menus are accessed by pressing **Change Mode** .

[Table 129 on page 151](#) shows the menu items.

<i>Table 129: CE Online Options menu (CE Online Mode)</i>	
Function	Next menu
Logs...	“CE Logs menu (CE Online Mode)” on page 152

<i>Table 129: CE Online Options menu (CE Online Mode) (continued)</i>	
Function	Next menu
Disp Serial No...	“CE DRV Ser No menu” on page 152
Disp Sensors...	“CE Disp Sensors menu (CE Online Mode)” on page 154
Show Statistics...	“Show Statistics menu (CE Online Mode)” on page 154

Logs...

Allows the CE to view the error logs.

Disp Serial No...

Allows the CE to display the serial number in decimal.

Disp Sensors...

Allows the CE to display the state of sensors.

Show Statistics...

Allows the CE to display tape and drive statistics and store the status of the device in nonvolatile storage.

CE Logs menu (CE Online Mode)

[Table 130 on page 152](#) shows data from the **CE Logs** menu items.

<i>Table 130: CE Logs menu (CE Online Mode)</i>	
Function	Next menu
Cancel	“CE Online Options menu” on page 151
Error Log...	“CE Error Log menu” on page 134
FID FE Log...	“CE FID FE Log menu” on page 135
FID FF Log...	“CE FID FF Log menu” on page 136
Temp Error Log...	“CE Temp Error Log menu” on page 137

Cancel

Causes the [“CE Online Options menu” on page 151](#) to display.

Error Log...

Allows the CE to view the **Error Log**.

FID FE Log...

Allows the CE to view the **FID FE** log.

FID FF Log...

Allows the CE to view the **FID FF** log.

Temp Error Log...

Allows the CE to view the **Temp Error** log.

CE DRV Ser No menu

[Table 131 on page 153](#) depicts the **CE Drive Serial Number** menu information. This menu displays in both **CE Online Mode** and **CE Offline Mode**.

<i>Table 131: CE DRV Ser No menu (CE Online Mode)</i>	
Display	Next menu
Cancel	“CE Online Options menu” on page 151 or “CE DRV Ser No menu (CE Offline Mode)” on page 121
000000010011 (for example)	
FFF000005002 (serial number sample)	

Cancel

Causes the **CE Online Options** menu to return. Menu has the 12-position decimal **Drive Serial Number** displayed.

Tape Statistics menu (CE Online Mode)

Table 132 on page 153 is an example of the **Tape Statistics** menu items. This menu allows the CE to display the tape statistical data for the most recent tape volume mounted.

<i>Table 132: Tape Statistics menu (CE Online Mode)</i>	
Function	Next menu
Cancel	“Show Statistics menu (CE Online Mode)” on page 154
Tape Mounts 0000000031	“Show Statistics menu (CE Online Mode)” on page 154
Tape MB Writn 0000000253	“Show Statistics menu (CE Online Mode)” on page 154
Tape MB Read 0000000347	“Show Statistics menu (CE Online Mode)” on page 154

Cancel

Causes the [“Show Statistics menu \(CE Online Mode\)” on page 154](#) to display.

Tape Mounts

Displays the total number of times a tape volume was mounted in a drive.

Tape MB Writn

Displays the total number of megabytes written on the cartridge.

Tape MB Read

Displays the total number of megabytes read on the cartridge.

DRV Statistics menu (CE Online Mode)

Table 133 on page 153 is an example of the **DRV Statistics** menu items. This menu allows the CE to display the lifetime drive statistical data. This menu appears in both **CE Online Mode** and **CE Offline Mode**.

<i>Table 133: Drive Statistics menu (CE Online Mode)</i>	
Function	Next menu
Cancel	“Show Statistics menu (CE Online Mode)” on page 154

<i>Table 133: Drive Statistics menu (CE Online Mode) (continued)</i>	
Function	Next menu
Drive Mounts 0000000025	“Show Statistics menu (CE Online Mode)” on page 154
DRV MB Writtn 0000000185 >	“Show Statistics menu (CE Online Mode)” on page 154
DRV MB Read 0000000325	“Show Statistics menu (CE Online Mode)” on page 154
Power On Hours 0000005250	“Show Statistics menu (CE Online Mode)” on page 154
Note:	
1. Supplemental Message Line 1: < Drive status – (READY and at LOAD POINT) >	
2. Supplemental Message Line 2: <none>	

Cancel

Causes the [“Show Statistics menu \(CE Online Mode\)” on page 154](#) to display.

Drive Mounts

Displays the total number of times a cartridge was mounted in the drive.

DRV MB Writtn

Displays the total number of megabytes written by the drive.

DRV MB Read

Displays the total number of megabytes read by the drive.

Power On Hours

Displays the total number of hours the device was powered ON.

CE Disp Sensors menu (CE Online Mode)

Table 134 on page 154 shows the **CE Disp Sensors** menu items. This menu allows the CE to view the state of a drive sensor, and to change that state dynamically. A delay of approximately 1 second is required between sensor state changes.

<i>Table 134: CE Disp Sensors menu</i>	
Function	Next menu
Cancel	“CE Online Options menu” on page 151
DO:1	DO - Door Open sensor across the right side of bezel "throat" (when tape cartridge is loaded) 0 = Obstructed path (AJAR) 1 = Unobstructed path

Show Statistics menu (CE Online Mode)

Table 135 on page 155 shows data from the **Show Statistics** menu items. This menu appears in both **CE Offline Mode** and **CE Online Mode**.

Table 135: **CE Show Statistics** menu (**CE Online Mode**)

Function	Next menu
Cancel	“CE Online Options menu” on page 151
Show Drive Stats...	“DRV Statistics menu (CE Online Mode)” on page 153
Show Tape Stats...	“Tape Statistics menu (CE Online Mode)” on page 153
Save	Causes the statistics to be saved in nonvolatile storage and returns to “Show Statistics menu (CE Online Mode)” on page 154

Cancel

Cancels the operation and returns to the previous menu.

Show Drive Stats...

Causes [“DRV Statistics menu \(CE Online Mode\)” on page 153](#) to display.

Show Tape Stats...

Causes [“Tape Statistics menu \(CE Online Mode\)” on page 153](#) to display.

Save

Causes the statistics to be saved in nonvolatile storage and returns to **Show Statistics** menu.

Chapter 5. Safety and Inspection

General instructions

Use this checklist to ensure that a machine not covered by an IBM Maintenance Agreement (that is, a status 3 machine) has the necessary safety items that are installed and no other changes were made that makes it unsafe or inoperable. Each machine, as it was designed and assembled, contains needed safety items that are installed to protect the owners, operators, and service personnel from injury.

Note: This equipment is designed for connection to IT (impedance transformer) power subsystems.

Materials needed

The following items are needed or are useful during the inspection -

- Copies of safety service memorandums (SMs) and engineering change announcements (ECAs) for this machine type
- Machine history
- *Electrical Safety for IBM Customer Engineers, S229-8124*

Education

Service personnel must be trained on the general maintenance agreement qualification (MAQ), tailored-maintenance agreement qualification, and changed machine safety inspection procedures as part of the electrical safety course.

Safety

The following notices are converted into selected languages, beginning on page [“Sécurité”](#) on page 166.

The general caution symbol  identifies conditions where caution must be used.

The electrical caution symbol  identifies electrical hazards where extreme caution must be used.

Complete this inspection before the normal inspection for a maintenance agreement. Suspect that the 3592 is unsafe until you verify that it is safe. If any unsafe conditions are present, decide how serious the hazard is and whether you can continue without first correcting the problem. Possible safety hazards are -

Electrical

An electrically charged frame can cause serious or lethal electrical shock.

Mechanical

Hazards, such as a safety cover that is missing, are potentially harmful to people.

Chemical

Do not use solvents, cleaners, or other chemicals that are not approved for use on this product.

Any of the problems that are listed here must be repaired before you service or use the 3592.



DANGER:

When you are working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- If IBM supplied a power cord, connect power to this unit only with the IBM-provided power cord. Do not use the IBM-provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that is attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Do not attempt to turn on power to the machine until all possible unsafe conditions are corrected.
- Assume that an electrical safety hazard is present. Perform all continuity, grounding, and power checks that are specified during the subsystem installation procedures to ensure that the machine meets safety requirements.
- Do not continue with the inspection if any unsafe conditions are present.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when you are installing, moving, or opening covers on this product or attached devices.

To disconnect:

1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices.

To connect:

1. Turn off everything (unless instructed otherwise).
 2. Attach all cables to the devices.
 3. Attach the signal cables to the connectors.
 4. Attach the power cables to the outlets.
- Sharp edges, corners, and joints might be present in and around the system. Use care when you are handling equipment to avoid cuts, scrapes, and pinching. (D005)



DANGER: Multiple power cords. The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords. (L003)

Safety inspection procedure

Before the safety procedures are completed, ensure that the existing room and electrical conditions are safe.

Read all safety information on the safety label before you start. See “Labels” on page 158 for location. Verify adequate grounding, as depicted in [Figure 52 on page 158](#).

3592 drive AC grounding inspection

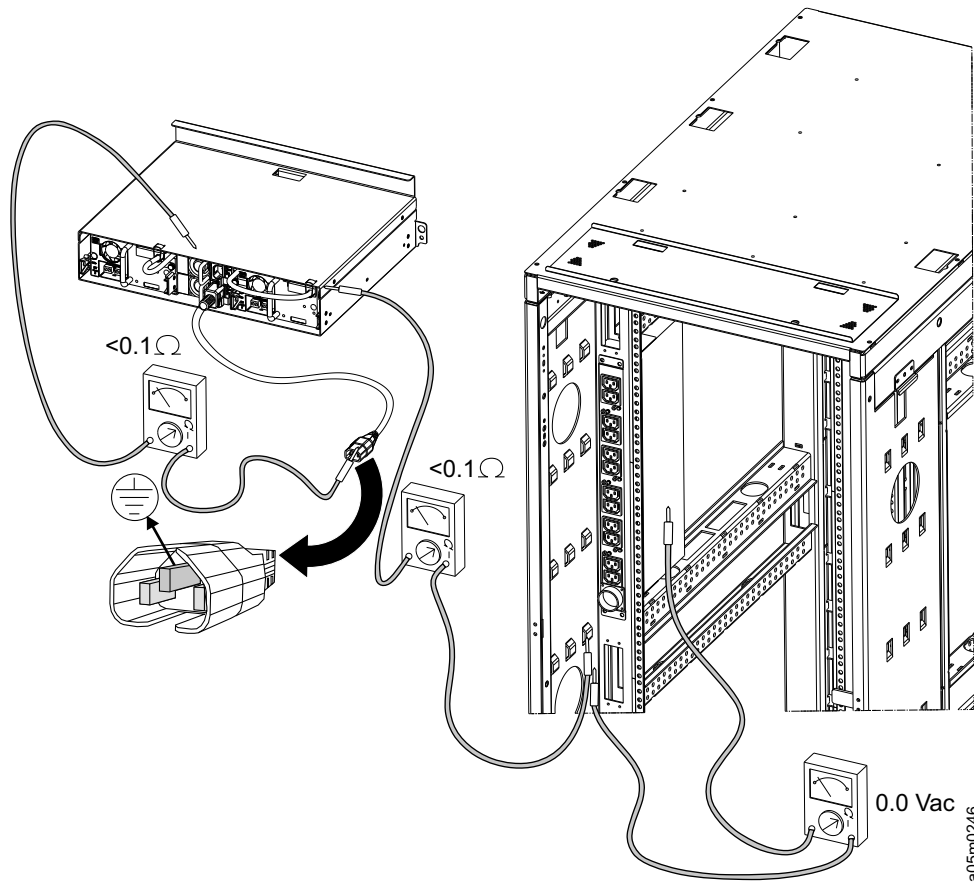
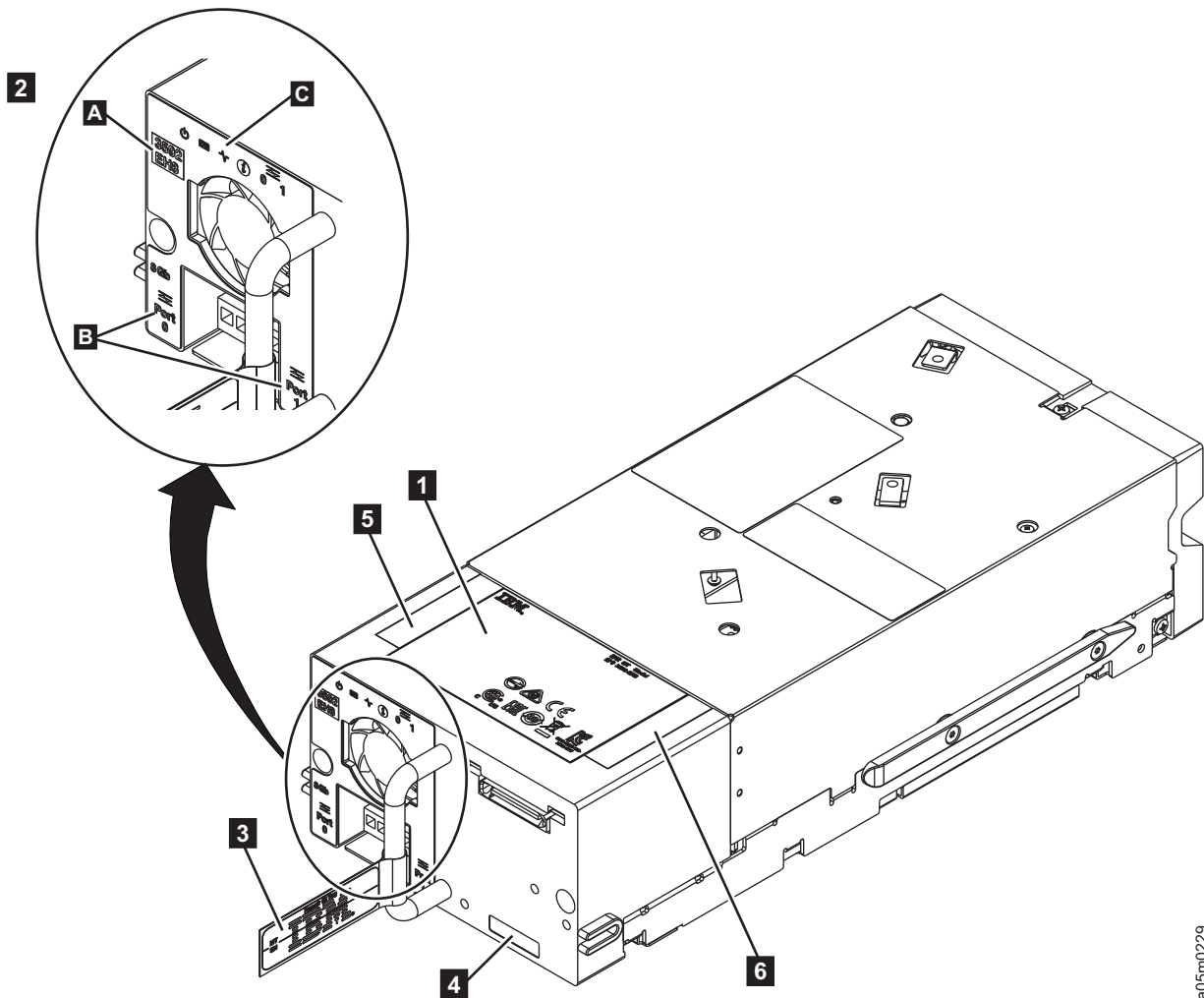


Figure 52: Grounding inspection

Labels

Ensure that the labels listed in Table 136 on page 159 and Table 137 on page 160 are installed as shown in Figure 53 on page 159 and Table 137 on page 160. Replace any label that is missing or unreadable. Refer to Chapter 9, “Parts catalog information,” on page 259 for the latest part number.



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Figure 53: Label locations. Use with Table 136 on page 159.

Table 136: Label names and locations. Use with Figure 53 on page 159.		
Item number	Label name	Additional information
1	Safety label	
2	Label set <ul style="list-style-type: none"> • A Model • B Ports • C LED status 	Contains three items
3	RID (Repair IDentification) tag (FRU)	Not present if 4 is installed
4	Serial number and machine type label	Not present on FRU, or if 3 is installed
5	Serial number, machine type, and EC label	
6	Part number, machine type, and bar code label	

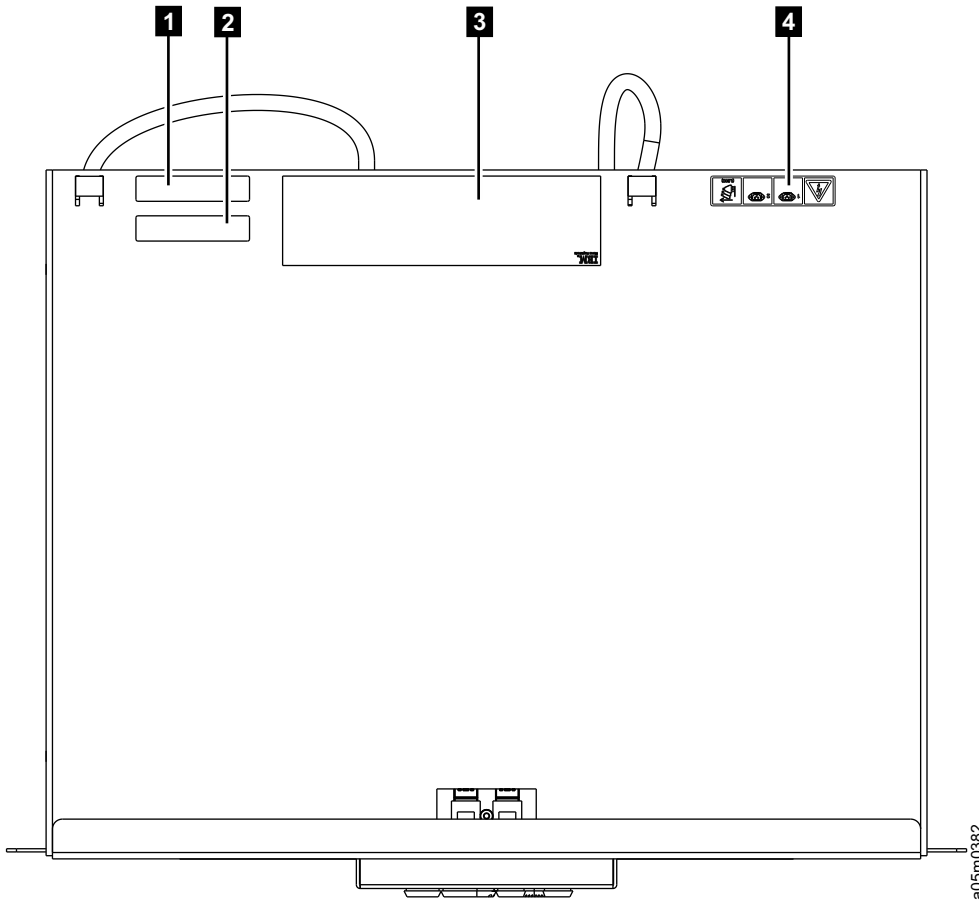


Figure 54: Enclosure label locations (top of enclosure shown). Use with [Table 137](#) on page 160.

Table 137: Enclosure label names and locations. Use with Figure 54 on page 160.		
Item number	Label name	Additional information
1	Manufacturing product label	This label shows the <ul style="list-style-type: none"> • Part number and serial number • EC number • Drive type • Bar code label
2	Date of manufacture label	
3	Safety label	
4	Dual line cord label	

If the manufacturing product label is missing, contact your next level of support.

Completion report

- Safety inspection for machine type 3592
- General safety inspection
- Maintenance agreement qualification (MAQ)

After you complete the inspection, make a photocopy of this form. Sign, date, and complete the copy, then store it with the MAQ form.

NAME ----- DATE ----- SERIAL NUMBER -----

SAFETY HAZARDS

LIST ALL SAFETY HAZARDS. IF NONE, SAY NONE.

1. -----
2. -----
3. -----
4. -----
5. -----
6. -----
7. -----
8. -----
9. -----
10. -----

Complete this report to finalize the safety inspection.

Completion report (additional copy)

- Safety inspection for machine type 3592
- General safety inspection
- Maintenance agreement qualification (MAQ)

After you complete the inspection, make a photocopy of this form. Sign, date, and complete the copy, then store it with the MAQ form.

NAME ----- DATE ----- SERIAL NUMBER -----

SAFETY HAZARDS

LIST ALL SAFETY HAZARDS. IF NONE, SAY NONE.

1. -----
2. -----
3. -----
4. -----
5. -----
6. -----
7. -----
8. -----
9. -----
10. -----

Complete this report to finalize the safety inspection.

Completion report (additional copy)

- Safety inspection for machine type 3592
- General safety inspection
- Maintenance agreement qualification (MAQ)

After you complete the inspection, make a photocopy of this form. Sign, date, and complete the copy, then store it with the MAQ form.

NAME _____ DATE _____ SERIAL NUMBER _____

SAFETY HAZARDS

LIST ALL SAFETY HAZARDS. IF NONE, SAY NONE.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Complete this report to finalize the safety inspection.

Completion report (additional copy)

- Safety inspection for machine type 3592
- General safety inspection
- Maintenance agreement qualification (MAQ)

After you complete the inspection, make a photocopy of this form. Sign, date, and complete the copy, then store it with the MAQ form.

NAME ----- DATE ----- SERIAL NUMBER -----

SAFETY HAZARDS

LIST ALL SAFETY HAZARDS. IF NONE, SAY NONE.

1. -----
2. -----
3. -----
4. -----
5. -----
6. -----
7. -----
8. -----
9. -----
10. -----

Complete this report to finalize the safety inspection.

Completion report (additional copy)

- Safety inspection for machine type 3592
- General safety inspection
- Maintenance agreement qualification (MAQ)

After you complete the inspection, make a photocopy of this form. Sign, date, and complete the copy, then store it with the MAQ form.

NAME _____ DATE _____ SERIAL NUMBER _____


SAFETY HAZARDS


LIST ALL SAFETY HAZARDS. IF NONE, SAY NONE.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Complete this report to finalize the safety inspection.

Sécurité

Le symbole attention  indique qu'une attention particulière est nécessaire.

Le symbole risque électrique  identifie des risques liés au courant électrique ; il faut en ce cas faire preuve d'une extrême prudence.

Ces procédures doivent être effectuées avant l'inspection normale pour un contrat de maintenance. **Le sous-système de bande magnétique IBM 3592 doit être considéré comme potentiellement dangereux tant qu'il n'a pas été vérifié.** Si vous détectez la moindre condition d'insécurité, vous devez évaluer sa gravité et déterminer si vous pouvez continuer ou non sans avoir d'abord corrigé le problème. Les risques peuvent être de différentes natures :

Risques électriques

Un châssis chargé en électricité peut provoquer un choc électrique grave ou mortel.

Risques mécaniques

L'absence d'un carter de sécurité, par exemple, peut être à l'origine de blessures.

Risques chimiques

Utilisez uniquement les produits de nettoyage et autres produits chimiques recommandés pour ce matériel.


Assurez-vous que toutes ces conditions de sécurité sont remplies avant d'utiliser le sous-système de bande magnétique IBM 3592.


Inspection de sécurité

Avant de procéder à l'inspection de sécurité, assurez-vous que la salle ainsi que l'installation électrique remplissent toutes les conditions de sécurité.

Pour plus de détails sur les emplacements des éléments, reportez-vous aux sections "Device Covers" et "Labels". Effectuez les opérations ci-dessous.

Seguridad

El símbolo general de precaución  identifica situaciones en las que debe tener precaución.

El símbolo de precaución eléctrica  identifica situaciones de riesgo eléctrico en las que debe extremar la precaución.

Realice esta inspección antes de la inspección normal para un acuerdo de mantenimiento. **Considere que la 3592 no es segura hasta verificar que lo es.** Si detecta alguna condición poco segura, decida el grado de riesgo existente y si puede continuar sin solucionar primero el problema. Posibles condiciones de riesgo para su seguridad son,

Riesgos eléctricos

Un bastidor cargado eléctricamente puede producir descargas serias o letales.

Riesgos mecánicos

Riesgos, como la falta de la cubierta de seguridad, son potencialmente perjudiciales para la gente.

Riesgos químicos

No use disolventes, artículos de limpieza u otros productos químicos que no hayan sido aprobados para ser usados en este producto.

Cualquier problema de los listados anteriormente debe ser corregido antes de usar la 3592.


Los avisos siguientes se han traducido en varios idiomas.


Procedimiento de inspección de seguridad

Antes de proceder con esta inspección, asegúrese de que las condiciones eléctricas y de carácter general existentes son seguras.

Consulte "Etiquetas" ("Labels") para saber donde se encuentran.

Segurança

O símbolo geral de cuidado  identifica condições nas quais é necessário cuidado.

O símbolo de cuidado elétrico  identifica riscos elétricos onde é necessário cuidado máximo.

Execute esta inspeção antes da inspeção normal para um contrato de manutenção. **Não acredite na segurança do 3592 até certificar-se de que é seguro.** Se houver qualquer condição insegura, verifique a gravidade do risco e se você pode continuar sem antes corrigir o problema. Os riscos de segurança possíveis são:

Elétrico

Uma estrutura carregada eletricamente pode causar choque elétrico sério ou letal.

Mecânico

Riscos, tais como a falta de uma tampa de segurança, são potencialmente prejudiciais para as pessoas.

Químico

Não utilize solventes, produtos de limpeza ou outros produtos químicos não-aprovados para uso neste produto.

Qualquer um dos problemas acima relacionados deve ser resolvido antes de se iniciar a utilização do 3592.

Os seguintes avisos são traduzidos nos idiomas selecionados.

Procedimentos Para Inspeção de Segurança

Antes de realizar os procedimentos de segurança, certifique-se de que o local e as condições elétricas existentes são seguras.

Consulte "Labels" para obter informações sobre localizações.

Chapter 6. Installation

Before installation

Notes:

- The 3592 drive canister (drive) might require certain microcode prerequisites. See [“Appendix D. Minimum microcode requirements”](#) on page 288.
- Consider setting aside and storing the drive canister packaging materials for the future repack of a 3592 drive canister for storage, transportation, or return. See [“Repacking instructions”](#) on page 181.

Ensure that

- Installation planning specifications are met by checking with the branch office or physical planning representative
- A Solutions Assurance Product Review (SAPR) is held for the first 3592 installed at this account
- You gather information from the customer about drive options, Fibre Channel address, and attachment data. See [Table 144](#) on page 206.
- The customer has the correct software levels and correct host PTFs for 3592 attachment. See [“Appendix D. Minimum microcode requirements”](#) on page 288).
- Correct length fibre cables are available for connection to a host, or to a switch
- Because you are field-installing a 3592 drive canister into a rack, ensure that one of the feature codes in [Table 138](#) on page 168 (3592 rack) is installed.

Description	Machine type	Model	Feature code
Rack Mount Kit	3592	EH7, EH8, 55F, 60F	4804
Rack Drive Accessories	3592	EH7, EH8, 55F, 60F	4805
Drive Filler Panel	3592	EH7, EH8, 55F, 60F	4806
Install first drive in Rack Mount Kit	3592	EH7, EH8, 55F, 60F	9806
Install second drive in Rack Mount Kit	3592	EH7, EH8, 55F, 60F	9807
10-meter OM3 fiber Cable (LC)	3592	EH7	AGK1
25-meter OM3 fiber Cable (LC)	3592	EH7	AGK2
80-meter OM3 fiber Cable (LC)	3592	EH7	AGK3
Attached to System z	3592	EH7, EH8, 55F, 60F	9000
Attached to HP-UX System	3592	EH7, EH8, 55F, 60F	9210
Attached to Solaris System	3592	EH7, EH8, 55F, 60F	9211

Table 138: Installation Instruction feature codes and RPQs (continued)

Description	Machine type	Model	Feature code
Attached to Windows System	3592	EH7, EH8, 55F, 60F	9212
Attached to Other Non-IBM	3592	EH7, EH8, 55F, 60F	9213
Attached to Linux System	3592	EH7, EH8, 55F, 60F	9215
Attached to i5/OS or OS/400 System	3592	EH7, EH8, 55F, 60F	9400
Attached to AIX System	3592	EH7, EH8, 55F, 60F	9600

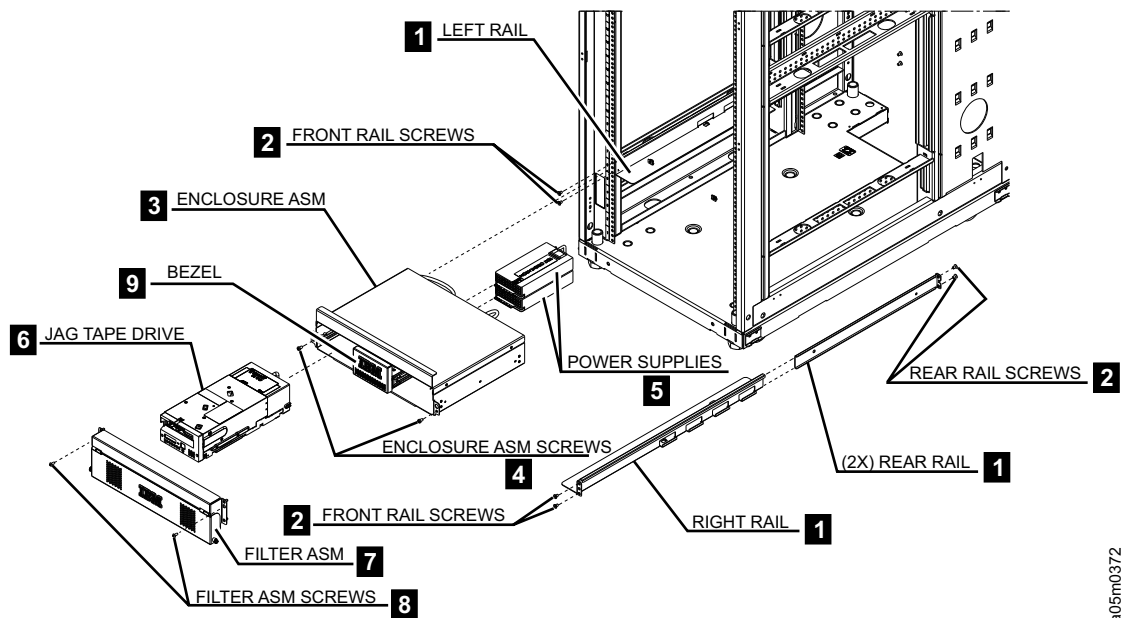
Tools

One set of tools is often shipped with a frame or rack shelf feature code. The tools can be contained in a ship group. See Chapter 9, “Parts catalog information,” on page 259 for part numbers. See “Special tools and customer supplies” on page 35 for information.

- **CE scratch tape** - It is not to be given to the customer for their use. This item, which is occasionally referred to as a diagnostic cartridge, is also available as a FRU. The EH7 and later drives use a JK type cartridge as a CE scratch tape.
- **Cleaning cartridge** - Use to clean the tape path. See “Cleaning cartridge” on page 36.
- **Microcode CD** - Contains the EC level of the microcode that is shipped with the drive canister. The part number changes with each EC release of the microcode.
- **Fibre wrap tools** - Use to test the connection at the drive and the end of the fibre cable. See “Fibre wrap tool” on page 38.
- **Ethernet patch cable for laptop** - Used for all service functions in this configuration.

Installing the Rack Mount Kit

Follow the steps to complete the installation of the Rack Mount Kit. Refer to [Figure 55 on page 170](#).



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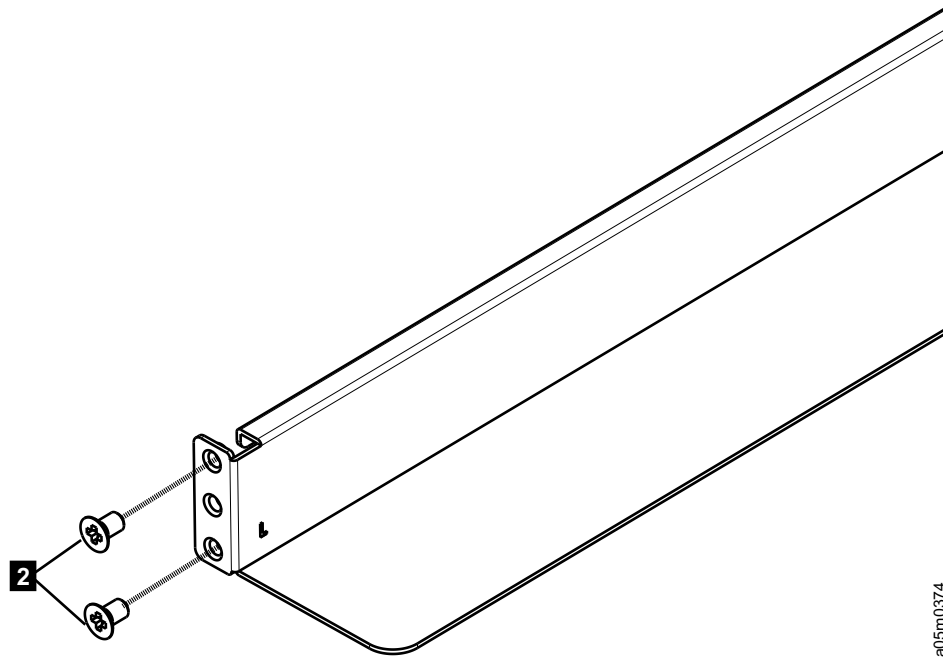
Figure 55: Exploded Rack Mount view

Note: Additional items must be considered for installation planning. A standard 42U rack can hold a maximum of 14 enclosures, but unless necessary, it is best to not install an enclosure in the top or bottom spaces in the rack. It can be difficult for an operator to load/unload cartridges in those positions, and it can also be difficult to read the 8-character message display on the front of the drive.

1. Position the enclosure by allocating 3 EIA units anywhere in the rack.
2. Install left and right rails (1) by using eight M6-10 Flat Head screws (2). Use the top and bottom holes on the front and rear rail mounts.

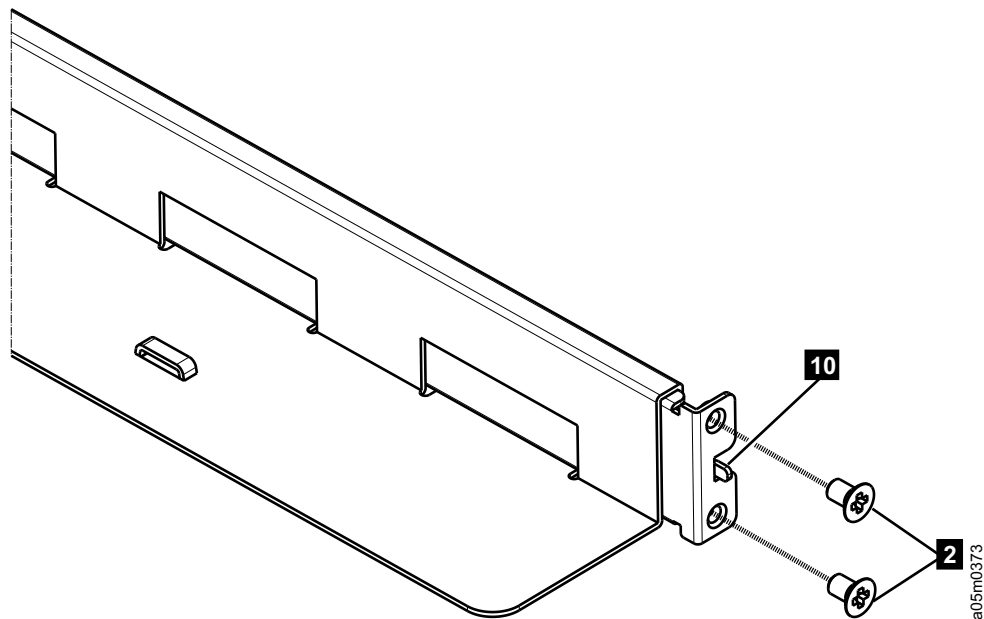
Note: The center hole in the front is used for securing the enclosure after the rails are installed in the frame. See Step 3 and Figure 56 on page 171. The location tab 10 shows the center hole position in the rear. See Figure 57 on page 171.

Note the "L" on the rail in the first graphic, showing that the left rail is being installed.



a05m0374

Figure 56: Installing the rail - front



a05m0373

Figure 57: Installing the rail - rear

3. Set the enclosure (3) on the rails and fasten with two screws (4).
4. Insert power supplies (5) into the enclosure. Ensure that the orange tabs are locked. See [Figure 80 on page 252](#).
5. Insert the drive or drives (6) into the enclosure.
 - If the drives are installed from the front of the enclosure, verify that the rear canister latch is in the locked position. Tighten the thumbscrew if necessary to hold it in place.
 - If the drives are installed from the rear of the enclosure, move the rear canister latch to the vertical position to unlock it. Insert the drive and lock the rear canister latch by turning the latches to a horizontal position.

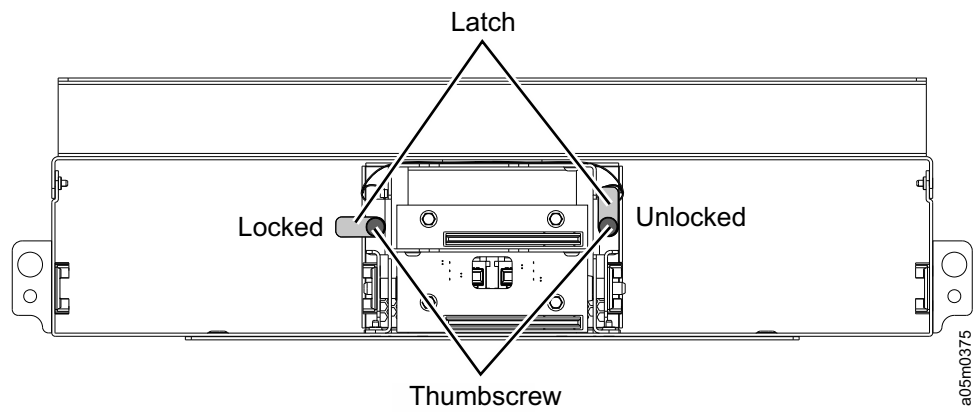


Figure 58: Lock/unlock positions

6. Connect power to power supplies. See [Figure 59 on page 172](#)

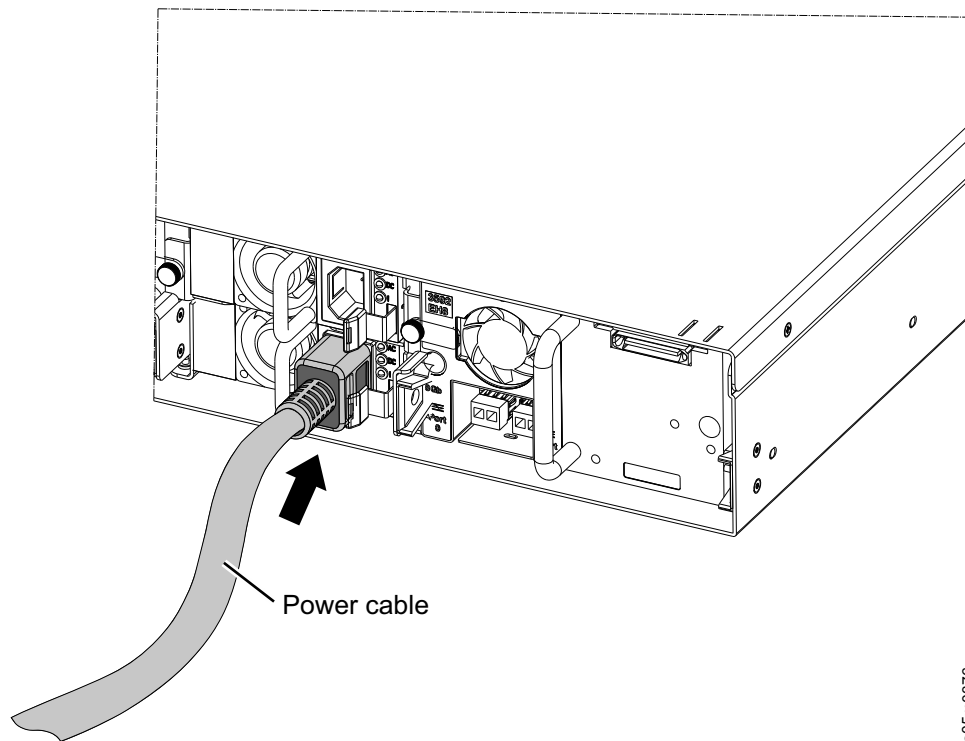


Figure 59: Connecting the power supply

7. Connect drive cable to drives.
8. Secure the drive cable with retention strap. See [Figure 60 on page 173](#).

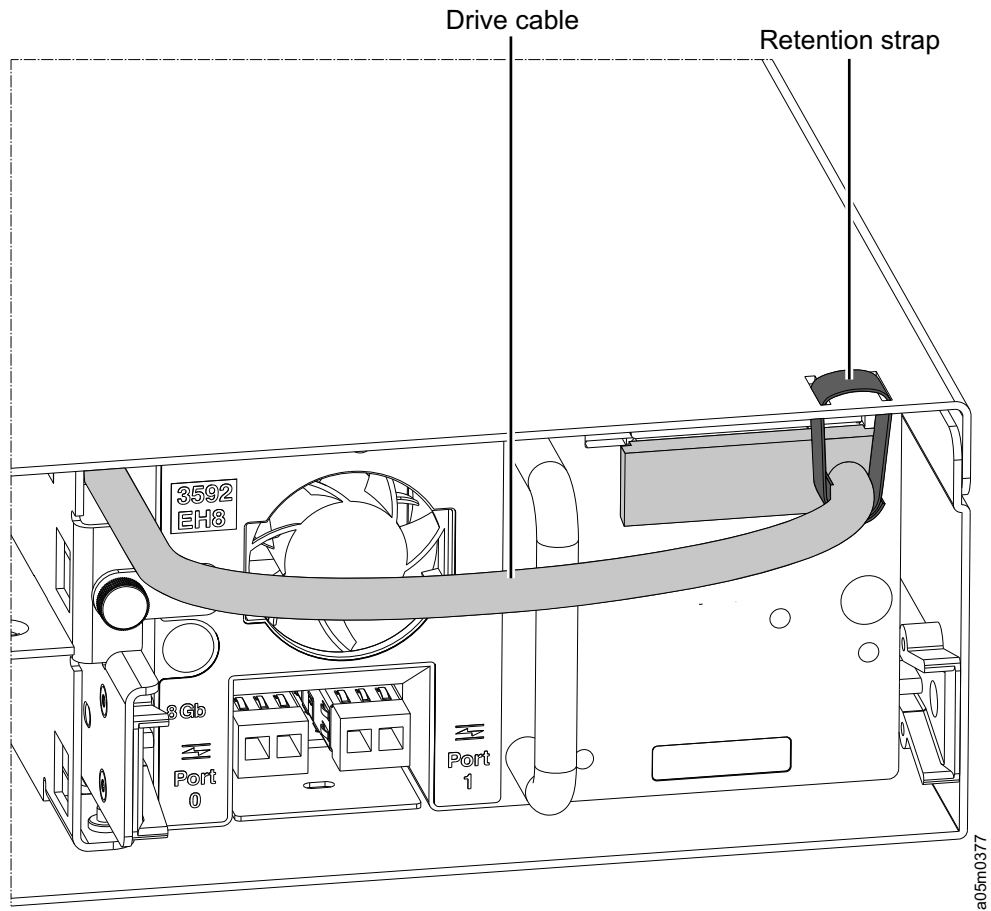


Figure 60: Securing the drive cable with the retention strap

9. Install a drive filler panel, if appropriate. See [Figure 61 on page 173](#)

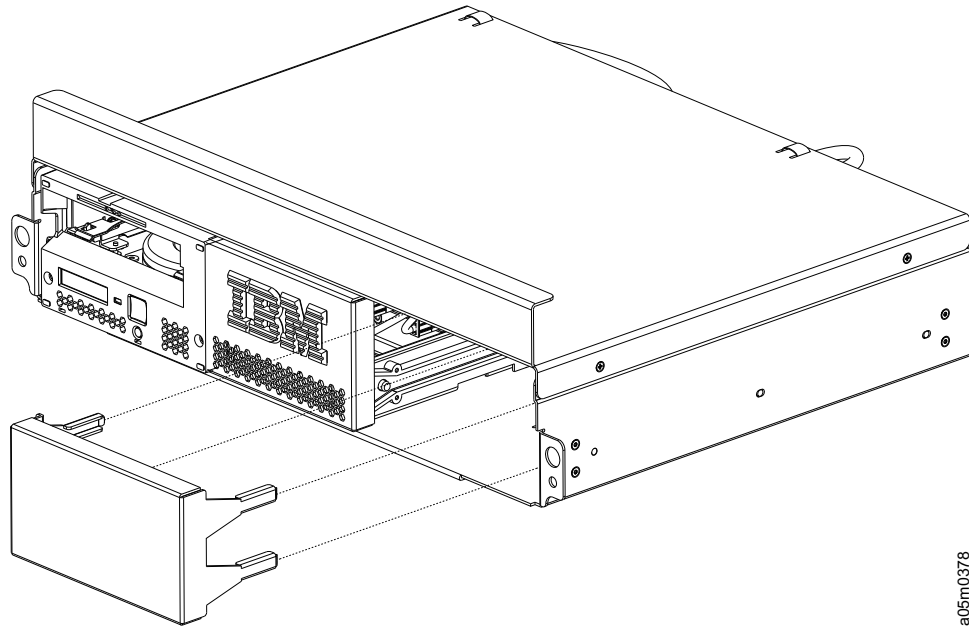


Figure 61: Installing the drive filler panel

Test Procedures

Complete the [“Installation checkout”](#) on page 174.

Install bezel and filter assembly

1. Insert the bezel (9 in Figure 55 on page 170) by pressing it into the enclosure.
2. Install the filter assembly (17) by placing the two clip nuts (not shown) on each side in the center hole of the top EIA for the enclosure. Secure the assembly with the two M5x10 Hex flange bolts (8). M3 nuts come preinstalled to the filter bezel assembly for attachment of the customer-supplied filters (not shown).

Note: The filter assembly is installed if RPQ 8B3658 is purchased by the customer.

Parts Disposition

1. Any removed parts that are not designated for reinstallation are considered as the property of the customer.
2. Tools are to be kept at the account for CE use only.

Machine Records

1. Report installation and quality with existing procedures immediately upon completion to ensure that the master history records are updated.
2. Update the machine history and any other relevant documents to show the following information, as needed.
 - FC 4804 - 3U Rack mount kit
 - FC 4805 - Drive rack accessories
 - FC 4806 - Drive filler panel
 - FC 9806 - Install the first drive in rack mount kit
 - FC 9807 - Install the second drive in rack mount kit
 - RPQ 8B3658 - Rackmount kit filter. The air filter assembly accepts two 80-mm air filters, provided by the customer.

Installation checkout

If you are installing a drive, go to [“FID 85: Drive canister” on page 252](#). After the drive is installed, continue with [“Installation checkout” on page 174](#).

1. Ensure that power is supplied to the drives.

Note: The power-on self-test (POST) usually takes less than 1 minute to complete.

2. See [Figure 62 on page 175](#). Check the following indicators on the back of each drive in the rack.
 - Drive Power indicator (1) appears green. If it is not green, consider a power problem, and go to [“Maintenance starting point” on page 1](#) and begin the service action.
 - Ignore the Drive Status indicator (2) at this step in the process.
3. Connect the virtual service panel of the drive canister that you are installing. See [“Connecting and disconnecting the laptop from the drive” on page 186](#).
4. If an error message or FID appears, go to [“Maintenance starting point” on page 1](#). Correct the condition, then return here.
5. When the POST diagnostic test completes with no errors, continue with [“Setting customer options” on page 175](#).

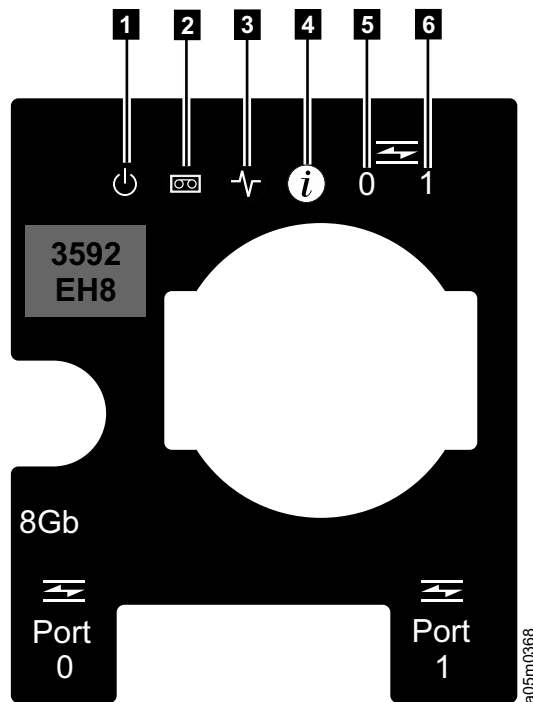



Figure 62: Drive canister LEDs (EH8 Fibre Channel)

Table 139: Drive canister LEDs.

1	Drive power	4	Information
2	Drive status	5	Port 0 Fibre Channel activity
3	Library communication	6	Port 1 Fibre Channel activity

Setting customer options

Refer to the “Virtual Operator panel menu trees” on page 88 for a depiction of the flow of these menus and menu selections.

1. If the operator **Options** menu is not displayed, press **Change Mode** , then select **Operator Mode**.
2. From the operator **Options** menu, select **Services**.
3. To set Port 0 Fibre Channel options, select **Fibre Options**, then **Set Port 0**.
4. From the **Fibre Options** menu, select **Set Speed**. This option defines the Fibre Channel data rate. It is determined by the speed of the attached fibre hardware, such as the switches and hubs. Select the **Auto-Negotiate** option, unless the customer requests a hard setting of 1 Gb, 2 Gb, 4 Gb, 8 Gb, or 16 Gb (60F only). Select **Yes** under the **Save Data** menu to save the option.
5. From the **Fibre Options** menu, select **Set Topology** for Port 0, then select **L->N Negotiate** unless the customer requests one of the other settings. If the drive is attached to an external switch, set the topology to **L->N Negotiate**.

Note: L-Port is used for an arbitrated loop (public or private) and N-Port is used when you are connecting to a fabric in point-to-point protocol. For a 60F, the only option is the N-Port.

Select **Yes** under the **Save Data** menu to save the option.

6. From the **Fibre Options** menu selection, select **Set Hard Address** or **Use Soft Address**.

Note: Soft addressing is not recommended, and is not supported by most adapters.

7. If the **Set Hard Address** option is selected, use the **Set Hard Address** menu to set the Arbitrated Loop Physical Address (AL_PA) that the customer selected. Then, select **Yes** under the **Save Data** menu to save the new address.

The Arbitrated Loop Physical Addresses (AL_PA) are assigned by industry specification and are in the range of 01 to EF.


- Not all of the addresses in this range are valid. If you select an invalid address, the drive microcode displays 'Invalid' on the service panel.
- The lower AL_PA hard addresses have the highest loop priority and are assigned to controlling devices on the loop. The drives must have higher AL_PA hard addresses with lower loop priority.

For all other installations, ask your customer for AL_PA hard address input.


8. Select **Cancel** until you return to the **Fibre Options** menu.
9. To set Port 1 Fibre Channel options, repeat Steps 3 - 9.
10. Continue with [“Setting drive options” on page 176](#).

Setting drive options

Note: Setting some drive options requires you to reset the drive. See Step 12.

1. Press **Change Mode** , then select **CE Offline Mode**.
2. Select **Config/Install, Drv Options, and Drv Features**.
3. Select one of the following options from the **CE Drv Features** menu (see [“CE DRV Features menu” on page 150](#) for information).

Note: The 'E0x' value changes to reflect your model number. For a 3592 drive in a rack, select the **E0x Rack Mount** option. The EHx drives show E0x in the drive VPD and various 3592 menus in the Virtual Panel. The only difference between E0x and EHx drives are the canisters in which the drives are installed. Any references in this document that specify E0x applies to EHx drives.

4. If the customer ordered encryption and wants it enabled now, set encryption, as specified by the customer. See [“Setting drive encryption” on page 250](#).
5. Select **Yes** to save the drive features and return to the [“CE Drv Options menu” on page 119](#), or select **Cancel** to return to the [“CE Drv Options menu” on page 119](#).
6. If the customer requests a change in the default density, continue with this Step; otherwise, go to Step 7. Select the **Default Density** that satisfies the customer's request. See [“Setting default density” on page 249](#).
7. Scroll down to the **SIM Sev Filt On/Off** selection. Select whether to filter the messages to be displayed on the panel and to be sent to the host. The default is *OFF*. Ask for the customer's preference. See **SIM Sev Filt On/Off** and **MIM Sev Filt On/Off** in the [“CE Drv Options menu” on page 119](#) for information.
8. You can select the **Num Repeat SIMs** option from the **CE Drv Options** menu. Selecting this option sets the number of times that the same SIM can be sent repetitively to the host. The default value is 0. Ask for the customer's preference. See **Num Repeat SIMs** in [“CE Drv Options menu” on page 119](#) for information.
9. Select **Cancel** until you return to the **Config/Install** menu.
10. Ensure that the **Force Error Log On/Off** option is set **OFF**.
This option must be used (turned on) only at the request of support personnel.
11. Select **Cancel** again to return to the **CE Options** menu. Ensure that you returned to the **CE Options** menu.
12. To reset the drive, press **Change Mode** , then select **Operator Mode, Services, and Reset Drive**.
This option does not become active until you reset the drive.

13. When a new drive is installed, ensure that the drive microcode matches the microcode on the CD-ROM that is in the accessories bay of this frame. See [“Microcode maintenance” on page 217](#) to read about loading microcode.
14. Continue with [“Running tests” on page 177](#).

Running tests

Rack installation tests

1. From the service panel, press **Change Mode** \bar{Y} .
2. Select **CE Offline Mode, Verify Fix/Diag**, and **Test Drive**.
3. Insert the 3592 CE scratch tape, by hand, into the drive to be tested.
4. From the **Load Scratch Tape** menu, select **Load Tape**, then **Process Loaded Tape**.
5. When the test is complete, select **Unload Drive**, and remove the CE scratch tape. This test takes 4-9 minutes to complete. If any other error message or FID displays, go to [“Maintenance starting point” on page 1](#) to correct the condition, then return here.
6. See [“Fibre wrap test” on page 236](#) and run the Wrap Test. Return here to continue the installation.
7. Ensure that the drive is returned to the operator mode.
 - Press **Change Mode** \bar{Y} , then select **Operator Mode**.
 - **--OR--**
 - Press **Reset**.
8. Move the service panel to the next drive in the rack.
9. Set the customer options, set the drive options, run **Test Drive**, and run the Fibre Port Wrap Tests for each drive that is located in the rack. When the testing of all the drives is complete, ensure that all the fibre cables are connected to the drives.
10. When you complete the installation checkout procedure, remove and save for future use any wrap tools you used for diagnostic wrap tests.
11. Continue with [“Fibre Channel attachments” on page 177](#).

Fibre Channel attachments

Supported host attachments

Fibre Channel

The 3592 drives with Fibre Channel attachment support attachment to the following host systems:

- IBM System p (AIX)
- IBM System i (OS/400)
- Hewlett-Packard (HP-UX)
- Linux
- Sun PCI/S-bus

Note: Refer to the *IBM 3592 Tape Drives and TS1120 Controller - Introduction and Planning Guide* for host attachment information.

The drives also support attachment to the following Fibre Channel fabric components:

- IBM 2103 fibre channel storage hub (for distance only)
- IBM 2109 SAN fibre channel switch

- IBM 2031 McData ES-1000 fibre channel loop switch
- IBM 2032 McData ED-5000 fibre channel switch (connected through ES-1000 or SAN)
- IBM 2042 InRange FC/9000 fibre channel director

Note: Refer to the *IBM 3592 Tape Drives and TS1120 Controller - Introduction and Planning Guide* for Fibre Channel fabric component information.

The host system and fabric component attachments have unique hardware and software requirements. Also, new systems and components can be added to the lists from time to time.

See *Fibre Support Information* for the current updates on [“Website information”](#) on page xviii.

Fibre Channel cabling examples

Each drive has two external Fibre Channel ports. The cable is a shortwave or multi-mode type (50-micron cable), and is intended for distances up to 500 m (1640 ft). The connection at the drive is a duplex LC connector type.

Table 140 on page 178 shows, by length, the fibre cables that can be ordered.

Feature code (FC)	Cable length
FC AGK1	10 Meters 'OM3" LC-LC Cable (33 ft)
FC AGK2	25 Meters 'OM3" LC-LC Cable (82 ft)
FC AGK3	80 Meters 'OM3" LC-LC Cable (262 ft)

If the customer requires cable lengths greater than 61 meters, they can contact IBM Site and Connectivity Services (I/T Consulting and Implementation Services in the US) for custom cable system design and installation.

Table 141 on page 178 lists the feature codes for the available system attachments.

Feature code (FC)	System
9000	System z attachment
9200	Open System Device Drivers
9210	HP-UX attachment
9211	Sun attachment
9212	Windows attachment
9213	Other Non-IBM attachment
9215	Other Linux attachment
9400	System i OS/400 attachment
9600	System p AIX attachment

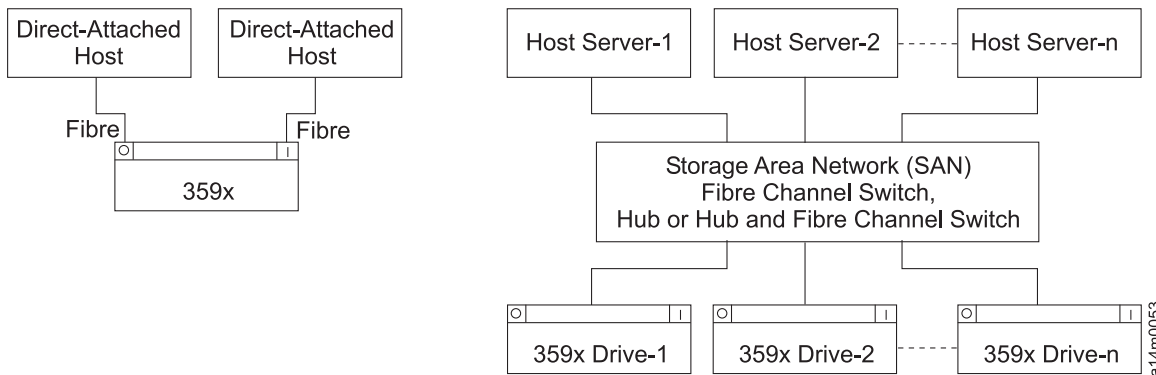


Figure 63: Typical fibre-to-host cabling

Fibre Channel cable at host

1. Refer to the customer's host or switch documentation for information about attaching the Fibre Channel cables between the drive and the host.
2. Install the appropriate cable from the drive to the host, hub, or switch. Refer to *IBM Tape System 3592 Introduction and Planning Guide*. Use switch, hub, or other product service guides to verify that the levels are supported.
See *Fibre Support Information* in “Website information” on page xviii for the current information about Fibre Channel cabling.
3. Go to “Online testing” on page 179.

Online testing

1. If the **Operator Options** menu is not displayed, press **Change Mode** **F**, then select **Operator Mode**.
2. From the **Options** menu, select **Services**, and **Set Online**.
3. From the **Set Online** menu, select **Port 0**, **Port 1**, or **Both** to set the interfaces online, depending on the customer's choice.
4. Select **Cancel** twice to return to the **Options** menu.
5. Complete one of the following procedures, depending on your application, then return here:
 - “Checking channel attachment - System i (OS/400)” on page 225 - Ensure that you have the latest System i (OS/400) PTFs before this procedure is completed.
 - “Checking channel attachment - AIX” on page 225
 - “Checking channel attachment - Linux” on page 229
 - “Checking channel attachment - Solaris” on page 230
 - “Checking channel attachment - HP-UX” on page 232

-- OR --

 - “Checking channel attachment - Windows ” on page 234
6. Ensure that the latest level of microcode is installed in the drive. If you must update the microcode, use one of the procedures in Table 155 on page 217.
7. Verify that the ON/OFF and color states of the LEDs at the rear of each drive agree with [Figure 4](#) on page 31 for the wanted status of that drive.

Post-installation reporting and activities

Follow this procedure after the drive is installed and tested, and the [“End of call” on page 185](#) is completed.

1. Record the drive serial number (from the label) into the machine history log. See [“Microcode EC level history log” on page 205](#).

Note: Record this serial number for use when nonvolatile storage is restored. It might be required by certain repair procedures.

2. Record the installed microcode level into the machine history log. See [“Microcode EC level history log” on page 205](#).
3. Ensure that the [“Fibre Channel worldwide names history log” on page 206](#) is filled out.
4. Save the tools and cartridges (and possibly the drive packaging materials) in a safe place for later use.
5. Store the service panel in the holder.
6. Report the installation as complete, using the local branch office procedure.
7. After the installation is successfully completed, notify the customer that the drive is now available for use.

Removing the drive from service

Notes:

- If your host system has software aids for system upgrades, installations, or relocations, run that software and follow the instructions that they provide.
- Use this procedure only if you are removing a drive from service and not returning it to service currently.

Follow this procedure to remove a 3592 drive from service. Consider storing the removed drive in an empty shipping carton or relocation kit package.

1. Before you proceed, check the following -
 - a. Ensure that the drive is unloaded and that the tape cartridge is removed from the drive.
 - b. Notify the system operator that you are removing the 3592 and that it is not available, then vary the drive offline.
2. Remove the drive: [“FID 85: Drive canister” on page 252](#)
3. The 3592 drive is now removed from service. If you are transporting or storing the 3592 drive for an extended period, see [“Relocating or storing the drive” on page 180](#).

Relocating or storing the drive

Follow this procedure to relocate or store a 3592 drive.

Notes:

- Before this procedure begins, ensure that you complete [“Removing the drive from service” on page 180](#).
- Ensure that you have an empty shipping carton or a relocation kit available before you begin this procedure if you plan to transport the drive some distance from the point of removal to relocate it or if you plan to store the drive. See [Chapter 9, “Parts catalog information,” on page 259](#) beginning for the relocation kit part number.

1. Move the drive to the new location.

--OR--

2. If you are not reinstalling the drive, place it in the shipping carton. See [“Repacking instructions” on page 181](#).

Repacking instructions

Before the 3592 is repacked for return, transportation, or storage, verify that no tape cartridge is in the drive. If a cartridge is present, unload it and remove it.

Consider reusing the packaging that was used when you received a drive canister at installation or as a FRU (as recommended in [“Before installation”](#) on page 168). If you cannot locate the original packaging, you can order a relocation kit. See [“3592 EH7/EH8/55E/55F/60F Rack FRU list”](#) on page 259 for the relocation kit part number.

Chapter 7. Procedures

Problem determination

Begin all maintenance activity at [“Maintenance starting point”](#) on page 1.

If you have a well-defined or solid failure symptom such as a FID or an ATTN message, use [Table 3 on page 1](#) to determine the correct service action.

If the problem is intermittent or you are unable to determine the cause of the problem (No Defect Found), or the symptoms change and you need further assistance, return here, and use the following problem determination procedure.

1. Discuss the problem with the customer.
 - Does the failure occur only during certain operations (load, unload, read, or write)?
 - Is the failure unique to a certain drive, cartridge, library, or host?
 - Was the customer running or trying to run an encrypted job?
 - Does the failure occur only with certain software applications, or has the microcode level changed recently?
2. Analyze the drive error log. See [“CE Error Log menu”](#) on page 134.
 - a. Look for FIDs with a time stamp close to the time of the failure.
 - b. If a FID appears to be associated with the failure, go to [“FID entry point”](#) on page 6.
3. Attempt to re-create the problem.
 - a. Run diagnostic tests by using the [“CE Loop Diag menu”](#) on page 111. Exercise the functional area that was causing the problem.
 - b. Have the customer run the failing job or application, if possible.
4. Analyze the host or controller error logs.
 - a. Refer to one of the following -
 - [“Service and Media Information messages \(SIMs and MIMs\)”](#) on page 39
 - [“Error Log Analysis - AIX”](#) on page 53
 - [“Error Log Analysis - System i”](#) on page 63
 - [“Obtaining drive error information from Linux system”](#) on page 68
 - [“Obtaining drive error information from Solaris system”](#) on page 70
 - [“Obtaining drive error information from HP-UX system”](#) on page 71
 - [“Obtaining drive error information from Windows system”](#) on page 71
 - b. Look for any SIM/MIM or other error information that might be related to the problem.
5. Analyze the FID FE error log. See [“CE FID FE Log menu”](#) on page 135 to display the log and [“FID 87 or F2 - Isolating fault between media and hardware”](#) on page 243 to analyze the data.

Note: With some host systems, you might need customer assistance to acquire data.

 - a. Look for FIDs with a time stamp close to the time of the failure.
 - b. If a FID appears to be associated with the failure, go to [“FID entry point”](#) on page 6.
6. Analyze the Temporary Error Log (see [“CE Temp Error Log menu”](#) on page 137).
 - a. Look for FIDs with a time stamp close to the time of the failure.
 - b. If a FID appears to be associated with the failure, go to [“FID entry point”](#) on page 6.

7. Call your next level of support, if necessary.

Excessive Clean messages

Note: The clean cycle takes approximately 4-5 minutes per drive to run.

Normal clean messages are created by the drive microcode that automatically initiates a clean cycle. It automatically loads a cleaning cartridge into the drive in the library. Excessive clean messages indicate that other procedures might be necessary. You are being notified that the drive has excessive clean messages when you see the additional text CLEAN_REQUIRED appear on the service panel.

If you have excessive clean messages or you believe that the drive requires cleaning, complete this procedure after the [“Problem determination” on page 182](#) procedure.

Note: When the cleaning cartridge is loaded into the drive, the service panel displays the number of allowed uses that remain on the cleaning cartridge. The service panel displays **Cleaning . . . Left: *nn*** where *nn* is the number of uses that remains available for that cleaning cartridge. You also can determine the number of uses that remain on the cleaning cartridge from host messages.

- If the cleaning cartridge reached its limit of 50 uses, notify the customer that you need a serviceable cleaning cartridge before you can continue.

--OR--

- If the cleaning cartridge in the library is below the limit of 50 uses, go to Step 1.
 1. Run the **Test Device** diagnostic test from the [“CE Verify Fix/Diag menu” on page 108](#).
 2. If you are still getting excessive clean messages, replace the drive canister. See [“FID 85: Drive canister” on page 252](#).

Preparing the tape drive for service

1. After you ensure that the customer's job is complete and that the drive is unloaded, ask the customer to take offline at the host, the drive you intend to service.
2. Connect the virtual service panel. See [“Connecting and disconnecting the laptop from the drive” on page 186](#).
3. Return to the procedure that sent you here.

Powering the device ON and OFF

Although there are no power ON/OFF switches on the 3592 drive canister or on the power supplies, you must use the following procedure sparingly. Because the drive canister and the power supplies are all single FRUs and are hot-pluggable, they do not require power ON/OFF switches for you to complete service activities.

You can press **Reset** on the service panel to run the power-on self test (POST) diagnostic test.

Removing drive canister power

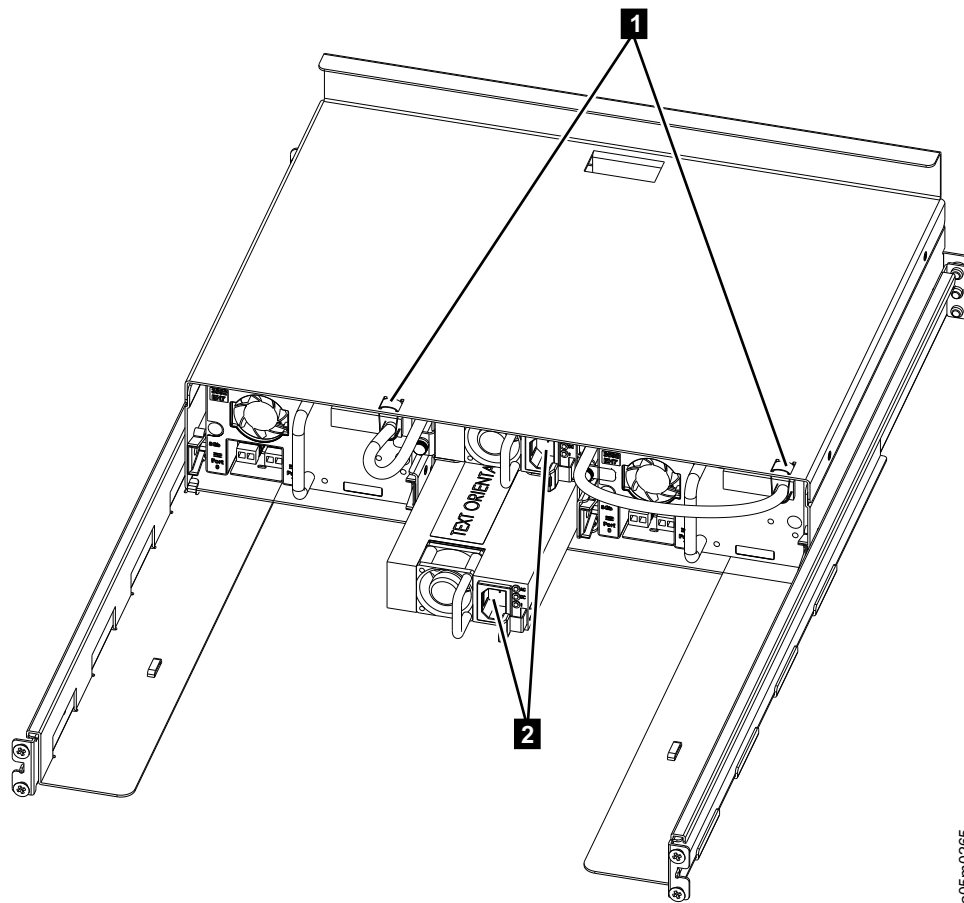


Figure 64: Rack service position - rear view

To power OFF the drive, complete the following steps:

1. If the device is not varied offline, have the customer vary (take) it offline at the host.
2. Ensure that the customer's job is complete.
3. Unless this call is for a **Tape Unload** problem, press **Unload** on the Operator bezel (see [Figure 2 on page 29](#)) to eject any currently loaded tape cartridge. It can take up to 5 minutes for the cartridge to rewind and unload. When the unload is complete, remove the cartridge from the drive.
4. Unhook the retaining strap (1).
5. Unplug the power connector (2). The power cables are not shown.
6. If the procedure that sent you here calls for removing the drive canister from the rack, go to [“Removing the drive canister from an enclosure” on page 253](#).

Restoring drive canister power

If the drive canister is not already installed in the rack, go to [“Replacing or reinstalling the drive canister” on page 254](#), and then return here.

1. Plug in the power connector (2 in [Figure 64 on page 184](#)).
2. Reattach the retaining strap (1 in [Figure 64 on page 184](#)).

Note: Wait at least 5 seconds after power is removed from the 3592 tape drive before power is restored.

The power-on-self-test (POST) runs when power is applied to the drive canister. This POST takes less than 1 minute to complete. When power is restored, the Operator 8-character display (see [Figure 2 on page 29](#)) initially displays B00TING. Then, while the POST test is running, the display shows DIAGS*. If POST completes successfully, the display changes from DIAGS* to blank.

If the Operator messages do not follow this described sequence, or if an FID message appears on the display, the POST test failed. Go to [“Maintenance starting point” on page 1](#) and isolate the failure.

Communications with the interface are not acknowledged during the POST. When the POST is complete, the customer can vary the device online.


End of call

Begin your end-of-call activity here, and continue through [“Final checks” on page 185](#) to complete the end-of-call procedure.

Notes:

- If the customer maintains FIPS-certified drives, ensure that the microcode that you install is at a FIPS-certified level.
- If you replaced the drive canister (FID 85), update the microcode to the current level, unless your drive requires FIPS microcode.
- Use your local procedures to report the FRU part number for the FID. Ensure that you accurately charge the model type such as EH7, EH8, 55F, or 60F.
- To set up the virtual service panel as needed, go to [Chapter 4, “Virtual Operator panel,” on page 77](#).


Verifying the fix

1. From the service panel, press **Change Mode** .
2. Select **CE Offline Mode > Verify Fix/Diag > Test Drive** to verify the operation of the drive.
 - If the problem was intermittent or if you want to test the drive more thoroughly, select **Test Device**, or select **Loop Diag** from the **CE Verify Fix/Diag** menu, then return here.
 - If the problem was a Fibre Channel problem, complete [“Fibre wrap test” on page 236](#), and return here.
3. If the service panel indicates port 0 or port 1 is offline, complete [“Setting the device online” on page 185](#) to put the ports online, then continue with [“Final checks” on page 185](#).

Setting the device online

1. From the operator **Options** menu, select **Services**, then **Set Online**.
2. From the **Set Online** menu, select **Port 0**, **Port 1**, or **Both** to set the interfaces online, depending on the customer's choice.
3. Select **Cancel** twice to return to the **Options** menu.

Final checks

1. Ensure that the drive is returned to the operator mode. Press **Change Mode** , then select **Operator Mode**.
2. Inspect all the power supplies in the rack to ensure that all the AC and DC LEDs are ON. If any of the AC or DC LEDs are OFF, go to [“Power problems MAP” on page 193](#) to correct the condition, then return here.
3. Inspect all the drive canister LEDs in the rack (see [Figure 4 on page 31](#)). If any of the **Power**, **Status**, or **Fibre Channel Port** LEDs indicate a problem, go to [“Maintenance starting point” on page 1](#) to correct the condition, then return here.
4. If the problem involved the Fibre Channel or a hang condition, complete one of the following procedures, depending on your application. Return here after you complete the procedure.
 - [“Checking channel attachment - System i \(OS/400\)” on page 225](#)

- [“Checking channel attachment - AIX” on page 225](#)
- [“Checking channel attachment - Linux” on page 229](#)
- [“Checking channel attachment - Solaris” on page 230](#)
- [“Checking channel attachment - HP-UX” on page 232](#)
- [“Checking channel attachment - Windows ” on page 234](#)

5. If you completed all service activity, notify the customer that the drive can be varied online to the host.

The end-of-call procedure for the drive is complete. If your service activity was directed here from another MI, return to that MI to complete any procedures or checks that are recommended there.

Connecting and disconnecting the laptop from the drive

Use this procedure to connect your laptop or notebook to a drive with the Ethernet port.

Notes:

- All of these Ethernet procedures require a straight-through Ethernet cable (patch cable) to connect your laptop to the Ethernet port on the drive.
- Alternative methods can be used for downloading microcode or memory dumps, or updating microcode. See [Table 154 on page 210](#) for downloading memory dumps or [Table 155 on page 217](#) for microcode maintenance.
- For the alphabetic characters that you enter during these Ethernet procedures, use only lowercase characters (like a, b, or c) unless otherwise directed to use an uppercase character (like A, B, or C).
- You can anticipate the best performance if you close nonessential applications before your laptop is connected.

Connecting a laptop for service

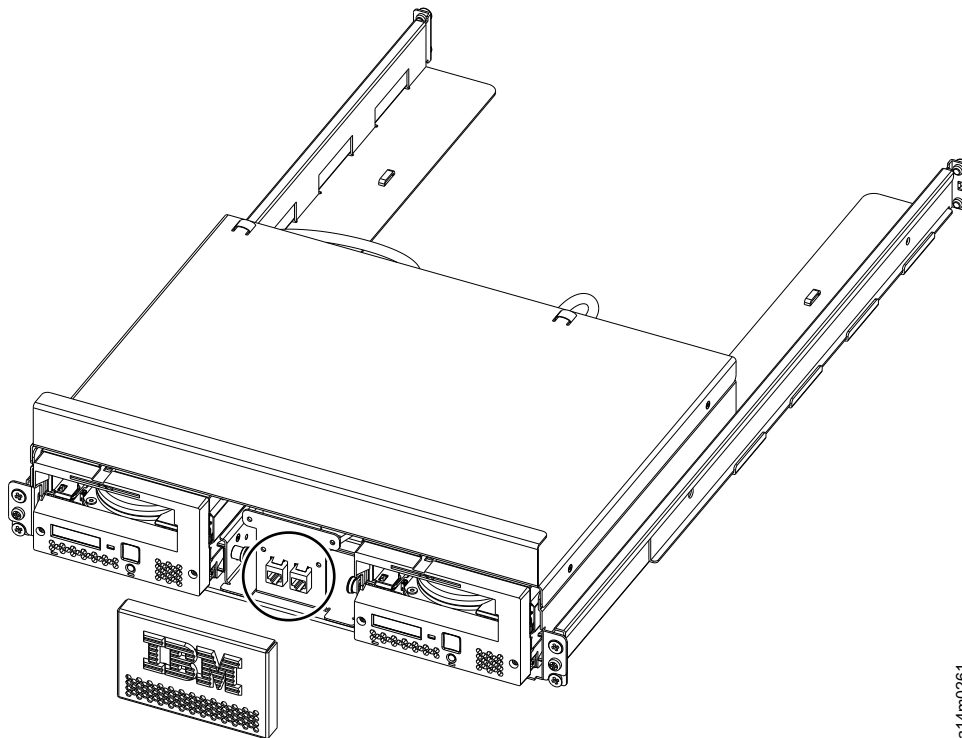


Figure 65: Enclosure - front view, showing the bezel removed and the Ethernet ports (circled)

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Refer to [Figure 65 on page 186](#). It shows two drives, in place on each side of the enclosure. The enclosure bezel in the center is removed, and the Ethernet ports are shown.

1. Insert one end of your Ethernet patch cable to the Ethernet port on the front enclosure. Use the right Ethernet port for the right-side drive, and the left Ethernet port for the left-side drive.
2. Connect the other end of the Ethernet cable to the Ethernet port on your laptop.
3. Create or change a local network connection on your laptop with the following TCP/IP settings.
 - IP address: 169.254.1.2
 - Subnet mask: OK
 - Default gateway: 169.254.1.1
4. If you are connecting your laptop to use the **Virtual Op Panel** or to display the **Drive Status** page, go to step 5. Otherwise, go to step 6.
5. Open a browser window on your laptop that points to 169.254.1.3/panel.html for the **Virtual Op Panel** or 169.254.1.3 for the **Drive Status** page. Login is not required. Refresh your browser to update with the current information, and then continue with step 11.
6. Open a DOS command line screen on your laptop.

Note: While you are completing some of the FTP procedures, you might need to change to a directory where a file needs to be stored or retrieved.
7. Type `ftp 169.254.1.3` to establish the communication connection to the drive and to open an FTP session. You can see a screen that provides you with the drive type, model number, serial number, and microcode level.
8. At the user prompt, type `ce` and press **Enter**. **User name okay, need password.** appears.
9. On the **Password:** line, type `serv1ce`. Use the numeral 1 in place of the letter i in this entry.
10. When the login is complete, the FTP prompt displays. Type `bin` to set the communication mode to binary.
11. If an error message displays after your `http` or `FTP` command was entered, verify that your command was typed without any errors. If the command was typed correctly but resulted in an error message, this action can indicate a patch cable problem or a laptop configuration problem. Contact your next level of support.
12. Complete the Ethernet procedure that sent you here, and then return here.
13. After you completed your Ethernet activity, close your browser window to end the `http` session, or type `bye` to exit the FTP session.
14. Remove the Ethernet cable from the enclosure Ethernet port and from your laptop.
15. Reinstall the enclosure bezel to cover the Ethernet ports.
16. Return to the procedure that sent you here, or go to [“End of call” on page 185](#).

Ethernet (laptop) Drive Dump procedures

Use these procedures when you want to work with drive dumps, by using the front Ethernet port on a Model EH7, EH8, 55F, or 60F drive.

Determining current dump status

Use this procedure to determine the current dump status by using the Ethernet port.

1. Perform the procedure [“Connecting and disconnecting the laptop from the drive” on page 186](#) if you did not do so already.
2. Type `ls` or `dir`. The drive dump information, along with the microcode level of the drive appears on your laptop. You might need this information in other procedures.

If no dump is in the buffer, you receive a response on your laptop like

```
0000008017_D3I4_451_000001326764_f.dmp
```

If a dump is in the buffer, you receive a response on your laptop like

```
0000008017_D3I4_451_000001326764.dmp (←--- existing dump in buffer)
0000008054_D3I4_451_000001326764_f.dmp
```

The dump in this example that ends with . . .6764.dmp (and not with _f.dmp) is the existing dump in the buffer.

3. Return to the departure point in [“Connecting and disconnecting the laptop from the drive” on page 186](#) that brought you here.

Offloading microcode dumps with the front Ethernet port

This procedure allows the CE to transfer a microcode dump from the drive to your laptop or notebook with the drive front Ethernet port. You might be asked to produce this dump for your next level of support.

1. Perform the procedure [“Connecting and disconnecting the laptop from the drive” on page 186](#) if you did not do so already.
2. Type `mget * .dmp` (with a space between "mget" and the asterisk) to transfer the current microcode dump that is in the drive buffer (if one exists), and the dump you want to force. If no dump exists in the buffer, the drive forces a dump, then it transfers the forced dump to your laptop. The dump file displays in the current directory of your laptop. The dump remains in the drive buffer after transfer. The dump offload time can take up to 10 seconds.
3. If no dump is in the buffer, you receive a response on your laptop like `mget 0000120036_D3I4_448_000001365747_f.dmp?`

Use [Table 142 on page 188](#) to help you understand the information in this response.

This text...	Refers to...
0000120036 ¹	Dynamic time stamp (this text changes with each transaction) ²
D3I4_448	Drive microcode level
000001365747	Drive serial number
_f.dmp	Forced dump (including the letter f forces the dump)
Notes:	
a. The characters in the file name you receive might be different from the characters in the file name that was shown when you requested the dump.	
b. The value in this region can reflect an actual date stamp or it can contain a relative value like a system-created time stamp.	

Type `y` for "yes." The drive forces a dump and transfers the forced dump to your laptop. After a brief pause, you see the message `Data transfer complete`.

4. If a dump is in the buffer, you receive a response on your laptop like `mget 0000000358_D3I4_448_000001365747.dmp?`

This response provides information that is similar to the information in [Table 142 on page 188](#).

Type `y` for "yes". This command transfers the existing dump to your laptop. After a brief pause, you see the message `Data transfer complete`. You receive a response on your laptop like `mget 0000000418_D3I4_448_000001365747_f.dmp?`

Type `y` for "yes". This command forces a dump and transfers that dump to your laptop.

After a brief pause, you see the message `Data transfer complete`. See Note 1 in [Table 142 on page 188](#).

5. Return to the departure point in [“Connecting and disconnecting the laptop from the drive” on page 186](#) that brought you here.

Ethernet (laptop) Microcode procedures

Use these procedures when you want to check or update microcode, by using the front Ethernet port on the EH7, EH8, 55F, or 60F drive.

Determining current drive microcode level

Use this procedure to determine the current level of the drive microcode by using the Ethernet port.

1. Perform the procedure [“Connecting and disconnecting the laptop from the drive” on page 186](#) if you did not do so already.
2. Type `ls` or `dir`. The microcode level of the drive, along with the drive memory dump information displays on your laptop or notebook. You might need this information in other procedures.
3. Return to the departure point in [“Connecting and disconnecting the laptop from the drive” on page 186](#) which brought you here.

Updating microcode with the Ethernet port

Use this procedure to update drive microcode with the Ethernet port on your laptop or notebook.

1. Perform the procedure [“Connecting and disconnecting the laptop from the drive” on page 186](#) if you did not do so already.
2. Ensure that the microcode image file is in the current directory of your laptop.
3. Type `put D3Ix_xxx.fmr` or `put D3Ix_xxx.fmrz` to transfer the microcode image to the drive. Use the same name for the microcode image as the file you have on your laptop. The drive resets automatically when the transfer is complete.

Note: When the drive resets, the FTP connection closes. You see the message `Connection closed by remote host`.

4. After the drive resets, reestablish the FTP connection to the drive to verify the drive microcode level by entering the command `ftp 169.254.1.3`. You see a screen that provides you with the drive type, model number, serial number, and microcode level.
5. Verify that the microcode level displayed is correct (the level you just loaded). If it is not correct, repeat the steps of this procedure, being careful to follow each step exactly. If the microcode level still does not verify correctly, contact your next level of support.
6. Return to the departure point in [“Connecting and disconnecting the laptop from the drive” on page 186](#) that brought you here.

Obtaining microcode image with the Ethernet port

Use this procedure to obtain drive microcode from a drive.

1. Perform the procedure [“Connecting and disconnecting the laptop from the drive” on page 186](#) if you did not do so already.
2. Type `ls` or `dir`. The microcode level of the drive displays.

Note: The `D3Ix_xxx` is the drive microcode level that displayed after you completed the previous step.

3. Type `mget *.fmrz` (with a space between "mget" and the asterisk) to transfer the drive microcode image to your laptop. The microcode image file is in the current directory of your laptop. You see a response like `mget D3Ix_xxx.fmrz?`
4. Type `y` for "yes".
5. After a brief pause, you see the message `Data transfer complete`.
6. Return to the departure point in [“Connecting and disconnecting the laptop from the drive” on page 186](#) which brought you here.

Drive FRU VPD procedures

Use these procedures to obtain or update the drive VPD, during a FRU replacement for the EH7, EH8, 55F, or 60F drive canister.

Obtaining the drive VPD image with the Ethernet port

Use this procedure to obtain the VPD image from the original drive (the drive that is being replaced).

1. Complete the procedure [“Connecting and disconnecting the laptop from the drive” on page 186](#) if you did not do so already.

Note: Steps 2-4 saves the VPD image of the original drive on your laptop, and is used in the [“Updating the drive VPD image with the Ethernet port” on page 190](#) procedure to update the replacement drive.

2. Type `mget *.vpd` (with a space between `mget` and the asterisk) to transfer the drive VPD image to your laptop. The VPD image file is in the current directory of your laptop. You see a response like `mget 0000078D8250.vpd?`
3. Type `y` for "yes".
4. After a brief pause, you see the message `Data transfer complete`.
5. Return to the departure point in [“Connecting and disconnecting the laptop from the drive” on page 186](#) that brought you here.

Updating the drive VPD image with the Ethernet port

Use this procedure to put the VPD from the original drive onto the new drive (the replacement drive).

1. Complete the procedure [“Connecting and disconnecting the laptop from the drive” on page 186](#) if you did not do so already.

Note: Steps 2-4 saves the VPD image of the replacement drive on your laptop, and can be useful if you need to later undo the FRU VPD update.

2. Type `mget *.vpd` (with a space between `mget` and the asterisk) to transfer the drive VPD image to your laptop. The VPD image file is in the current directory of your laptop. You see a response like `mget 0000078D8251.vpd?`

3. Type `y` for "yes".

4. After a brief pause, you see the message `Data transfer complete`.

Note: Steps 5-7 updates the VPD image of the replacement drive with the file from the original drive stored on your laptop.

5. Type `put xxxxxxxxxxx.vpd fru.vpd` to transfer the drive VPD image from your laptop. Use the same name for the VPD image as the file you have on your laptop from the procedure ["Obtaining drive VPD image with Ethernet port"](#). The xxxxxxxxxxx must be the serial number of the drive that is being replaced.
6. Type `y` for "yes"
7. After a brief pause, you see the message `Data transfer complete`.

8. Reset the drive.

Note: When the drive resets, the FTP connection closes. You see the message Connection closed by remote host.

9. After the drive resets, reestablish the FTP connection to the drive to verify the drive serial number. Enter the command `ftp 169.254.1.3`. You see a screen that provides you with the drive type, model number, serial number, and microcode level.

10. Verify that the drive serial number displayed is correct (the same as the original drive's). If it is not correct, repeat the steps of this procedure, being careful to follow each step exactly. If the serial number still does not verify correctly, contact your next level of support.

11. Return to the departure point in [“Connecting and disconnecting the laptop from the drive” on page 186](#) that brought you here.

Displaying the Drive Status page



Attention: Customers might want to use this function for remote monitoring. If the Ethernet cable is in use by the customer, consult with them before the drive is removed or replaced.

Complete [“Connecting and disconnecting the laptop from the drive” on page 186](#), if you did not do so already.

The **Drive Status** page offers detailed information on the drive in table or text-only (for printing) formats. This page is for information purposes only and no changes can be made from the interface.

3592-E07 Drive 000001350595

Text Only version (for cut and paste)

system time : 2011/01/20 12:25:00
drive time : 2010/03/25 14:24:22

<input checked="" type="checkbox"/> Drive Information			
Serial Number	000001350595	Current Position	<input type="text" value="10%"/>
Model	3592-E07	EOD Position	<input type="text" value="40%"/>
Code Level (build date)	D3I2_000 (MAR 25 2010 13:29)	Logical Position	<input type="text" value="4%"/>
Status	Writing	Physical Position	<input type="text" value="74%"/>
Message Display Text	e WRITE*	Current Time (origin)	2010/03/25 14:24:22 (library)
Status Indicators	flash dump clean encrypted		
<input type="checkbox"/> Host Interface			
<input type="checkbox"/> Ethernet Settings			
<input type="checkbox"/> Library Information		<input type="checkbox"/> VPD Encryption Settings	
<input type="checkbox"/> Drive Statistics		<input type="checkbox"/> Tape Statistics	
<input type="checkbox"/> Manufacturing Information			
<input type="checkbox"/> Host Reservation (SPC-2)			
<input type="checkbox"/> Host Media Removal (prevented)			
<input type="checkbox"/> FID Error Log			
<input type="checkbox"/> TEMP Error Log			

Figure 66: **Drive Status** page.

Drive information is divided into the following categories -

- Drive Information (initially displayed) - Serial Number, Model, Code Level (build date), Status, Message Display Text, Status Indicators, Current Position, EOD Position, Logical Position, Physical Position, Current Time (origin)
- Host Interface (for Port 0 and Port 1) - Status, WWID, FC Address (actual/configured), Speed (actual/configured), Topology (actual/configured)
- Ethernet Settings (for Port 0 and Port 1) - IP addresses (Current), MAC Address (VPD), Drive IP address 1 (VPD), Drive IP address 2 (VPD), EKM IP address 1, EKM IP address 2

- Library information - Library Type/Model, Library Serial Number, Library Firmware Level, Library Interface Speed, Library IP address, Drive's Element Address, Drive's Position
- VPD Encryption Settings
- Drive Statistics - Drive Mounts, Drive MB Written, Drive MB Read, Power On Hours (current/VPD)
- Tape Statistics - Volume Serial (origin), Tape Mounts, Tape MB Written, Tape MB Read
- Manufacturing Information - Serial Number, Part Number, and EC Number for Card, Bezel, Head, MCA, Deck, Drive
- Host Reservation (SPC-2) - create time, device path, host name, OS version, driver version, WWPN, reservation type
- Host Media Removal (prevented) - create time, device path, host name, OS version, driver version, WWPN
- FID Error Log
- TEMP Error Log

Display of the information in each category can be toggled by the associated check box.

Electrostatic discharge (ESD) sensitive parts

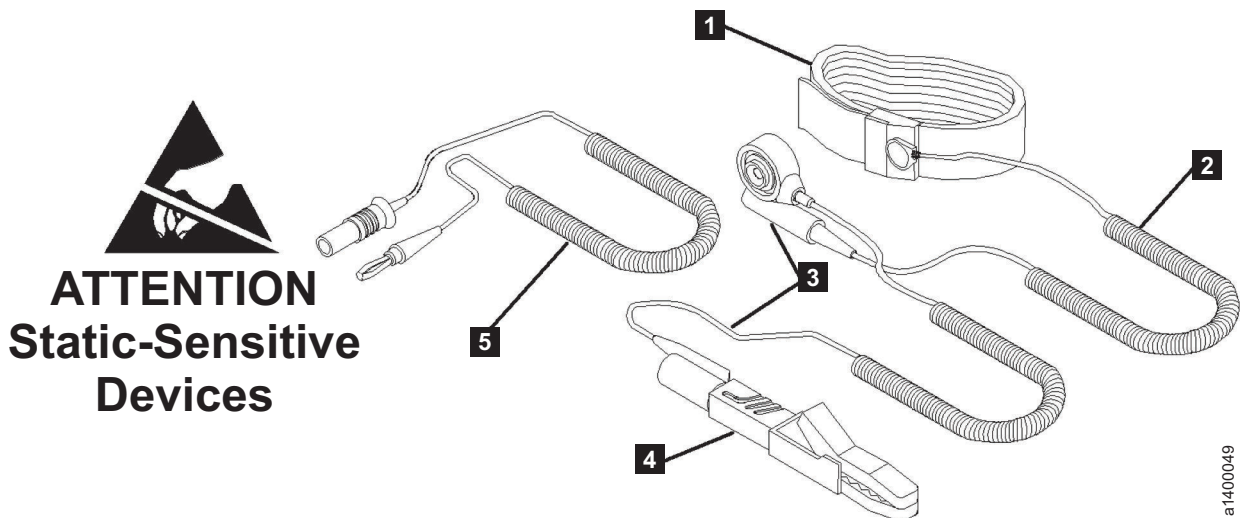


Figure 67: Static-sensitive device attention symbol and grounding wrist strap

When you are wearing the ESD grounding wrist band (1), ensure that the ground clip (4) remains connected. Failure to do this procedure creates a safety exposure, the same as wearing jewelry while you are working on live exposed electrical circuits.

Use the most current IBM part number available when you are order a field ESD kit. In addition to the mat, the kit P/N 93F2649 contains the following components in a resealable, static-shielding bag.

- Adjustable wrist band P/N 6405959 (1)
- Wrist band cord P/N 74F9658 (2)
- Mat cord P/N 93F2652 (3)
- Large ground clip P/N 93F2654 (4)
- Cord extension P/N 93F2653 (5)

All of the 3592 drive logic cards and sensors in the drive are ESD-sensitive parts.

To prevent damage when you are working with ESD-sensitive parts, observe the following instructions, and the instructions that are printed on the ESD mat. The following instructions are in addition to all the usual precautions:

- Ensure that the device power is Off (see “Powering the device ON and OFF” on page 183).
- Put on the ESD grounding wrist strap (1) before the ESD-sensitive part is touched. This strap has a high resistance (1 megohm) resistor in series with the grounding clip (4). Use of the ESD grounding wrist strap is not dangerous to you. It discharges the static electricity from your body. Connect the clip to the flex ground strap of the gate to the frame. Keep on the strap while you are inserting or removing a logic card or handling any ESD-sensitive part.
- Keep ESD-sensitive parts in their special ESD shipping bag until ready for installation.
- Do not place ESD-sensitive parts on any machine cover or on a metal table. If you must put down the ESD-sensitive part for any reason, place it inside its protective shipping bag or on the ESD grounded mat that is provided in the ESD kit. (Large metal objects can be discharge paths without being grounded.)
- Prevent ESD-sensitive parts from being touched by other personnel.
- Reinstall all covers when not working on the machine.
- Be extra careful when you are handling ESD-sensitive parts during a period of cold-weather, building heating. Heating of cold air lowers the relative humidity, which increases the static electricity.

Cleaning the operator bezel

Activities such as completing a drive canister installation and some errors that display might require you to clean the operator bezel. See the *3592 Drive Operator Guide* for procedures.

This procedure requires the following items:

- Tape unit cleaner, if available. This cleaner is the only approved cleaning solution for the 3592 drive. You also can use water.
- Clean, lint-free cloth



Attention:

- Do NOT spray or apply cleaner or fluids directly to the internals of the drive or a tape cartridge. Doing so damages sensitive parts and mechanisms!
 - Do not allow any liquid to wick into a tape cartridge.
 - A damp cloth might work better than a dry cloth by reducing the risk of creating a static electrical charge that can damage data on a tape cartridge.
1. Apply only enough water or tape unit cleaner to dampen a lint-free cloth, but do not apply liquid directly to a component or the drive.
 2. Gently wipe the front of the bezel by using the damp, lint-free cloth.

Power problems MAP

This MAP helps you isolate power failures.

Notes:

- See [Chapter 8, “Locations, checks, adjustments, removals, and replacements,”](#) on page 251 for power supply procedures.
- See [“Power supplies”](#) on page 32 for a description of 3592 power.
- See [“Redundant power”](#) on page 35 for a description of redundant power.
- See [“Power supplies”](#) on page 32 for the location of the AC LED and the DC LED on the power supply.
- Unless otherwise directed, run **Verify Fix/Diag** from the **CE Options** menu to test the drive after a FRU replacement.

Complete [“Preparing the tape drive for service”](#) on page 183.

Step power 01

Does the power LED on the back of the drive appear green?

Note: The Power LED is normally green. On occasion, it can be blue, which can be ignored. The blue color is for future usage and does not indicate a problem with the drive.

Yes

This display is normal. Go to [“Step power 02”](#) on page 194.

No

Go to [“Step power 05”](#) on page 194.

Step power 02

Observe both power supplies in the cradle or shelf. **Is each ‘DC’ LED ON?**

Note: Attempt to correct this condition by reseating the cables and drive canister before you replace any parts.

Yes

Normal operation. The drive canisters and both power supplies appear to be OK. However, an intermittent failure in the cables between the power supplies and the drive might be occurring. Repair or replace, as necessary.

No

Go to [“Step power 03”](#) on page 194.

Step power 03

Observe the AC LED of the failing power supply.

Is the ‘AC’ light ON?

Yes

Replace the power supply. See [“FID 82: Power supply”](#) on page 252.

No

Go to [“Step power 04”](#) on page 194.

Step power 04

Check the circuit breaker (CB) on the power source.

Is the CB ON (not tripped)?

Yes

Normal operation. Check the AC power cable to the power supply. If the cable is OK and there is AC power to the power supply, but the ‘AC’ light is not ON, replace the power supply. See [“FID 82: Power supply”](#) on page 252.

No

Reset the tripped CB. If the CB trips again, disconnect the power cords one at a time to isolate the problem.

Step power 05

Check the Power LED on the other drive in the cradle or shelf.

Does the other ‘Power’ LED appear green?

Yes

Go to [“Step power 06”](#) on page 195.

No

Both drives lost power. If both power supplies are OK, replace the cable and card FRU kit. See [“FID EA: Cables FRU kit”](#) on page 255.

Step power 06

Perform [“Preparing the tape drive for service”](#) on page 183 for the other drive in the cradle or shelf. Swap the two drive canisters to see whether the failure moves.

Did the failure move with the drive?**Yes**

Replace the failing drive. See [“FID 85: Drive canister”](#) on page 252.

No

Replace the cable and card kit. See [“FID EA: Cables FRU kit”](#) on page 255.

Return the good drive to its original location.

Manual cartridge removal

**Attention:**

1. Before this procedure is used to recover a tape cartridge that fails to unload from a drive canister, you must exhaust all other means of removing the tape cartridge from the drive. Use this procedure only if you cannot remove the tape cartridge with any other means, such as
 - Asking the customer to attempt to start a system unload command
 - Asking the customer to press **Unload** on the operator bezel
 - Asking the customer to use a utility like *tapeutil* or *ntutil*
 - Using the **Unload Drive** option of the [“Options menu”](#) on page 97
2. The following removal procedures can destroy customer data! Use extreme care when the customer's tape cartridges are handled or removed to minimize tape and drive damage, and to prevent data loss.
3. Determine from the customer if the cartridge contains security sensitive data that cannot leave the customer site.
4. Inform the customer that manually removing the tape cartridge from the drive can further damage the tape media and the drive.
5. With critical customer data, you might not want to attempt to remove the cartridge in the field and risk further media damage. IBM recommends that you return the drive to IBM, with the tape cartridge still loaded in the drive as you found it when you began this service activity. If the customer granted you permission to return the cartridge with the drive to IBM (see [Step 3](#)), contact your next level of support for advice and instructions about returning the drive to IBM.

Perhaps returning the drive to active service is more important to the customer than losing the data on the cartridge. Involve the customer in the decision to risk losing the data in favor of returning the drive to active service.



- Do not touch the head, magnetic tape, tape path, or electronic components. They are sensitive to electrostatic discharge and contamination like the oil and salt from your skin. Use clean, lint-free gloves when you are working around magnetic tape or the tape path components.
- Electrostatic-sensitive components. Use an ESD kit (see [“Electrostatic discharge \(ESD\) sensitive parts”](#) on page 192).
- After you remove a stuck data cartridge, advise the customer to copy the data to another cartridge and to remove this tape cartridge from service.

- Do not use power tools or magnetic tools to complete this procedure.
- If you cannot remove the cartridge from the drive with the following procedure, contact your next level of support.

The purpose of this section is to assist you to determine the condition of the cartridge or the magnetic tape and to direct you to the procedure you might follow to remove the cartridge.

Before you begin this procedure

1. If you did not already do so, attempt to remove the cartridge by powering ON the device.
2. If you did not do so, complete the procedure [“Preparing the tape drive for service” on page 183](#) before you remove the drive canister from the enclosure.
3. Display the **Options** menu on the service panel.
4. Select **Unload Drive** from the **Options** menu, and press **Enter**. The cartridge unloads and is returned to a storage location.

Note: A typical tape cartridge rewind and unload can take up to 5 minutes. An error recovery condition like a stuck tape can extend this time to up to 1 hour.

5. If the cartridge unloads, inform the operator that the cartridge is unloaded, and complete [“End of call” on page 185](#). If the cartridge does not unload, continue with this procedure.

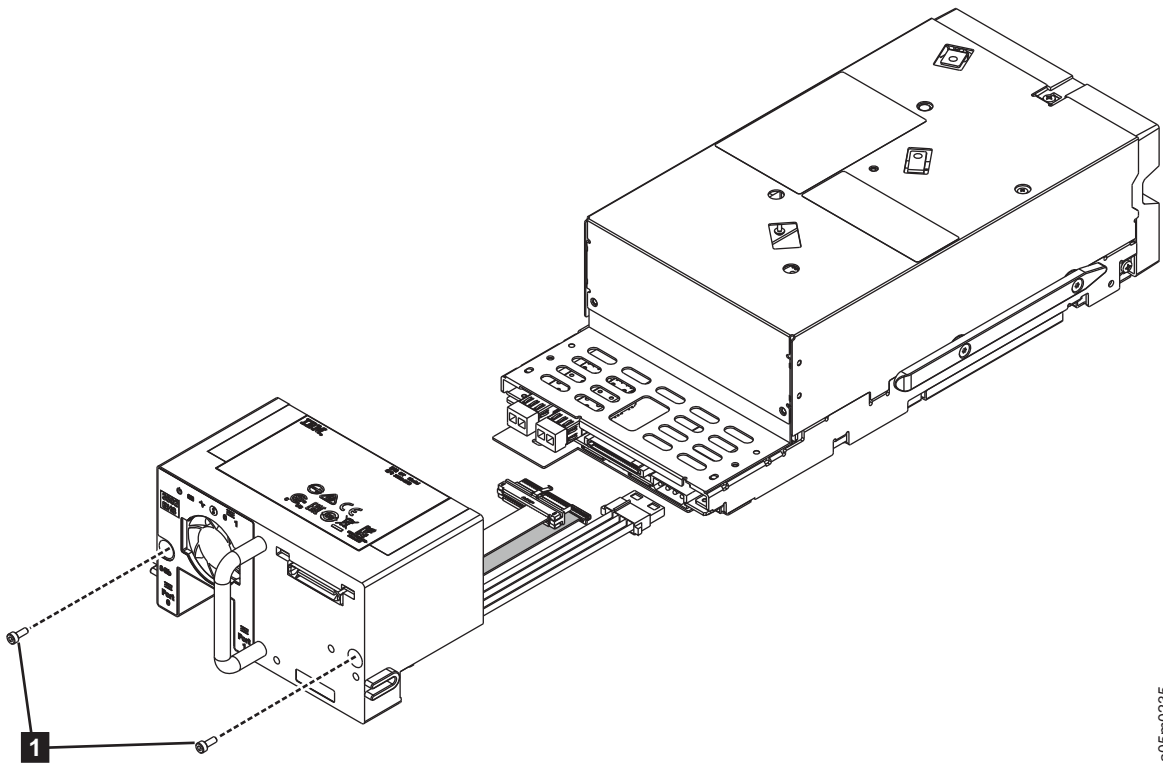
Recommended tools (do not use magnetized tools)

- 2.5 mm offset hex wrench
- #1 Crosspoint screwdriver
- ESD Kit (see [“ESD kit” on page 38](#))
- Flashlight (optional)
- Small, flat-bladed screwdriver (optional)

Begin this procedure

Note: If the drive did not run an automatic dump to flash memory, complete [“Offloading the dump to flash memory” on page 211](#) before the drive canister is removed.

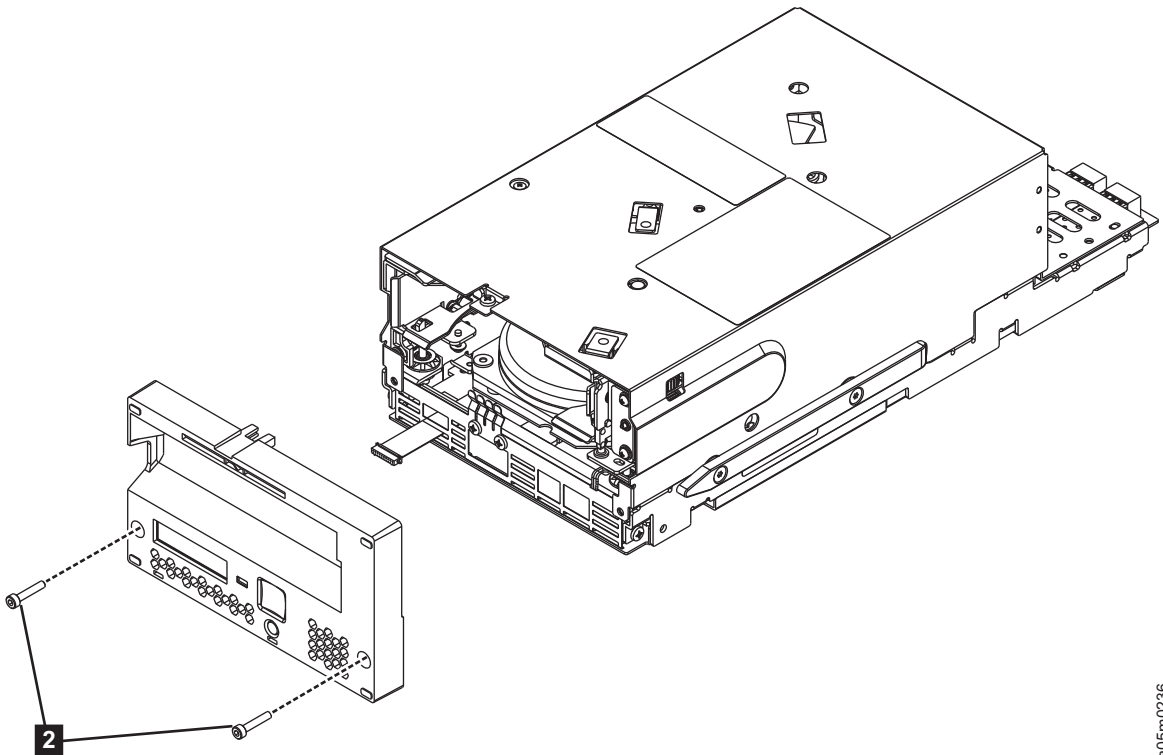
1. Remove the drive canister from the enclosure. See [“FID 85: Drive canister” on page 252](#).



a05m0235

Figure 68: Drive canister - canister screws

2. Remove the drive from the enclosure. See [Figure 68 on page 197](#).



a05m0236

Figure 69: Drive canister - bezel screws

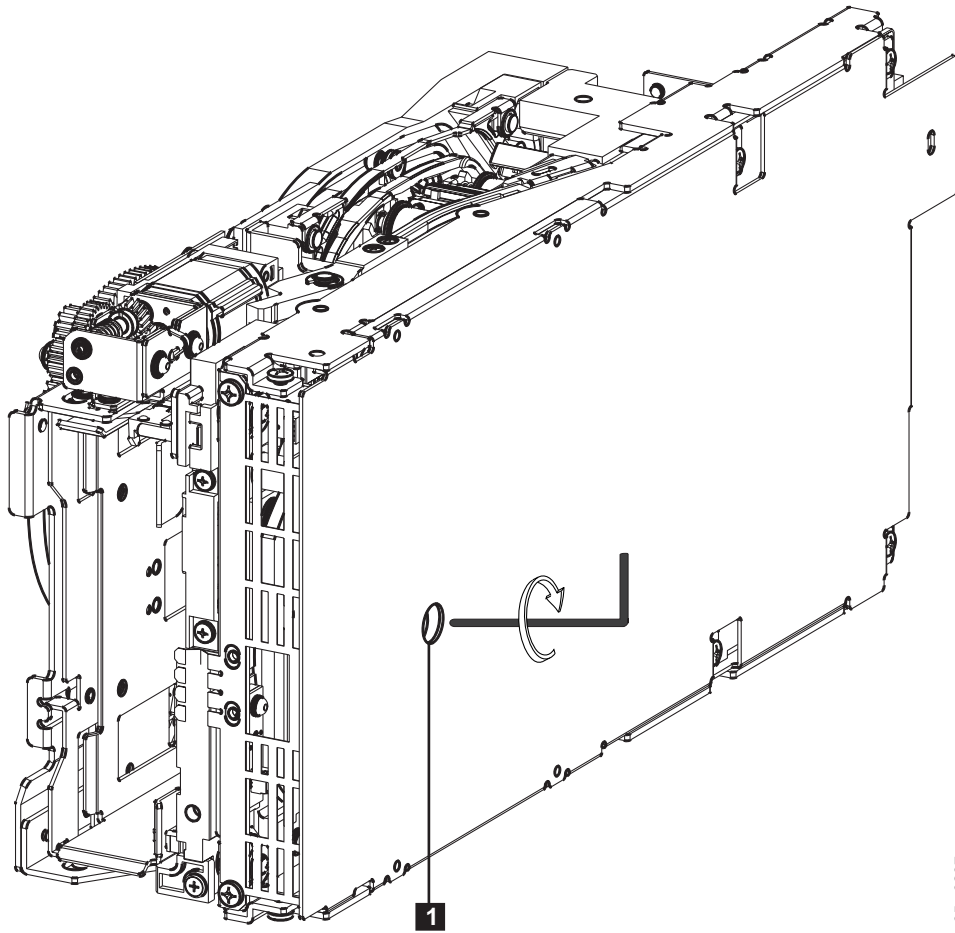
3. Place the drive on a sturdy, work surface.
4. Ground yourself to the drive by using the ESD Kit.

5. Remove the cover of the drive. See [Figure 69 on page 197](#).
6. Inspect the drive to decide which of the following conditions most closely match the symptom on your drive. Proceed to that procedure:
 - [“Tape spooled off supply reel” on page 198](#) - All the tape appears to be on the take-up reel and no tape is on the supply reel (inside the cartridge).
 - [“Tape pulled from leader pin or broken near leader pin” on page 199](#) (at the front end) - All the tape appears to be on the supply reel (inside the cartridge) and little or no tape appears to be on the take-up reel. The leader block is positioned in the take-up reel. After the procedure is complete, return the drive through your normal IBM parts channel.
 - [“Tape broken in midtape” on page 201](#) - Tape appears to be on both the supply reel (inside the cartridge) and the take-up reel.
 - [“Tape tangled along tape path” on page 202](#) - Tape appears to be tangled and damaged but intact. After the procedure is complete, return the drive through your normal IBM parts channel.
 - [“No apparent failure or damage to tape” on page 203](#) - There appears to be no damage or slack to the tape. After the procedure is complete, return the drive through your normal IBM parts channel.

Tape spooled off supply reel

Use this procedure if the tape becomes unspooled inside the tape cartridge. Use [Figure 70 on page 199](#), as you follow this procedure.

1. With the front of the drive facing you, unspool approximately 0.6 m (2.0 ft) of tape out of the take-up reel from the left side of the drive.
2. From the take-up reel, thread tape around the rear of the tape path and over the head rollers on the left side of the drive.
3. Rotate the drive onto its left side, with the head and the tape path facing up.
4. Moisten a cotton swab with water. Wet approximately 13 mm (0.5 in.) of the tape end, and feed it onto the supply reel (located inside the cartridge).
5. See [Figure 70 on page 199](#). From the bottom of the drive, insert a 2.5 mm offset hex wrench through the bottom cover access hole **1**, and into the reel motor axle.



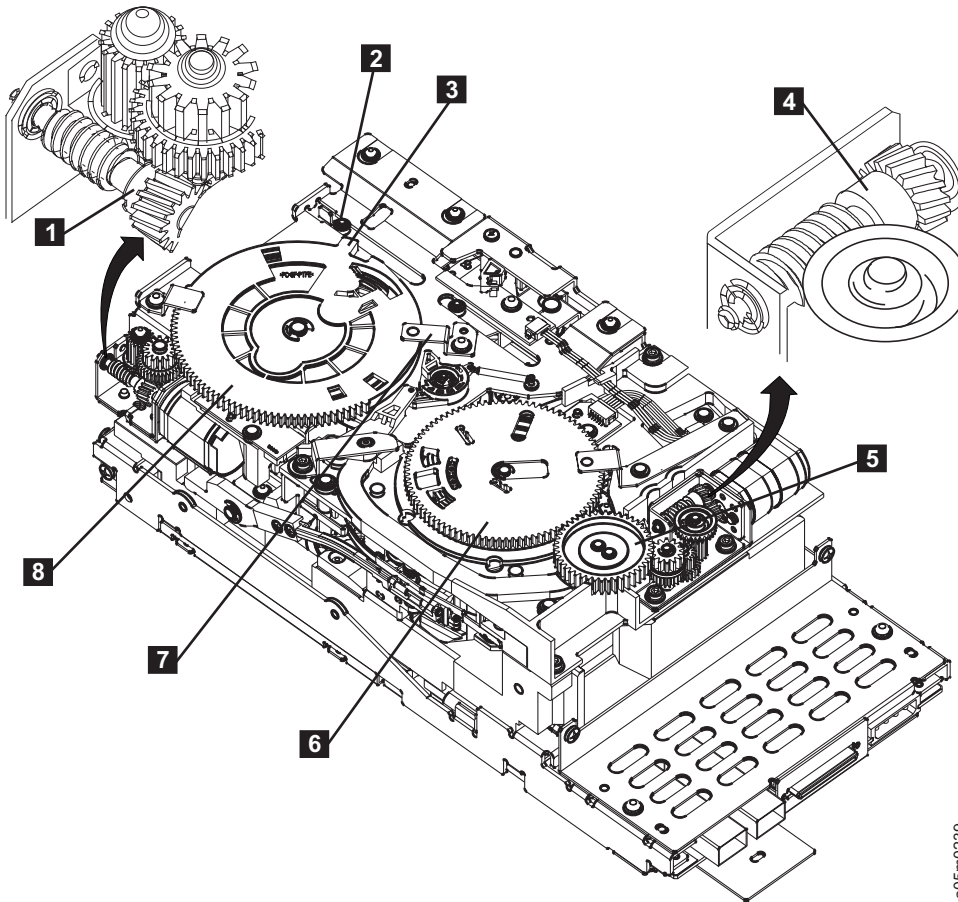
a05m0237

Figure 70: Hex wrench rewinds tape into cartridge

6. Turn the supply reel clockwise, allowing the moistened tape to adhere to the hub as it winds around the supply reel (inside the cartridge).
7. Continue spooling tape into the cartridge until the tape is taut and remains within the flanges of the tape guiding rollers. Ensure that you do not stretch or scratch the tape.
8. Reassemble the drive by reversing Step 5 in [“Manual cartridge removal”](#) on page 195.
9. Reassemble the drive canister by reversing Step 2 in [“Manual cartridge removal”](#) on page 195.
10. Reinstall the drive canister into the cradle assembly. Ensure that the connector on the drive is seated properly into the connector on the cradle.
11. Allow the drive to complete midtape recovery. Messages might appear for several minutes while this action occurs. When this activity completes, the cartridge ejects automatically.
12. Go to [“End of call”](#) on page 185.

Tape pulled from leader pin or broken near leader pin

Use this procedure if the tape becomes detached from the leader pin or is broken close to the leader pin. Use [Figure 71](#) on page 200, as you follow this procedure.



a05m0239

Figure 71: Drive canister with cover removed to reveal gear train. Use with Table 143 on page 200.

Table 143: Gear train identification. Use with Figure 71 on page 200.

Figure identifying number	Gear or part name
1	Loader motor worm gear
2	Cartridge loader tray guide bearing
3	Rotator stub
4	Threader motor worm gear
5	Threader intermediate gear
6	Threader mechanism gear
7	Aluminum bracket
8	Loader mechanism gear

1. From the left side of the drive, pull out tape from the take-up reel.

Note: If there is more than approximately 0.6 m (2 ft) of tape on the take-up reel, go to [“Tape broken in midtape”](#) on page 201.

2. If there is less than approximately 0.6 m (2 ft) of tape on take-up reel, cut off the excess tape as close to the leader pin as possible.

3. Locate the threader motor worm gear **4** on the rear end of the drive. Use your finger to rotate the threader motor worm gear and slowly drive the threader mechanism gear **6**.

4. Rotating the threader motor worm gear **4** clockwise draws the leader block assembly (LBA) into the cartridge. As the tape LBA is secured in the cartridge, you hear the LBA retention spring clips click into place. If you do not hear the click, continue rolling until the threader motor worm gear **1** stops. The LBA is in the correct position. Notice the -
 - Loader mechanism gear **8** nearest the front of the drive, which actuates the cartridge loader mechanism
 - Position of the rotator stub **3**
 - Front loader motor worm gear **1**. Rotating this gear allows the loader mechanism gear **8** to turn
5. With a small screwdriver on the end of the shaft, or with your finger, rotate the loader motor worm gear **1** to turn the loader mechanism gear **8** counterclockwise. Continue turning until the rotator stub **3** passes under the aluminum bracket **7**. This action releases the LBA leader pin.
6. Rotate the threader motor worm gear **4** to turn the threader mechanism gear **6** counterclockwise. This action moves the LBA out of the cartridge and past the read/write head. Stop this rotation when the LBA (Item **1** in [Figure 72 on page 201](#)) is near the tape guide roller nearest the drive rear end.

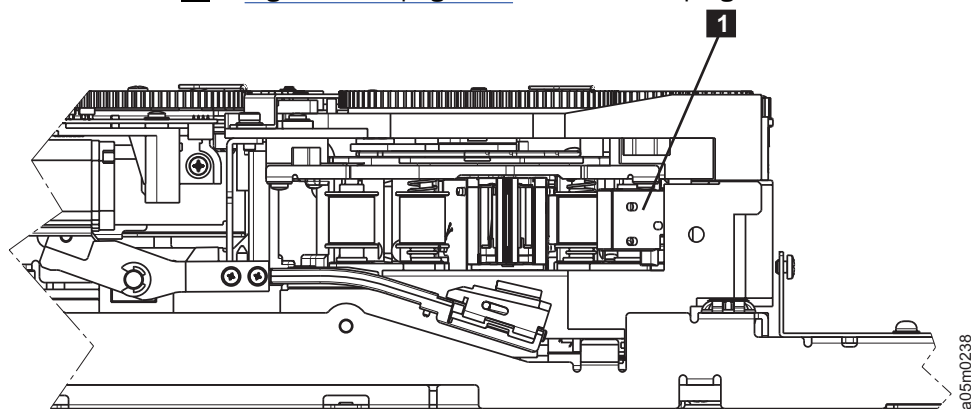


Figure 72: Leader block assembly (LBA)

7. See [Figure 71 on page 200](#). Continue rotating the loader motor worm gear **1** until the rotator stub **3** is positioned, as shown in [Figure 71 on page 200](#). Notice that the rotator stub **3** is nearly aligned with the cartridge loader tray guide bearing **2**.
8. Remove the cartridge from the cartridge loader tray.
9. Reassemble the drive by reversing Step 5 in [“Manual cartridge removal” on page 195](#).
10. Reassemble the drive canister by reversing Step 2 in [“Manual cartridge removal” on page 195](#).
11. Install a new drive canister. See [“Replacing or reinstalling the drive canister” on page 254](#).
12. Repack and return the failed drive through your IBM parts network. For information about repackaging the failed drive canister, see [“Repackaging instructions” on page 181](#).

Tape broken in midtape

Note: The term *midtape* refers to tape that was not in the first or final 1.8 m (6 ft) of tape.

Use this procedure if the tape is broken in midtape, and not near either end. Use [Figure 70 on page 199](#), as you follow this procedure.

1. With the front of the drive facing you, pull 0.6 m (2 ft) of tape out of the drive, from the take-up reel on the left side of the drive.

Note: If less than approximately 5 cm (2 in.) of tape is on the take-up reel, go to [“Tape pulled from leader pin or broken near leader pin” on page 199](#).

2. From the supply reel inside the cartridge, pull approximately 0.3 m (1 ft) of tape.
3. From the take-up reel, thread tape around the rear of the tape path and over the head rollers on the left side of the drive.

4. Using a cotton swab moistened with water, wet approximately 13 mm (0.5 in.) of the tape end. Overlap the tape ends, loosely mending them together.
5. Set the drive on its left side with the head and the tape path facing up.
6. See [Figure 70 on page 199](#). From the bottom of the drive, locate the access hole **1** in the bottom cover. Insert a 2.5 mm offset hex wrench through the bottom cover access hole and into the reel motor axle. Begin spooling tape back into the cartridge by turning the hex wrench clockwise.
7. Turn the supply reel clockwise, carefully guiding the mended portion of the tape to wind around the hub of the supply reel that is located inside the cartridge. Continue spooling tape into the cartridge until the tape is taut. The tape must remain within the flanges of the tape guiding rollers. Ensure that you do not stretch the tape.
8. Reassemble the drive by reversing Step 5 in [“Manual cartridge removal” on page 195](#).
9. Reassemble the drive canister by reversing Step 2 in [“Manual cartridge removal” on page 195](#).
10. Reinstall the drive canister into the cradle assembly or onto the shelf. Ensure that the connector on the drive is seated properly into the connector on the cradle or shelf. See [“Replacing or reinstalling the drive canister” on page 254](#).
11. Allow the drive to complete midtape recovery. Messages might display for several minutes while this recovery occurs. When this activity completes, the cartridge ejects automatically.
12. Go to [“End of call” on page 185](#).

Tape tangled along tape path

Use this procedure if the tape becomes tangled in the tape path. Use [Figure 71 on page 200](#), as you follow this procedure.

1. Carefully pull out and untangle unspooled tape until both the take-up reel and the supply reel contain untangled tape.

Note: If you find the tape to be broken, complete one of the following procedures.

- [“Tape spooled off supply reel” on page 198](#)
- [“Tape pulled from leader pin or broken near leader pin” on page 199](#)
- [“Tape broken in midtape” on page 201](#)

2. Set the drive on its left side with the head and the tape path facing up.
3. See [Figure 70 on page 199](#). From the bottom of the drive, locate the access hole **1** in the bottom cover. Insert a 2.5 mm offset hex wrench through the bottom cover access hole and into the reel motor axle. Begin spooling tape back into the cartridge by turning the hex wrench clockwise.
4. Continue spooling tape into the cartridge until the tape is taut and remains within the flanges of the tape guiding rollers. Ensure that you do not stretch or scratch the tape.
5. See [Figure 71 on page 200](#). Locate the threader motor worm gear **4** on the rear end of the drive. Use your finger to rotate the threader motor worm gear and slowly drive the threader mechanism gear **6**. Rotating the threader motor worm gear clockwise draws the LBA into the cartridge.
6. As the tape leader block assembly (LBA) is secured in the cartridge, you hear the LBA retention spring clips click into place. If you do not hear the click, continue rolling until the threader motor worm gear **4** stops. The LBA is in the correct position.
7. Notice the following -
 - Loader mechanism gear **8** nearest the front of the drive that actuates the cartridge loader mechanism
 - Position of the rotator stub **3**
 - Front loader motor worm gear **1**. Rotating this gear allows the loader mechanism gear **8** to turn.
8. Rotate the loader motor worm gear **1** to turn the loader mechanism gear **8** counterclockwise. Continue turning until the rotator stub **3** passes under the aluminum bracket **7**. This action releases the LBA leader pin.

9. Rotate the threader motor worm gear **4** to turn the threader mechanism gear **6** counterclockwise. This action moves the LBA out of the cartridge and past the read/write head. Stop this rotation when the LBA is near the tape guide roller nearest the drive rear end (see **1** in Figure 72 on page 201).
10. See Figure 71 on page 200. Continue rotating the loader motor worm gear **1** until the rotator stub **3** is positioned. Notice that the rotator stub **3** is nearly aligned with the cartridge loader tray guide bearing **2**.
11. Remove the cartridge from the cartridge loader tray.
12. Reassemble the drive by reversing Step 5 in [“Manual cartridge removal” on page 195](#)
13. Reassemble the drive canister by reversing Step 2 in [“Manual cartridge removal” on page 195](#).
14. Install a new drive canister. See [“Replacing or reinstalling the drive canister” on page 254](#).
15. Repack and return the failed drive through your IBM parts network. For information about repackaging the failed drive canister, see [“Repacking instructions” on page 181](#).

No apparent failure or damage to tape

Use this procedure if you cannot see a failure or there does not seem to be any damage to the tape. Use Figure 71 on page 200, as you follow this procedure.

1. Set the drive on its left side with the head and the tape path facing up.
2. See Figure 70 on page 199. From the bottom of the drive, locate the access hole **1** in the bottom cover. Insert a 2.5 mm offset hex wrench through the bottom cover access hole and into the reel motor axle. Begin spooling tape back into the cartridge by turning the hex wrench clockwise.
3. Continue spooling tape into the cartridge until the tape is taut and remains within the flanges of the tape guiding rollers. Ensure that you do not stretch the tape.
4. See Figure 71 on page 200. Locate the threader motor worm gear **4** on the rear end of the drive. Use your finger to rotate the threader motor worm gear and slowly drive the threader mechanism gear **6**. Rotating the threader motor worm gear clockwise draws the leader block assembly (LBA) into the cartridge.
5. As the LBA is secured in the cartridge, you hear the LBA retention spring clips click into place. If you do not hear the click, continue rolling until the threader motor worm gear **4** stops. The LBA is in the correct position.
6. Notice the following -
 - Loader mechanism gear **8** nearest the front of the drive that actuates the cartridge loader mechanism
 - Position of the rotator stub **3**
 - Front loader motor worm gear **1**. Rotating this gear allows the loader mechanism gear **8** to turn.
7. Rotate the loader motor worm gear **1** to turn the loader mechanism gear **8** counterclockwise. Continue turning until the rotator stub **3** passes under the aluminum bracket **7**. This action releases the LBA leader pin.
8. Rotate the threader motor worm gear **4** to turn the threader mechanism gear **6** counterclockwise. This action moves the LBA out of the cartridge and past the read/write head. Stop this rotation when the LBA is near the tape guide roller nearest the drive rear end (see **1** in Figure 72 on page 201).
9. See Figure 71 on page 200. Continue rotating the loader motor worm gear **1** until the rotator stub **3** is positioned. Notice that the rotator stub **3** is nearly aligned with the cartridge loader tray guide bearing **2**.
10. Remove the cartridge from the cartridge loader tray.
11. Reassemble the drive by reversing Step 5 in [“Manual cartridge removal” on page 195](#)
12. Reassemble the drive canister by reversing Step 2 in [“Manual cartridge removal” on page 195](#).
13. Install a new drive canister. See [“Replacing or reinstalling the drive canister” on page 254](#).
14. Repack and return the failed drive through your IBM parts network. For information about repackaging the failed drive canister, see [“Repacking instructions” on page 181](#).

FMR tape maintenance



Select one of these options to make, update, and convert FMR tapes.

- Make an FMR tape from a CE scratch tape.
- Update an FMR tape from the drive.
- Update microcode from an FMR tape.
- Convert an FMR tape to a CE scratch tape.

If a tape cartridge with the wrong track format is loaded, a `Tape write prot'd` message displays.



Making FMR tape from CE scratch tape

Use this procedure to create an FMR tape from a CE scratch tape.

1. From the service panel, press **Change Mode** , and select **CE Offline Mode**.
2. From the **CE Options** menu, select **FMR Tape**, then **Make FMR Tape**.
3. When you are prompted, load a CE scratch tape. When the tape cartridge is loaded and the drive is ready, select **Process Loaded Tape**. After the header information on the tape is changed, the final status menu indicates that the operation was successful.
4. Select **Unload Drive**.
5. If it is not labeled, label the cartridge as the FMR tape and save the cartridge in a secure place.
6. Return the drive to the **Operator Mode** by pressing **Change Mode**  from the service panel, and selecting **Operator Mode**.

Updating FMR tape from the drive

Use this procedure to update an FMR tape with microcode from the drive.

1. From the service panel, press **Change Mode** , and select **CE Offline Mode**.
2. From the **CE Options** menu, select **FMR Tape**, then **Microcode Update** menu.
3. When prompted, load the FMR tape. When the tape is loaded and the drive is ready, select **Process Loaded Tape**.
4. If the EC level of the microcode in the drive is not on the cartridge, the microcode is copied from the drive to the cartridge.
5. The EC level of the microcode is displayed with the **Select EC Level** screen.
6. Press **Cancel**.
7. Select **Unload Drive**.
8. Return the drive to the **Operator Mode** by pressing **Change Mode**  from the service panel, and selecting **Operator Mode**.
9. Return to the procedure that sent you here.

Updating microcode from the FMR tape cartridge




Attention: Do not use this method of updating microcode if a controller is attached.

Use this procedure to update the drive microcode by using an FMR (field microcode replacement) tape cartridge. Before this method is used, review [Table 155 on page 217](#) for preferred methods.

1. From the service panel, press **Change Mode** , and select **CE Offline Mode**.
2. From the **CE Options** menu, select **FMR Tape** > **Microcode Update**.



3. At the **Load FMR Tape** menu, load the FMR cartridge.
4. When the tape is loaded and at ready point, select **Process Loaded Tape**.
 - The device verifies that FMR tape is the correct format for the drive model.
 - If the current EC level of microcode is not already on the FMR cartridge, the 3592 writes the current level of microcode onto the FMR cartridge. This procedure provides the CE with the option to go back to the current level, if necessary.
5. When the **Select EC Level** menu displays on the service panel, select the wanted EC level. (The drive displays only EC levels of microcode that are valid for the EC level of the drive.)

Note: Do not touch **Reset** while a microcode update is in process.

 - The microcode in the drive is automatically updated with the latest level of microcode from the FMR tape.
 - When the update is complete, the drive status displays on the service panel.
6. If the update was not successful, try again with a different cartridge.
7. When the update is successful, select **Unload drive**.
8. Press **Reset** to activate the microcode.
9. Record the EC level and link level of the microcode in “[Microcode EC level history log](#)” on page 205.
10. Return the drive to the **Operator Mode** by pressing **Change Mode** , and selecting **Operator Mode**.
11. Save the FMR cartridge in a secure place.
12. Return to the procedure that sent you here.

Converting FMR tape to a CE scratch tape

Use this procedure to convert an FMR tape to a CE scratch tape.

1. From the service panel, press **Change Mode** , and select **CE Offline Mode**.
2. From the **CE Options** menu, select **FMR Tape > Unmake FMR Tape**.
3. When you are prompted, load the FMR tape. When the tape is loaded and the drive is ready, select **Process Loaded Tape**.
4. After the tape has the header information that is changed, the final status menu indicates whether the operation was successful.
5. Select **Unload Drive**.
6. Return the drive to the “**Operator Mode**” by pressing **Change Mode** , and selecting **Operator Mode**.

History log examples

Microcode EC level history log

[Figure 73 on page 206](#) shows how to determine the EC level and link level of the microcode by using the service panel. Use the link level **1** to determine the latest EC level.

If you read the EC level and link level from the FMR tape (“[Updating microcode from the FMR tape cartridge](#)” on page 204), the link level (LL) is displayed as dddd instead of d_ddd. The following example shows that the second entry is the latest level microcode:

```
EC=6C56789 LL=4D0D
EC=3C56789 LL=5B02 (highest EC level)
```


Setting WW names

Note:

1. If you alter any name, you must save or alter all the names. For example, if you alter the Node 0 Name only, you must at least save Node 1, Port 0 and Port 1.
2. Refer to “Supplemental Messages” in [Table 44 on page 79](#) for fibre- addressing information.

1. Ensure that the drive is offline.

2. At the **Options Display** screen, press **Change Mode** \uparrow . Select **CE Offline Mode > Config/Install > Drv Options**.

Note: The drive Serial No, Node 0 Name/Node 1 Name, Port 0 Name, and Port 1 Name must be recorded. If not, see “Displaying WW names” on [page 207](#), and enter the data in [Table 145 on page 207](#), as necessary.

3. At the **CE Drv Options** menu, select **Drv Serial No**.
4. Select **Alter Serial No**. Increment each serial number digit, as necessary, to reflect the recorded serial number.

Table 148: Alter Serial No - CE VPD Data menu	
CE VPD Data	J1A-F
▶ 0 ▲ 1 0 0 1 1 SAVE AND CONTINUE	SEQUENCE NUMBER

5. Select **SAVE AND CONTINUE**, then press **Enter**. This action causes the **CE Save Data?** menu to display.

Table 149: Alter Serial No - CE Save Data? menu	
CE SAVE DATA?	J1A-F
▶ CANCEL ▲ YES NO	Supplemental Message section contents depend on the data that is stored. Serial Sequence Number Node 0/1 Noden FC WWID Port 0/1 Portn FC WWID

6. Select **YES**, then press **Enter** to store the data into VPD memory and return you to the **CE DRV Ser No** menu.
7. Select **Cancel**, as necessary to return to the **CE Config/Install** menu.
8. Select **Fibre Options**, then select **Set Node 0 Name**.
9. Get the Node 0 Name from [Table 145 on page 207](#) and enter the last 6 digits into VPD memory, as shown in [Table 150 on page 208](#). Increment the Node 0 Name digit positions to reflect the recorded Node 0 name.

Table 150: CE Set Node 0 Name menu	
SET NODE 0 NAME	J1A-F

Table 150: CE Set Node 0 Name menu (continued)	
▶ 0 ▲ 2 0 7 7 SAVE AND CONTINUE	5005076302002077

10. Select **SAVE AND CONTINUE**, then press **Enter**. This action causes the **CE Save Data?** menu to display.
11. Select **YES**, then press **Enter** to store the data into VPD memory, and return you to the **Fibre Options** menu.
12. Select **Set Node 1 Name**.
13. Get the Node 1 Name from [Table 145 on page 207](#), and enter the last 6 digits into VPD memory, as shown in the example in [Table 151 on page 209](#). Increment the Node 1 Name digit positions to reflect the recorded Node 1 name.

Table 151: CE Set Node 1 Name menu	
SET NODE 1 NAME	J1A-F
▶ 0 ▲ 2 0 7 7 SAVE AND CONTINUE	5005076302C02077

14. Select **SAVE AND CONTINUE**, and press **Enter**. This action causes the **CE Save Data?** menu to display.
15. Select **YES**, and press **Enter** to store the data into VPD memory, and return you to the **Fibre Options** menu.
16. At the **Fibre Addresses** menu, select **Set Port 0 Name**.

Table 152: Set Port 0 Name menu	
SET PORT 0 NAME	J1A-F
▶ 0 ▲ 2 0 7 7 SAVE AND CONTINUE	50050763020402077

17. Get the Port 0 Name from [Table 145 on page 207](#), and enter the last 6 digits into VPD memory, as shown in the previous example. Increment the Port 0 Name digit positions to reflect the recorded Port 0 Name.
18. Select **SAVE AND CONTINUE**, then press **Enter**. This action causes the **CE Save Data?** menu to display.
19. Select **YES**, then press **Enter** to store the data into VPD memory and return you to the **Fibre Options** menu.
20. At the **Fibre Options** menu, select **Set Port 1 Name**.

Table 153: CE Set Port 1 Name menu	
SET PORT 1 NAME	J1A-F
▶ 0 ▲	5005076302802077
2	
0	
7	
7	
SAVE AND CONTINUE	

21. Get the Port 1 Name from [Table 145 on page 207](#), and enter the last 6 digits into VPD memory, as shown in the previous example. Increment the Port 1 Name digit positions to reflect the recorded Port 1 Name.
22. Select **SAVE AND CONTINUE**, then press **Enter**. This action causes the **CE Save Data?** menu to display.
23. Select **YES**, then press **Enter** to store the data into VPD memory and return you to the **Fibre Options** menu.
24. Now that the Serial, Node 0, Node 1, Port 0, and Port 1 Names are set, you can return the machine to the customer. You might want to check the names with the [“Displaying WW names” on page 207](#) to verify their validity.
25. Return the drive to the **Operator Mode**, and place the drive online.
26. Return to the procedure that sent you here.

Setting Root names

Note: If you alter the root name, all WW names are reset automatically.

1. Ensure that the drive is offline.
2. At the **Options Display** screen, press **Change Mode** **I**.

Note: The drive Serial No, Node Names, and Port Names must be recorded in [Table 145 on page 207](#). If they are not, see [“Displaying WW names” on page 207](#).
3. At the **Confirm Mode Change** menu, select **CE Offline Mode > Config/Install > Fibre Options > Set Root Name**.
4. Increment the root name digit positions to reflect the wanted root name.
5. Select **Save and Continue**, and press **Enter**. The **CE Save Data** menu displays.
6. Select **Yes**, and press **Enter** to store the data in VPD memory.
7. Follow the [“Displaying WW names” on page 207](#) to record the new node names and port names in [Table 145 on page 207](#).


Dump maintenance utilities

You can offload a dump by using the methods that are shown in [Table 154 on page 210](#).

Table 154: <i>Offloading dumps</i>	
To offload a dump to -	Go to -
Laptop (notebook) with Ethernet port	“Ethernet (laptop) Drive Dump procedures” on page 187
Flash	“Offloading the dump to flash memory” on page 211



<i>Table 154: Offloading dumps (continued)</i>	
To offload a dump to -	Go to -
System i	“Offloading dumps to tape cartridge” on page 216
AIX	“Offloading dumps to AIX with TAPEUTIL” on page 212
Linux	“Offloading dumps to Linux system with TAPEUTIL” on page 213
Solaris system	“Offloading dumps to Solaris system with TAPEUTIL” on page 214
HP-UX system	“Offloading dumps to HP-UX system with TAPEUTIL” on page 215
Windows	“Offloading dumps to Windows system with NTUTIL” on page 216
Tape cartridge	“Offloading dumps to tape cartridge” on page 216

Offloading the dump to flash memory



The dump icon  displays when the memory dump is available. It remains on the screen to indicate that trace data is stored in the device.


Notes:

- Trace data is volatile and is lost if you press **Reset** or if you remove power from (power OFF) the drive before the dump is offloaded.
- If you determine through your investigation that the drive does not need replacement, you must clear the dump from flash memory. See [“Clearing flash dump memory” on page 211](#).

1. From the service panel, press **Change Mode** .
2. Select **CE Offline Mode**, then **Dump**.
3. If the dump icon  is displayed, continue at Step 4.

--OR--


If the dump icon  is not displayed, a dump must be forced. From the **CE Dump** menu, select **Force Dump**. When the dump is available, the dump icon  displays.

4. From the **CE Dump** menu, select **Copy Dump to Flash** to copy a dump from dynamic random access memory (DRAM) to nonvolatile flash memory in the drive. The **CE Wait** menu displays momentarily while the dump is copied.
5. At the **CE Diags Good** menu, the  icon displays, which indicates that a dump is in flash memory. An **FID2 ED** displays, which indicate that a dump is stored in flash memory.
6. Select **Cancel** to return to the **CE Dump** menu, or select **Logs** to view the **CE Logs** menu.
7. Return to the procedure that sent you here.

Clearing flash dump memory

Note: This action removes the flash icon from the service panel and from the operator bezel -

- Flash icon from the service panel
- Dump from flash memory
- Reporting action to the host

The flash dump icon  appears when a dump is stored in flash memory. If you do not need the flash dump information, you can clear the dump by using this procedure.


1. From the service panel, press **Change Mode I**.
2. Select **CE Offline Mode**, then **Dump**.
3. From the **CE Dump** menu, select **Clear Flash Dump**. The **CE Wait** menu appears momentarily while the dump is cleared.
4. Select **Cancel** to return to the **CE Dump** menu.
5. Return to the procedure that sent you here.

Offloading Dumps to System i (OS/400)

Use “[Offloading dumps to tape cartridge](#)” on page 216.

Offloading dumps to AIX with TAPEUTIL

Refer to the *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for details of the ITDT/tapeutil program with AIX systems.

The dump icon  appears when the dump is available. It remains on the screen to indicate that trace data is stored in the device.

Note: Trace data is volatile and is lost if you press **Reset** or power OFF the device.

You might require assistance from the customer during this process.

This procedure reads a dump from the 3592 and writes it to a diskette in AIX/UNIX format.

1. At the drive service panel, verify that the drive is Online.
2. Verify that the drive is unloaded.
3. Verify that the drive is not in use by another host.
4. Insert the diskette that is used for the dump into the system floppy diskette drive.
5. When the prompt appears, format the diskette by typing `format`, and pressing **Enter**.
6. Start the tape utility program by typing `tapeutil` at the prompt.
7. Select **Tape Drive Service Aids** option from the menu, and press **Enter**.
8. Select **Read Dump** from the following panel, and press **Enter**.

```
IBM Tape Device Service Aid Menu                                700000

Select One of the Service Aids to be performed

Force Microcode Dump
  Perform a microcode dump of the system. The dump is stored in
  the device.
  After the dump is performed it must be read using Read Dump.
Read Dump
  Transfer a dump from the tape device to a host file, diskette or
  a tape cartridge.
Microcode load
  Download microcode from host file or diskette to tape device via
  SCSI bus.
Error Log Analysis
  Analyze system error log for device.
F3=Cancel                                     F10=Exit
```

9. Select a **Device**, and press **F7=Commit** from the following panel. You must press **F7=Commit** after the drive is selected.


```

IBM Tape Device Selection Menu.                                9000000

Select One of the devices listed below.

NAME          LOCATION      TYPE
rmt2          00-05-01-10  IBM 3592 Tape Drive and Medium Changer
rmt3          00-05-01-30  IBM 3592 Tape Drive and Medium Changer

F3=Cancel          F7=Commit          F10=Exit

```

10. Enter the File name in the destination field. (Example: /dev/rfd0 +/). You must press **F7=Commit** to write the file to the diskette.

```

Prompting for Srce File for Operation on rmt3 located at 00-05-01-30
                                                    B000000

Please enter the following fields...

Enter Filename:                                     /dev/rfd0 +/


F1=Help          F2=Refresh          F3=Cancel          F4=List
F5=Reset          F7=Commit          F10=Exit

```

11. Press **F10** to exit the read dump.
12. Press **q** to quit *tapeutil*.
13. Remove the diskette from the diskette drive. The dump diskette that is created is in AIX/UNIX format.

Offloading dumps to Linux system with TAPEUTIL

Refer to the *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for details of the ITDT/tapeutil program with Linux systems.

The dump icon  appears when the dump is available, and remains on the screen to indicate that trace data is stored in the device.

Note: Trace data is volatile and is lost if you press **Reset** or power OFF the device.

1. At the drive service panel, verify that the drive is Online.
2. Verify that the drive is unloaded.
3. Verify that the drive is not in use by another host.
4. Start the tape utility program by typing `IBMtapeutil` at the prompt.

```

IBMtapeutil for Linux
=====
1. Tape
  2. Changer
  3. Quit
=====

Enter your choice:

```

5. Select **1** (Tape).

Hit <enter> to continue...

```
----- General Commands: -----
 1. Open a Device          7. Request Sense
 2. Close a Device        8. Log Sense Page
 3. Inquiry               9. Mode Sense Page
 4. Test Unit Ready      10. Switch Tape/Changer Device
 5. Reserve Device       11. Create Special Files
 6. Release Device       12. Query Driver Version
 Q. Quit IBMTapeutil

----- Medium Changer Commands: -----
60. Element Information  65. Load/Unload Medium
61. Position To Element 66. Initialize Element Status
62. Element Inventory   67. Prevent/Allow Medium Removal
63. Exchange Medium     68. Initialize Element Status Range
64. Move Medium         69. Read Device Identifiers

----- Service Aid Commands: -----
70. Dump Device         72. Load Ucode
71. Force Dump         73. Reset Drive

-----
99. Back To Main Menu

Enter Selection: :
```

6. Enter 1 (Open a Device).

7. Enter /dev/IBMTape0 when prompted for the device name.

8. Enter 1 (Read/Write) (not shown).

```
----- General Commands: -----
 1. Open a Device          7. Request Sense
 2. Close a Device        8. Log Sense Page
 3. Inquiry               9. Mode Sense Page
 4. Test Unit Ready      10. Switch Tape/Changer Device
 5. Reserve Device       11. Create Special Files
 6. Release Device       12. Query Driver Version
 Q. Quit IBMTapeutil

----- Tape Commands: -----
20. Rewind                33. Set Block Size
21. Forward Space Filemarks 34. Retension Tape
22. Backward Space Filemarks 35. Query/Set Tape Position
23. Forward Space Records  36. Query Tape Status
24. Backward Space Records 37. Load Tape
25. FSFM                  38. Unload Tape
26. BSFM                  39. Lock Tape Drive Door
27. Space to End of Data   40. Unlock Tape Drive Door
28. Read and Write Tests   41. Take Tape Offline
29. Write Filemarks       42. Enable/Disable Compression
30. Read or Write Files    43. Flush Driver's Buffer
31. Erase                 44. Self Test
32. Reset Drive           45. Display Message

----- IBMTape Commands: -----
46. Query Sense           52. Locate Tape Position
47. Query Inquiry        53. Read Tape Position
48. Query/Set Tape Parameters 54. Query Mtdevice Number
49. Query/Set Tape Position 55. Synchronize Buffers
50. Query/Set MT/ST Mode  56. List Tape Filemarks
51. Report Density Support

----- Service Aid Commands: -----
70. Dump Device         72. Load Ucode
71. Force Dump         73. Reset Drive

-----
99. Back To Main Menu

Enter Selection:
```

9. Select **70** (Dump Device).


10. Specify the file name from which the dump is to be read, then press **Enter**.

11. Enter **Q**. to quit the program.


Offloading dumps to Solaris system with TAPEUTIL

Refer to the *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for details of the ITDT/tapeutil program with Solaris systems.

The 3592 supports forcing a diagnostic dump and storing that dump to a mounted tape cartridge or to a host system file through the SCSI bus.

The dump icon  appears when the dump is available, and remains on the screen to indicate that trace data is stored in the device.

Note:

- Trace data is volatile and is lost if you press **Reset** or power OFF the device.
- If you force a dump when the dump icon  is already displayed. The existing trace data is overlaid by the new trace data.

You might require information from the customer during this process.

To force and store a diagnostic dump on these devices, complete the following steps:

1. Verify that the IBM tape subsystem is powered ON and online.
2. Verify that the drive is not in use by another host.
3. Verify that the drive has no customer cartridges loaded. CE Scratch Tape is OK.
4. Enter the following command to force the dump, substituting **n** with the actual value from the device special file that is associated with the target device:

```
/opt/IBMtape/tapeutil -f /dev/ramt/nst -o fdp -v
```

5. Determine the location for the dump to be stored (that is, floppy diskette such as /vol/dev/aliases/floppy0 or host file such as /tmp/diag_dump.file).
6. Enter the following command, substituting **file** with the actual path and file name of the dump destination file, and substituting **n** with the actual value from the device special file that is associated with the dump device:

```
/opt/IBMtape/tapeutil -f /dev/ramt/nst -o sdp -z file -v
```


Note: The diagnostic dump procedure can also be completed with the menu-driven interface of the tapeutil program. To start the tapeutil program in this format, enter the following command, then choose option 1 to open the device, followed by option 5 to force a dump, and option 6 to store the dump:

```
/opt/IBMtape/tapeutil
```


Offloading dumps to HP-UX system with TAPEUTIL

Refer to the *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for details of the ITDT/tapeutil program with HP-UX systems.

The 3592 supports forcing a diagnostic dump and storing that dump to a mounted tape cartridge or to a host system file via the SCSI bus.

The dump icon  appears when the dump is available, and remains on the screen to indicate that trace data is stored in the device.

Notes:

- Trace data is volatile and is lost if you press **Reset** or power OFF the device.
- If you force a dump when the dump icon  is already displayed. The existing trace data is overlaid by the new trace data.

You might require information from the customer during this process.

To force and store a diagnostic dump on these devices, complete the following steps -

1. Verify that the IBM tape subsystem is powered ON and online.

2. Verify that the drive is not in use by another host.
3. Verify that the drive has no customer cartridges loaded.
4. Enter the following command to force the dump, substituting **n** with the actual value from the device special file that is associated with the target device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nst -o fdp -v
```

5. Determine the location for the dump to be stored (that is, floppy diskette such as /vol/dev/aliases/floppy0 or host file such as /tmp/diag_dump.file).
6. Enter the following command, substituting **file** with the actual path and file name of the dump destination file, and substituting **n** with the actual value from the device special file that is associated with the dump device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nst -o sdp -z file -v
```

Note: The diagnostic dump procedure also might be completed with the menu-driven interface of the tapeutil program. To start the tapeutil program in this format, enter the following command, then choose option **1** to open the device, followed by option **5** to force a dump, and option **6** to store the dump:

```
/opt/IBMtape/tapeutil
```

Offloading dumps to Windows system with NTUTIL

Refer to the *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for details of the ITDT/tapeutil program with Windows systems.


Note: The dump procedure might be completed with the menu-driven interface of the ntutil program. To start the ntutil program in this format, enter the common commands and option 80 to Force Dump.

The dump goes to the default drive/directory.

1. Verify that the IBM tape subsystem is powered ON and online.
2. Verify that the tape drive has a tape cartridge loaded.
3. Start ntutil and open the drive by completing Steps 1 - 3 in [“Starting NT UTILITY \(ntutil\) from Windows”](#) on page 222. Return here.
4. Determine the version of microcode present on the device by entering the command **85** (Get Version).
5. Force the dump by entering the following command **80** (Force Dump).
6. When the operation completes successfully, select **21** (close), then press **Enter**.
7. After tests are complete, quit the **Command Prompt** window by clicking the **X** in the upper right corner of the screen.
8. Return to the procedure that sent you here.


Offloading dumps to tape cartridge

Note: Do not begin this procedure unless instructed to by your next level of support.


The dump icon  appears when the dump is available and remains on the screen to indicate that trace data is stored in the device.



Attention: Trace data is volatile and is lost if you press **Reset** or remove power from the drive.

1. Press **Change Mode**  to place the drive in **CE Offline** mode.
2. Select **Dump** from the **CE Options** menu.
3. Select **Copy Dump to Tape** to copy a dump from dynamic random access memory (DRAM) to a tape cartridge.

4. Select **Write Dump at BOT** to copy a dump at the beginning of tape, or select **Write Dump at EOD** to copy a dump at the end of the data that is already present on the tape.
5. At the prompt, load a CE scratch tape, and select **Process Loaded Tape**.
A screen indicates the status of the copy to medium (Successful Copy or Unsuccessful Copy).
6. When the dump to tape completes, contact your next level of support for further instructions.

The dump icon  disappears from the 3592 operator panel when the dump to tape completes.

Microcode maintenance

You can update microcode with one of the various methods in Table 155 on page 217, shown in a somewhat descending order of preference, with "FMR cartridge" being the **least** preferred.

Note: See "Horizontal bar indicators" on page 83 if you would like to learn how to monitor the progress of the microcode update.

Table 155: Updating microcode. These methods are shown in a descending order of desirability.

To update microcode from:	Go to:	Approximate elapsed time
Host	Documentation for your host system	2 minutes/drive
Ethernet port of your laptop	"Ethernet (laptop) Microcode procedures" on page 189	A few seconds
System i	"Updating microcode from System i (OS/400)" on page 217	2 minutes/drive
AIX with TAPEUTIL	"Updating microcode from AIX with TAPEUTIL" on page 218	2 minutes/drive
Linux with TAPEUTIL	"Updating microcode from Linux with TAPEUTIL" on page 219	2 minutes/drive
Solaris with TAPEUTIL	"Updating microcode from Solaris with TAPEUTIL" on page 220	2 minutes/drive
HP-UX System with TAPEUTIL	"Updating microcode from HP-UX system with TAPEUTIL" on page 221	2 minutes/drive
Windows with NTUTIL	"Updating microcode from Windows with NTUTIL" on page 222	2 minutes/drive
FMR cartridge	"Updating microcode from the FMR tape cartridge" on page 204	Create FMR: 2 minutes Update: 3 minutes/drive

Updating microcode from System i (OS/400)

Microcode load for the 3592 tape drives that are directly attached to an System i is obtained from the System i with the program temporary fix (PTF) process.

1. Notify the customer that a microcode load for the 3592 is available with a PTF.
2. The customer applies the PTF.
3. Before the customer IPLs the input/output processor (IOP) -
 - Verify that the drive is unloaded.
 - At the drive service panel, verify that the drive is online. The PTF indicates that the drive must be varied online with a reset.

4. The customer can now IPL the IOP. The IPL causes the microcode load to proceed.
5. When the microcode load is complete, the drive completes a soft power-on reset (restarts the microcode).

Updating microcode from AIX with TAPEUTIL

Refer to the *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for details of the ITDT/tapeutil program with AIX systems.

You might require assistance from the customer during this process.

This procedure downloads microcode to the tape drive from a file or from CDs, with the Fibre Channel.

1. At the drive service panel, verify that the drive is Online.
2. Verify that the drive is unloaded.
3. Verify that the drive is not in use by another host.
4. Take the drive offline from the host.
5. Start the tape utility program by typing `tapeutil` at the prompt.
6. Select the **Tape Drive Service Aids** option, and press **Enter**.
7. Select **Microcode load** from the following panel, then press **Enter**.

```

IBM Tape Device Service Aid Menu                                700000

Select One of the Service Aids to be performed

Force Microcode Dump
  Perform a microcode dump of the system. The dump is stored in
  the device.
  After the dump is performed it must be read using Read Dump.
Read Dump
  Transfer a dump from the tape device to a host file, diskette or
  a tape cartridge.
Microcode load
  Download microcode from host file or diskette to tape device via
  fibre channel.
Error Log Analysis
  Analyze system error log for device.
F3=Cancel                                                    F10=Exit

```

8. Select a **Device**, and press **F7=Commit** from the following panel. You must press **F7=Commit** after the drive is selected.

```

IBM Tape Device Selection Menu.                                900000

Select One of the devices listed below.

NAME          LOCATION      TYPE
rmt2          00-05-01-10  IBM 3592 Tape Drive and Medium Changer
rmt3        00-05-01-30 IBM 3592 Tape Drive and Medium Changer

F3=Cancel          F7=Commit          F10=Exit

```

9. If you are loading the microcode from the CD drive, press **F7=Commit** from the following panel. Otherwise, enter the path and filename, and press **F7=Commit**.
10. Enter the full path name (as in `/tmp/D3I2_xxx.yyyy`) in the source field, where `xxx.yyyy` is the file name of the microcode file to be loaded. An example of a microcode file might be `./762.fmrz`. You must press **F7=Commit** after the file name is entered.

Important: Ensure that you select the correct microcode file for the type of drive to be updated.

- 3592 Model EH7 = D3I3_xxx.fmrz
- 3592 Model EH8 = D3I4_xxx.fmrz
- 3592 Model 55F = D3I4_xxx.fmrz
- 3592 Model 60F = D3I5_xxx.fmrz

```
Prompting for Srce File for Operation on rmt3 located at 00-05-01-30
                                                    B00000

Please enter the following fields...

  Enter Filename:                               D3I0_xxx.fmrz

F1=Help      F2=Refresh      F3=Cancel      F4=List
F5=Reset     F7=Commit      F10=Exit
```

While the microcode load takes place, the display shows

```
"Operation running, please stand by"
```

The drive display shows the loading status messages at the bottom of the display.

11. When the microcode load completes, the initiator display shows

```
Operation completed successfully!
```

The drive runs a soft power-on reset (restart the microcode).

12. Press **F10** to exit the microcode load.
13. Repeat the previous steps for each drive, then return here to complete this procedure.
14. Press **q** to quit *tapeutil*.
15. Vary the device online to the host.
16. Remove the CD from the CD drive.

Note: You must have root authority to complete the following step.

17. Update the VPD data in the host System p (AIX) by unconfiguring the device (**Example: rmdev -l rmt3**) and reconfiguring the device (**Example: mkdev -l rmt3**).

Updating microcode from Linux with TAPEUTIL

Refer to the *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for details of the ITDT/tapeutil program with Linux systems.

You might require assistance from the customer during this process.

1. At the drive service panel, verify that the drive is Online.
2. Verify that the drive is unloaded.
3. Verify that the drive is not in use by another host.
4. Start the tape utility program by typing `IBMtapeutil` at the prompt.

```
IBMtapeutil for Linux
=====
 1. Tape
 2. Changer
 3. Quit
=====

Enter your choice:
```

5. Select **1** (Tape).

Hit <enter> to continue...

```
----- General Commands: -----
 1. Open a Device          7. Request Sense
 2. Close a Device        8. Log Sense Page
 3. Inquiry               9. Mode Sense Page
 4. Test Unit Ready      10. Switch Tape/Changer Device
 5. Reserve Device       11. Create Special Files
 6. Release Device       12. Query Driver Version
 Q. Quit IBMtapeutil

----- Medium Changer Commands: -----
60. Element Information   65. Load/Unload Medium
61. Position To Element  66. Initialize Element Status
62. Element Inventory    67. Prevent/Allow Medium Removal
63. Exchange Medium     68. Initialize Element Status Range
64. Move Medium          69. Read Device Identifiers

----- Service Aid Commands: -----
70. Dump Device          72. Load Ucode
71. Force Dump          73. Reset Drive

-----
99. Back To Main Menu
```

Enter Selection:

6. Enter **1** (Open a Device).
7. Enter **/dev/IBMtape0** when prompted for the device name.
8. Enter **1** (Read/Write) (not shown).

```
----- General Commands: -----
 1. Open a Device          7. Request Sense
 2. Close a Device        8. Log Sense Page
 3. Inquiry               9. Mode Sense Page
 4. Test Unit Ready      10. Switch Tape/Changer Device
 5. Reserve Device       11. Create Special Files
 6. Release Device       12. Query Driver Version
 Q. Quit IBMtapeutil

----- Tape Commands: -----
20. Rewind                33. Set Block Size
21. Forward Space Filemarks 34. Retension Tape
22. Backward Space Filemarks 35. Query/Set Tape Position
23. Forward Space Records  36. Query Tape Status
24. Backward Space Records 37. Load Tape
25. FSFM                  38. Unload Tape
26. BSFM                  39. Lock Tape Drive Door
27. Space to End of Data   40. Unlock Tape Drive Door
28. Read and Write Tests   41. Take Tape Offline
29. Write Filemarks       42. Enable/Disable Compression
30. Read or Write Files    43. Flush Driver's Buffer
31. Erase                  44. Self Test
32. Reset Drive           45. Display Message

----- IBMtape Commands: -----
46. Query Sense           52. Locate Tape Position
47. Query Inquiry        53. Read Tape Position
48. Query/Set Tape Parameters 54. Query Mtdevice Number
49. Query/Set Tape Position 55. Synchronize Buffers
50. Query/Set MT/ST Mode   56. List Tape Filemarks
51. Report Density Support

----- Service Aid Commands: -----
70. Dump Device          72. Load Ucode
71. Force Dump          73. Reset Drive

-----
99. Back To Main Menu
```

Enter Selection:

9. Select **72** (Load Ucode).
10. Specify the file name from which the microcode image is to be read, then press **Enter**.
11. Enter **Q** to quit the program.

Updating microcode from Solaris with TAPEUTIL

Refer to the *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for details of the ITDT/tapeutil program with Solaris systems.

You might require assistance from the customer during this process.

The 3592 supports downloading a new microcode image from the host system with the fibre channel. This procedure downloads microcode to the tape drive from a file or diskette. This diskette must be in AIX/UNIX format.

To download microcode to these devices, complete the following steps:

1. Verify that the IBM tape subsystem is powered ON and online.
2. Verify that the tape drive does not currently have a tape cartridge loaded.
3. Verify that the drive is not in use by another host.
4. Determine the current version of microcode present on the device by entering the following command, substituting **n** with the actual value from the device special file that is associated with the target device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nm -o qmc -v
```

5. Determine the source of the new microcode image file (that is, the host file such as /tmp/ucode_image.file).
6. Enter the following command, substituting **file** with the actual path and file name of the microcode image file, and substituting **n** with the actual value from the device special file that is associated with the destination device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nm -o dmc -v -z file
```

Note: The microcode download procedure can also run with the menu-driven interface of the tapeutil program. To start the tapeutil program in this format, enter the following command, then choose option 1 to open the device, followed by option 4 to query the current device microcode level, and option 7 to download new microcode.

```
/opt/IBMtape/tapeutil
```

Updating microcode from HP-UX system with TAPEUTIL

Refer to the *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for details of the ITDT/tapeutil program with HP-UX systems.

You might require assistance from the customer during this process.

The 3592 supports downloading a new microcode image from the host system. This procedure downloads microcode to the tape drive from a file or diskette. This diskette must be in AIX/UNIX format.

To download microcode to these devices, complete the following steps:

1. Verify that the IBM tape subsystem is powered ON and online.
2. Verify that the tape drive does not currently have a tape cartridge loaded.
3. Verify that the drive is not in use by another host.
4. Determine the current version of microcode present on the device by entering the following command, substituting **n** with the actual value from the device special file that is associated with the target device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nst -o qmc -v
```

5. Determine the source of the new microcode image file (that is, the host file such as /tmp/ucode_image.file).
6. Enter the following command, substituting **file** with the actual path and file name of the microcode image file, and substituting **n** with the actual value from the device special file that is associated with the destination device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/nst -o dmc -z file -v
```

Note: The microcode download procedure might also run with the menu-driven interface of the tapeutil program. To start the tapeutil program in this format, enter the following command, then choose option 1 to open the device, followed by option 4 to query the current device microcode level, and option 7 to download new microcode.

```
/opt/IBMtape/tapeutil
```

Updating microcode from Windows with NTUTIL

Refer to the *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for details of the ITDT/tapeutil program with Windows systems.

You might require assistance from the customer during this process.

The 3592 supports downloading a new microcode image from the host system with the Fibre Channel. This procedure downloads microcode to the tape drive from a file.

Note: The microcode download procedure can be run with the menu-driven interface of the ntutil program. To start the ntutil program in this format, go to the common start: followed by commands: option 20 to open the device, followed by option 85 to query the current device microcode level, and option 82 to download new microcode:

1. Verify that the IBM tape subsystem is powered ON and is online.
2. Verify that the tape drive does not have a tape cartridge loaded.
3. Start ntutil and open the drive by completing Steps 1-3 in [“Starting NT UTILITY \(ntutil\) from Windows” on page 222](#). Return here.
4. Determine the version of microcode present on the device by entering the following command **85** (Get Version).
5. Update the microcode by entering the following command **82** (Update Code).
Ntutil prompts you for the microcode level.
6. Enter the microcode level (**D310_43B**, for example; see [“Appendix D. Minimum microcode requirements” on page 288](#)).
This command calls the device driver DeviceIoControl () entry point, and loads the new microcode.
7. Go to the Close routine, and complete step 8 in [“Starting NT UTILITY \(ntutil\) from Windows” on page 222](#).

Updating microcode with an FMR cartridge

See [“Updating microcode from the FMR tape cartridge” on page 204](#) for information about updating microcode with an FMR cartridge. Other methods that are shown in [Table 155 on page 217](#) are the preferred means of updating microcode.

Starting NT UTILITY (ntutil) from Windows

Refer to the *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for details of the ITDT/tapeutil program with Windows systems.

Follow this procedure to start NTUTIL.

Note: You might require assistance from the customer during this process.

1. Click the **Start** icon.
2. Select **Program, Accessories, Command Prompt**.

On the next screen, the cursor is at the right of the default prompt **C:\>** Any data that is read is stored in that drive/directory and any data that is written tries to originate from the same drive/directory. If you want to read to or write to or from a different drive/directory, enter `cd newdir` (where `newdir` is a fully qualified, valid drive) and `dir` to change to the new directory.

3. Enter **ntutil**. The following main menu appears on the screen.

```
1: Manual Test
2: Batch Test
9: Exit ntutil
Enter selection:
```

4. Enter **1** in the **Enter selection: input** area to select **Manual Test**.

The menu in [Figure 74](#) on [page 224](#) appears.

5. Enter **20** (open) in the **Enter selection: input** area to open the device.

```
SYNTAX: open device-file RW
          $D          RO

where RW means read/write
      RO means read only

for example,
  open RW          means open default device tape0
  open $D RO      means open device specified by -d option
  open tape0 RO   means open device tape0

If the special file $D is specified, the -d value must be given on the
command line, and will be substituted for $D.
```

6. Select by its number the test you want to run. Run the appropriate tests and complete the necessary tasks, then return here to finish the call.
7. After the tests are complete, enter **21** in the Enter selection: input area to select **Close**, then press **Enter**.
8. Enter **99** to return to the main menu shown in Step 3.
9. Enter **9** to exit ntutil.
10. Return to the procedure that sent you here.

Base Mode

```
Test tool version x.x.x.x
Variable settings
===== BASE MODE =====
gp->fd0=-1 gp->fd1=-1 block size=1024 block count=1
hex block id = 0000000000000000
return_error_when_fail 1 exit_on_unexpected_result 0 trace_flag 0

manual test menu:
=====
  1: set device special file          2: display symbols
  3: set block size R/W (now !0 fixed) 4: set block count (R/W)
  5: set return error when fail       6: set/reset trace
  7: set exit on unexpected result    8: Library Mode
=====
20: open                             21: close
22: read                              23: write
24: read and display block           25: flush (buffer->media)
26: read block id                   27: erase
28: locate block id                 29: display block data
=====
30: write filemark(s)                31: rewind
32: forward space filemark(s)        33: unload
34: reverse space filemark(s)        35: load (3592 System Mode)
36: forward space record(s)         37: return error
38: reverse space record(s)         39: test unit ready
43: set media parms (block size)     44: set dev parms (compression)
46: get device information
48: get medium information           49: inquiry
53: space EOD                       54: display message
=====
70: system command

=====
80: Force Dump                       81: Read Dump
82: Update Code                      83: Log Sense
84: Get Last Sense                   85: Get Version
86: Associative/Persistent WProtect  87: Read/Write Test
88: Find Devices                     89: Get MTDevice info
=====
99: return to main menu

=====
Enter selection:
```

Figure 74: Base Mode

Exercising drive attached to Windows with NTUTIL

Refer to the *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for details of the ITDT/tapeutil program with Windows systems.

Note: The drive exercise procedure can be run with the menu-driven interface of the **ntutil** program. To start the **ntutil** program in this format, enter the common commands and option 87 to Read/Write Test.

Remember the read/write test writes on the tape. **Use a CE scratch tape.**

1. Verify that the IBM tape subsystem is powered ON and online.
2. Verify that the tape drive has a CE scratch tape loaded.
3. Start **ntutil** and open the drive (see Steps 1-3 in [“Starting NT UTILITY \(ntutil\) from Windows”](#) on page 222), then return here.
4. Complete either a **31** (rewind) or a **39** (test unit ready) to clear the not-ready status to a ready status. If status is present, NTUTIL issues a 1110 (ERROR_MEDIA_CHANGED) message.
5. Read and write on the tape with the command **87** (Read/Write Test).
6. When the operation completed successfully, select **21** (close), then press **Enter**.
7. When the tests are complete, quit the **Command Prompt** window by clicking the **X** in the upper-right corner of the screen.
8. Return to the procedure that sent you here.

Host attachment checkout

You can check out the host attachment from various host systems.

Checking channel attachment - System i (OS/400)

To verify that a 3592 tape drive is attached properly to an System i, complete the following steps.

1. Type WRKCFGSTS *DEV *TAP ASTLVL (*BASIC) at the prompt. The screen that shows all of the attached tape device names, displays. In this example, TAP13 **1** is the device name to use for VFYTAP.

```
Work with Tape Devices                               System: 12345678
Type options below, then press Enter.
1=Make available      2=Make unavailable      5=Display details
7=Display message    8=Work with controller  9=Rename
13=Change description

Opt Device      Type      Status
TAPM1.B1      3592      Unavailable (use Opt 1)
TAP01         6380      Unavailable (use Opt 1)
TAP02         3490      Unavailable (use Opt 1)
TAP03         3490      Unavailable (use Opt 1)
TAP09         6390      Unavailable (use Opt 1)
TAP10         3480      Unavailable (use Opt 1)
TAP11         3480      Unavailable (use Opt 1)
TAP13 1
3592 Available to use
TAP14         6390      Unavailable (use Opt 1)
TAP15         6380      Unavailable (use Opt 1)
TAP16         6390      Available to use
TAP17         6380      Available to use

Bottom

F1=Help  F3=Exit  F5=Refresh  F9=Command line  F11=Display descriptions
F12=Cancel  F17=Top  F18=Bottom  F21=Select assistance level
```

2. Type VFYTAP (the Verify Tape command) on the System i command line.
3. Type tap13, the device that is associated with the 3592 tape device.
4. Select the **Basic read/write test** **2** option on the **Tape Device Test** menu and follow the instructions that are provided.

```
AJCUHQV2                               Tape Device Test Menu
Select one of the following:
1. Basic read/write test 2
2. Read/write reliability test
3. Exit test menu 3

Selection
-
F3=Exit
```

The following screen is displayed when the verification test completes successfully:

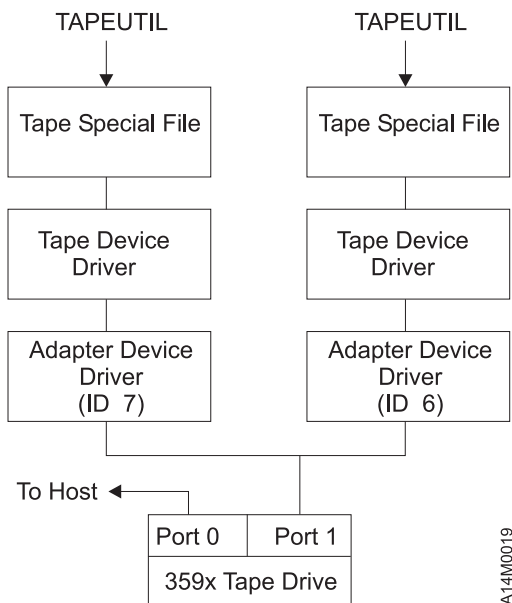
```
AJCUHQV3                               Tape Problem Analysis
The verification test completed successfully.
Press Enter to continue.
```

5. When the **Tape Device Test** menu is displayed, select **Exit test menu** **3**.

Checking channel attachment - AIX

The devices must be fully installed and the host device driver must be configured and available. See *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide*, for

information about installing and configuring the IBM tape drive. Also, “Installation and Configuration Instructions” describes the `smit` and `cfgmgr` commands. Figure 75 on page 226 shows an example of software and hardware paths that are used in the following tests. The figure illustrates unique *initiator* addresses for a configuration with more than one initiator that shares a Fibre Channel.



Note: Port 1 of a 3592 tape drive is connected to two hosts. Host drivers are configured so that one initiator is at ID address 7 and one initiator is at ID address 6. Tape special file names on each host are independent and might be different.

Figure 75: Host attachment example

Inquiry command

Note: This section depicts a mix of SCSI and fibre inquiry sequences of events for an inquiry of the tape drives.

Inquiry sequence

1. To check installed tape devices, type the `lsdev -Cc tape` command. From the listing of devices, remember the ones that you are going to test. In the following example, fibre devices `rmt0` and `rmt1` are available, which indicates they can communicate with host. The fibre address is not shown with this command.

The SCSI devices `rmt2` and `rmt3` are available and at port addresses (2,0) and (1,0). These addresses are SCSI addresses 2 and 1.

```

$ lsdev -Cc tape [enter]
rmt0 Available 30-70-01      IBM 3592 Tape Drive and Medium Changer (FCP)
rmt1 Available 30-70-01      IBM 3592 Tape Drive and Medium Changer (FCP)
rmt2 Available 10-70-00-2,0  IBM 3592 Tape Drive and Medium Changer
rmt3 Available 10-70-00-1,0  IBM 3592 Tape Drive and Medium Changer
  
```

Figure 76: Device fibre addresses - available

```

1
rmt0 Defined 00-02-00 IBM 359x Tape Drive and Medium Changer FCP
rmt1 Available 00-02-00 IBM 359x Tape Drive and Medium Changer FCP
  
```

Figure 77: Device fibre addresses - defined

Complete the following steps to determine the port address (FCP ID) and port name (FCP Worldwide Name). The example in the following text refers to the device *rmt1*. Its port address is 0x26 (with leading 0s not shown) and the port name is “0x500507630240202a”. If you do not know which devices to test, ask the customer's system administrator.

2. To determine the “unique identifier,” use the following information.

a. Enter the following information -

```
$ tapeutil -f /dev/rmt1 qrypath
```

b. This command displays on the console -

```
Querying SCSI paths...
Logical Device..... rmt1
SCSI Parent..... fscsi0
FCP SCSI ID..... 0x26
FCP Logical Unit..... 0x0
FCP World Wide Name..... 0x500507630240202a
Drive Port Number..... 0
Path Enabled..... Yes
Alternate Path Configured..... No
```

3. Type `tapeutil`, and the following menu appears -

Note: Your *tapeutil* menus might vary from the examples, depending on the level of your **Atape.driver** installed in your system. The following examples are using **Atape.driver** at 2.5.1.0.

```
General Commands:
  1. Open a Device          5. Inquiry                9. Log Sense Page
  2. Close a Device        6. Test Unit Ready       10. Mode Sense Page
  3. Device Info           7. Reserve Device        11. Release Device
  4. Tape Drive Service Aids 8. Request Sense         Q. Quit Program

Medium Changer Commands:
  12. Element Information   16. Move Medium
  13. Position To Element  17. Load/Unload Medium
  14. Element Inventory     18. Initialize Element Status
  15. Prevent Medium Removal 19. Allow Medium Removal

Tape Commands:
  20. Query/Set Parameters  30. Read and Write Tests
  21. Load Tape            31. Unload Tape
  22. Rewind               32. Erase
  23. Erase Gap            33. Write Filemarks
  24. Forward Space Filemarks 34. Backward Space Filemarks
  25. Forward Space Records 35. Backward Space Records
  26. Space to End of Data  36. Query/Set Tape Position
  27. Log Sense            37. Library Sequence Number
  28. Display Message      38. Read or Write Files
  29. Synchronize Buffers  39. Recover Buffer Data

Enter Selection:
```

4. At the **Enter Selection:** prompt, select **Open a Device**, and press **Enter**.

5. At the **Enter the device special file name:** prompt, type `/dev/rmt1` (or your actual device).

6. At the **Select mode (1=Read/Write, 2=Read Only, 3=Write Only, 4=Append):** prompt, type 1 to receive the **Opening device...** prompt.

7. At the **Hit any key to continue...** prompt, press **Enter**.

```
General Commands:
  1. Open a Device          5. Inquiry                9. Log Sense Page
  2. Close a Device        6. Test Unit Ready       10. Mode Sense Page
```

8. At the **Enter Selection for /dev/rmt1:** prompt, select the **Inquiry** option to receive the **Issuing inquiry...** and the following data:

```
Inquiry Data, Length 127
      0 1 2 3 4 5 6 7 8 9 A B C D E F 0123456789ABCDEF
0000 - 0180 0202 3300 0038 4942 4D20 2020 2020      ..3..8IBM
0010 - 3033 3539 3045 3031 3033 3539 3042 3131      03592B1103592B11
0020 - 3344 3201 4353 3030 3030 3030 3030 3031      3D2.CS0000000001
0030 - 3632 2041 C000 0180 04D0 6101 82D0 6101      62 A.....Pa..Pa.
0040 - 80D0                                6101      .Pa.. a..Pa..Pa.
0050 - 02D0          Example                0000      .Pa..Pa.....
0060 - 0000                                0000      .....
0070 - 0000 0000 0000 0000 0000 0000 0000 00      .....
```

9. At the **Hit any key to continue...** prompt, press **Enter**.

```
General Commands:
  1. Open a Device          5. Inquiry                9. Log Sense Page
  2. Close a Device        6. Test Unit Ready       10. Mode Sense Page
```

10. At the **Enter Selection for /dev/rmt1:** prompt, select **Close a Device**.

The system response is **Device closed...**

Read and Write tests

Load a CE scratch tape in the 3592 tape drive before you start this test.



Attention: This test overwrites any data or tape label on the tape.

1. If the response from the previous test is **Hit any key to continue...**, press **Enter**. Otherwise, type `tapeutil` to restart.

Note: Your `tapeutil` menus might vary from the examples, depending on the level of the **Atape.driver** installed in your system. The following examples use **Atape.driver** at 2.5.1.0.

```
General Commands:
  1. Open a Device          5. Inquiry                9. Log Sense Page
  2. Close a Device        6. Test Unit Ready       10. Mode Sense Page
```

2. At the **Enter Selection:** prompt, select **Open a Device**, and press **Enter**.
 3. At the **Enter the device special file name:** prompt, type `/dev/rmt1` (or your specific device).
 4. At the **Select mode (1=Read/Write, 2=Read Only, 3=Write Only, 4=Append):** prompt, type 1.

At the **Hit any key to continue....** prompt, press **Enter**.

```
General Commands:
  1. Open a Device          5. Inquiry                9. Log Sense Page
  2. Close a Device        6. Test Unit Ready       10. Mode Sense Page
  3. Device Info           7. Reserve Device        11. Release Device
  4. Tape Drive Service Aids 8. Request Sense         Q. Quit Program

Medium Changer Commands:
  12. Element Information  16. Move Medium
  13. Position To Element  17. Load/Unload Medium
  14. Element Inventory    18. Initialize Element Status
  15. Prevent Medium Removal 19. Allow Medium Removal

Tape Commands:
  20. Query/Set Parameters  30. Read and Write Tests
```

5. At the **Enter Selection for /dev/rmt1:** prompt, select the **Read and Write Tests** option, and press **Enter**.
 6. At the **Select test (1=Read/Write, 2=Read Only, 3=Write Only):** prompt, type 1.
 7. At the **Hit <Enter> for default 10240 block size or enter new block size:** press **Enter**.
 8. At the **Hit <Enter> for default 20 blocks per read/write or enter new blocks:** prompt, press **Enter**.

9. At the **Hit <Enter> for default 1 repetition or enter new repetition:** prompt, press **Enter**.

The following data is displayed -

```
Read/Write test, blocksize 10240 count 20 repetition 1
Setting block size...
Read/Write test pass 20
Writing 10240 bytes, 20 blocks...
Write complete, bytes written 204800, blocks 20
Writing 2 file marks...
Backward spacing 2 file marks...
Backward spacing 1 records...
Reading 204800 bytes, 20 blocks...
Read complete, bytes read 204800, blocks 20
Forward spacing file mark...
Data verification complete, no discrepancies found
Read/Write test completed, total bytes written 204800
```

10. At the **Hit any key to continue...** prompt, press **Enter**.

```
General Commands:
 1. Open a Device           5. Inquiry                 9. Log Sense Page
 2. Close a Device         6. Test Unit Ready        10. Mode Sense Page
```

11. Unload the drive before the device is closed in the next step.

12. At the **Enter Selection for /dev/rmt1:** prompt, select **Close a Device**, and press **Enter**.

At the **Device closed...**

Hit any key to continue... prompt, press **Enter**.

```
General Commands:
 1. Open a Device           5. Inquiry                 9. Log Sense Page
 2. Close a Device         6. Test Unit Ready        10. Mode Sense Page
 3. Device Info            7. Reserve Device         11. Release Device
 4. Tape Drive Service Aids 8. Request Sense          Q. Quit Program
```

13. At the **Enter Selection:** prompt, type q to stop the *tapeutil* program.

Checking channel attachment - Linux

The devices must be fully installed and the host device driver must be configured and available. See *IBM Tape Device Drivers Installation and User's Guide* for information about installing and configuring the IBM tape drive. Also, **Installation and Configuration Instructions** in the guide describe the *smi*t and *cfgmgr* commands.

Tape device attachment test

This procedure, which tests the attachment of a tape device to a Linux system, assumes that

- Your device is attached at `/dev/IBMtape0`.
- There is no cartridge in the drive.

When the **Hit<Enter>to Continue...** message displays or when you are told to enter information, press **Enter** after the instruction is followed. When the utility displays information, use the appropriate hardware manual to verify that the information is reasonable.

1. Open a Linux window.
2. If you want to run a complete test, mount a writable CE scratch tape manually into the drive.
3. Enter **IBMtapeutil**. A menu opens.
4. Enter **1** (Open a Device).
5. Enter `/dev/IBMtape0` when prompted for the device name.
6. Enter **1** (Read/Write).

7. Enter **3** (Inquiry). Specify **0** when prompted for an inquiry page. This command concludes a basic test of the device, fibre connection, and the device driver. You can stop the test here or continue with the following steps to run a complete test.
8. Enter **4** (Test Unit Ready) until no error occurs.
9. Enter **20** (Rewind).
10. Enter **28** (Read and Write Tests).
11. Enter **1** (Read and Write). Press **Enter** three times to accept the defaults and to run the test.
12. Enter **38** (Unload Tape).
13. Enter **2** (Close a Device).
14. Enter **Q** to quit the program.

Checking channel attachment - Solaris

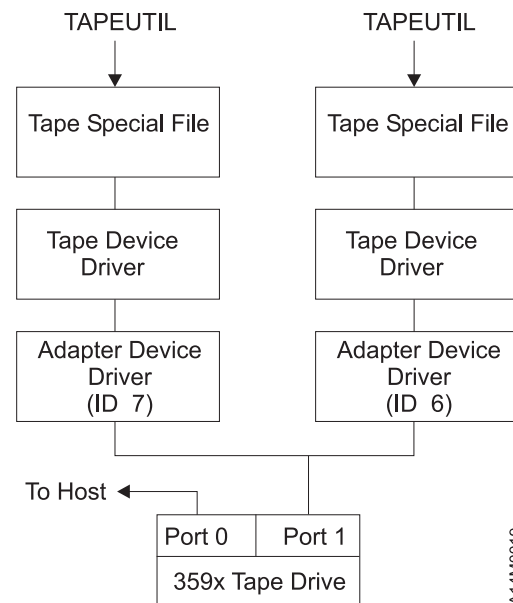
Refer to *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for information about installing and configuring the IBM tape drive.

The devices must be fully installed and the host device driver must be configured and available.

You might require assistance from the customer during this process.

To verify that the device driver and the devices are functional, use the *tapeutil* program, which is provided with the *IBM SCSI Tape Device Driver for SolarisOS*.

The diagram shows an example of the software and hardware paths that are used in the following tests.



Note: Port 1 of a 3592 tape drive is connected to two hosts. The host drivers are configured so that one initiator is at fibre ID address 7 and one initiator is at fibre ID address 6. The tape special file names on each host are independent and might be different.

1. Load a CE scratch tape into the 3592 tape drive.



Attention: This test overwrites any data or label that exists on the tape cartridge.

2. Type `/opt/IBMtape/tapeutil`. The following menu opens. (The menu reappears at the completion of each command.)

```

+-----+
|          TEST UTILITY          |
| IBM SCSI Tape Device Driver for SolarisOS |
+-----+
1: Open Device                17: Forward Space File
2: Close Device               18: Backward Space File
                               19: Forward Space Record
3: Inquiry                    20: Backward Space Record
4: Request Sense              21: Locate End Of Data
5: Test Unit Ready
6: Reserve                    22: Off-line
7: Release                    23: Load Tape
                               24: Unload Tape
8: Element Information
9: Move Medium                25: Sync Buffer
10: Inventory                  26: Display Message
                               27: Get Device Status
11: Read Data                  28: Get Device Info
12: Write Data                 29: Get Media Info
                               30: Get Position
13: Write File Mark           31: Set Position
14: Erase Tape                 32: Get Parameter
15: Rewind                    33: Set Parameter
16: Retention
Q: Quit Program

```

3. At the **Enter Selection:** prompt, select **1** to open the device.
4. At the **Enter device special file name:** prompt, type `/dev/mt/1st` (or the actual device special file for your device).
5. At the **Select mode (1=read-write, 2=read, 3=write, 4=append):** prompt, type **1**. The **Device opened** response is displayed.
6. At the **Enter Selection:** prompt, select **3** to receive the device inquiry data. The inquiry data follows -

```

The IOC_INQUIRY ioctl succeeded.      (EXAMPLE)

The inquiry data is:

  1 80  2  2 33  0  0 38 49 42 4d 20 20 20 20 20
30 33 35 39 30 42 31 31 20 20 20 20 20 20 20
34 44 30 33 54 55 20 20 20 20 20 20 20 30 30 30
32 39 30 20  3  0  0 81  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0

```

7. At the **Enter Selection:** prompt, select **5** to verify device test-unit ready. The response is -

```
The IOC_TEST_UNIT_READY ioctl succeeded.
```

8. At the **Enter Selection:** prompt, select **12** to complete write verification.
9. At the **Enter Block Size:** prompt, type `1024`.
10. At the **Enter Blocking Factor:** prompt, type `256`.
11. At the **Enter Megabytes To Write:** prompt, type `10`.
12. At the **Enter Pattern File Name:** prompt, press **Enter**.
13. At the **Enter Random Seed:** prompt, type `0`. The response is -

```

Generated 262144 bytes of random data using seed 7892.
*****
*****
Transferred 10MB in 1.98 seconds for rate of 5.16MB/second.

```

14. At the **Enter Selection:** prompt, select **15** to rewind the tape. The response is -

```
The STIOC_TAPE_OP ioctl succeeded.
```

15. At the **Enter Selection:** prompt, select **11** to complete read verification.

16. At the **Enter Block Size:** prompt, type 1024.
17. At the **Enter Blocking Factor:** prompt, type 256.
18. At the **Enter Megabytes to Write:** prompt, type 10. The response is -

```
*****  
*****  
Transferred 10MB in 2.19 seconds for rate of 4.69MB/second.
```

19. At the **Enter Selection:** prompt, select **15** to rewind the tape. The response is -

```
The STIOC_TAPE_OP ioctl succeeded.
```

20. At the **Enter Selection:** prompt, select **2** to close the device. The **Device Closed** response is displayed.
21. At the **Enter Selection:** prompt, select **Q** to exit the *tapetest* program.

Checking channel attachment - HP-UX

The devices must be fully installed and the host device driver must be configured and available. See *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for information about installing and configuring the IBM tape drive. Also, "Installation and Configuration Instructions" in the guide describes the `smit` and `cfgmgr` commands.

Refer to the **Host Attachment Example** diagram for an example of the software and hardware paths that are used in the following tests. The figure illustrates unique *initiator* addresses for a configuration with more than one initiator that shares a SCSI bus.

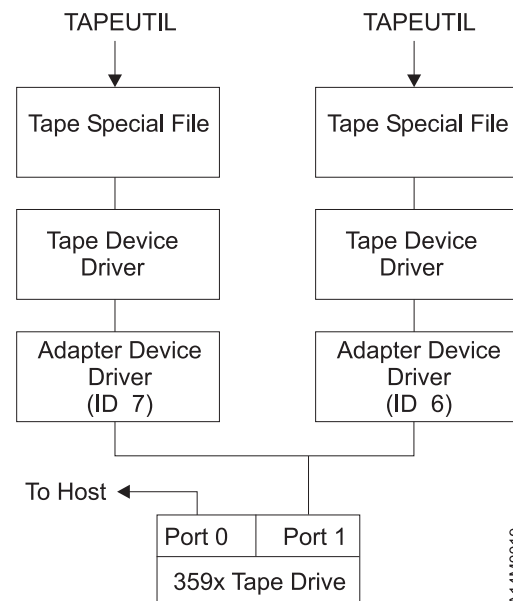
1. Load a CE scratch tape into the 3592 drive.



Attention: This test overwrites any data or label that exists on the tape cartridge.

2. Type `/opt/IBMtape/tapeutil`.
3. At the **Enter Selection:** prompt, select **1** to open the device.
4. At the **Enter Device Special File Name:** prompt, type `/dev/rmt/0st` (or the actual device special file for your device).
5. At the **Select Mode (1=read-write, 2=read, 3=write, 4=append):** prompt, type 1. The **Device opened** response is displayed.
6. At the **Enter Selection:** prompt, select **10** to receive the device inquiry data. Valid data that indicates the device is a 3592 is displayed.
7. At the **Enter Selection:** prompt, select **9** to verify the device test-unit is ready.
8. At the **Enter Selection:** prompt, select **21** to run write verification.
9. At the **Enter Block Size:** prompt, type 1024.
10. At the **Enter Blocking Factor:** prompt, type 256.
11. At the **Enter Megabytes to Write:** prompt, type 10.
12. At the **Enter Pattern File Name:** prompt, press **Enter**.
13. At the **Enter Random Seed:** prompt, type 0.
14. At the **Enter Selection:** prompt, select **24** to rewind the tape.
15. At the **Enter Selection:** prompt, select **20** to run read verification.
16. At the **Enter Block Size:** prompt, type 1024.
17. At the **Enter Blocking Factor:** prompt, type 256.
18. At the **Enter Megabytes to Write:** prompt, type 10.
19. At the **Enter Selection:** prompt, select **24** to rewind the tape.
20. At the **Enter Selection:** prompt, select **2** to close the device. The **Device Closed** response is displayed.
21. At the **Enter Selection:** prompt, select **Q** to exit the *tapetest* program.

Host Attachment Example



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Note: Port 1 of a 3592 drive is connected to two hosts. The host drivers are configured so that one initiator is at fibre ID address 7 and one initiator is at fibre ID address 6. The tape special file names on each host are independent and might be different.

Checking channel attachment - Windows

The devices must be fully installed and the host device driver must be configured and available. See *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for information about installing and configuring the IBM tape drive. Also, **Installation and Configuration Instructions** in the guide describes the `smit` and `cfgmgr` commands.

Refer to **Host Attachment Example** diagram for an example of the software and hardware paths that are used in the following tests.

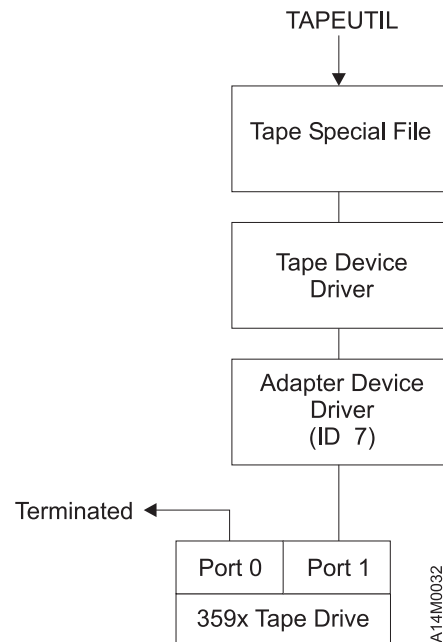
1. Load a CE scratch tape into the 3592 drive.



Attention: This test overwrites any data or label that exists on the tape cartridge.

2. Type `ntutil`.
3. At the **Enter Selection:** prompt, select **1** to open the device.
4. At the **Enter Device Special File Name:** prompt, type `tape0` (or the actual device special file for your device).
5. At the **Select Mode (1=read-write, 2=read, 3=write, 4=append):** prompt, type **1**. The **Device Opened** response is displayed.
6. At the **Enter Selection:** prompt, select **49** to receive the device inquiry data. Valid data that indicates the device is a 3592 is displayed.
7. At the **Enter Selection:** prompt, select **39** to verify the device test-unit is ready.
8. At the **Enter Selection:** prompt, select **23** to run write verification.
9. At the **Enter Block Size:** prompt, type `1024`.
10. At the **Enter Blocking Factor:** prompt, type `256`.
11. At the **Enter Megabytes to Write:** prompt, type `10`.
12. At the **Enter Pattern File Name:** prompt, press **Enter**.
13. At the **Enter Random Seed:** prompt, type `0`. The PC writes data to the tape and status displays.
14. At the **Enter Selection:** prompt, select **31** to rewind the tape.
15. At the **Enter Selection:** prompt, select **22** to run read verification.
16. At the **Enter Block Size:** prompt, type `1024`.
17. At the **Enter Blocking Factor:** prompt, type `256`.
18. At the **Enter Megabytes to Write:** prompt, type `10`. Data is read from the tape and status displays.
19. At the **Enter Selection:** prompt, select **31** to rewind the tape.
20. At the **Enter Selection:** prompt, select **2** to close the device. The **Device closed** response is displayed.
21. At the **Enter Selection:** prompt, select **Q** to exit the *tapetest* program.

Host Attachment Example



Checking channel attachment with NTUTIL under Windows

The devices must be fully installed and the host device driver must be configured and available. See *IBM SCSI Tape Drive, Medium Changer, and Library Device Drivers: Installation and User's Guide* for information about installing and configuring the IBM tape drive.

Note:

1. The 3592 tape drive must be powered ON before the Windows device is powered ON.
If the 3592 tape drive power is not ON when Windows is powered ON, the Windows device does not recognize the 3592. If the 3592 drive is powered ON after the Windows device is powered ON, the Windows device still does not recognize the 3592 tape drive.
2. The sense procedure can be run with the menu-driven interface of the *ntutil* program. To start the *ntutil* program in this format, enter the common commands, item **83** to Force the Log of Sense, and item **84** Get Last Sense.

To check out the SCSI interface, run a **Force Sense**, followed by a Get Last Sense command:

1. Verify that the IBM tape subsystem is powered ON and is online.
2. Verify that the tape drive has a tape cartridge loaded.
3. Start *ntutil* and open the drive (see Steps 1-3 in [“Starting NT UTILITY \(ntutil\) from Windows”](#) on page 222), then return here.
4. Run the command **83** (Log Sense).
5. Read the sense information with the command **84** (Get Last Sense).
6. When the operation completed successfully, select **21** (close), then press **Enter**.
7. When the tests are complete, quit the **Command Prompt** window by clicking the **X** in the upper-right corner of the screen.
8. Return to the procedure that sent you here.

Fibre Channel testing

Use this information to help you test and diagnose the Fibre Channel connection on EH7, EH8, 55F, and 60F drives.

Fibre wrap test



Attention: Notify the customer that all of the devices on the Fibre Channel must be varied offline before the **Wrap Test** procedure can be run.


Since the channel is an active device, the preferred and safest method to work on a drive is to take all of the Fibre Channel ports offline first.

To run the Fibre Channel ports wrap test, complete the following steps:

1. Complete [“Preparing the tape drive for service”](#) on page 183.
2. Unplug the Fibre Channel cable connector. This action might open the fibre loop connection.
3. Plug a fibre wrap tool into one or both of the fibre wrap ports.

Note: Do not run the wrap test with the Fibre Channel cables connected. This action can disturb the Fibre Channel loop, causing performance or I/O problems on the fibre loop.

4. From the service panel, press **Change Mode** **Y**. Select **CE Offline Mode** > **Verify Fix/Diag** > **Test Fibre Wrap**.
5. Select **Both Ports**, **Port 0**, or **Port 1**.
 - If the wrap test fails, a FID message is displayed. Go to [“FID entry point”](#) on page 6 to isolate the problem.

- If the Wrap Test passes, the drive is good.
6. If you still have a Fibre Channel failure, the problem might be in the cable or at the host. Go to the service manual for the host, or contact your next level of support.
 7. Remove any wrap tool, and restore the Fibre Channel connection.
 8. Ensure that the drive is returned to the operator mode.
 - Press **Change Mode** , then select **Operator Mode**.
 - Press **Reset**.
 9. At the completion of the activity, ensure that you have the customer do a reconfiguration on all systems to update the configuration, if necessary.
 10. Return to the procedure that sent you here.

Fibre Channel problem determination

Use this information to help you isolate the source of a Fibre Channel problem.

Common Fibre messages

See “Supplemental Messages” in [Table 44 on page 79](#) for Fibre Channel messages that display on the service panel.

Fibre Bus problem determination

Use the “Solid Fibre Channel errors” on [page 237](#) procedure or the “Intermittent Fibre Channel errors” on [page 239](#) procedure.



Attention: Notify the customer that the devices on the Fibre Channel must be varied offline before the problem determination procedure can be completed.

Verify the Fibre Channel topology. Verify that a problem exists between the drive, the drive cable, and the device to which it is attached. Use the switch, hub, or other fibre product service guides, as appropriate. Verify that the switch hub configuration, host adapter, host software levels, and device drivers are supported.

Refer to the *Practical Guide for SAN with System p* in “[Website information](#)” on [page xviii](#) for the latest information.

Notes:

- Refer to “[Fibre Channel attachments](#)” on [page 177](#) to ensure that all of the Fibre Channel cables are installed correctly.
- Ensure that the port/node names (WWID) are unique. If two drives in an installation have the same WWID, only one is recognized by the host or the controller.

Solid Fibre Channel errors

Determine the number of drives on the Fibre Channel.

Single tape drive on Fibre Channel loop

1. Ensure that the drive serial number is the same as the drive serial number that is used by the host program.
2. Ensure that the Fibre Channel options are set correctly. See “[Fibre Options menu \(Services menu\)](#)” on [page 100](#).
3. Ensure that the drive is seeing light and is communicating. The Port 0 or Port 1 LED on the back of the drive is flashing green, and the status area does not have -- -- -- or ?? ?? ??. Ensure that the AL_PA is valid (status area does not display CONFLICT or OFFLINE).

4. If Steps 1-3 are OK, run the Fibre Channel wrap test. See [“Fibre wrap test” on page 236](#).
Note: Refer to [“Fibre Channel attachments” on page 177](#) to ensure that all of the Fibre Channel cables are installed correctly.
5. If the Fibre Channel wrap test runs successfully, go to Step 6. If the Fibre Channel wrap test fails, replace the drive canister. See [“FID 85: Drive canister” on page 252](#).
6. If the Fibre Channel wrap test runs successfully, check the fibre attachment at the host to confirm that a problem still exists.

Note: Ensure that you remove the duplex wrap tool, and restore the fibre cable connections.

7. Complete one of the following procedures -
 - [“Checking channel attachment - System i \(OS/400\)” on page 225](#)
 - [“Checking channel attachment - AIX” on page 225](#)
 - [“Checking channel attachment - Linux” on page 229](#)
 - [“Checking channel attachment - HP-UX” on page 232](#)
 - [“Checking channel attachment with NTUTIL under Windows ” on page 236](#)
 - [“Checking channel attachment - Solaris” on page 230](#)

This action verifies that the drive is available and properly configured at the host.

8. If the problem persists, check the Fibre Channel attachment at the drive.
9. If the problem persists after the fibre attachment is checked at the host and the drive, replace the fibre cable.
10. If the problem persists after the fibre cable is replaced, inform the customer that the problem is probably with the host hardware or software.
11. When the problem is corrected (or determined to be a host problem), restore all of the Fibre Channel cables to their correct position, then return to the procedure that sent you here or go to [“End of call” on page 185](#).

Multiple tape drives on Fibre Channel

1. Use one of the following procedures to determine whether all of the drives on the Fibre Channel have the problem.
 - [“Checking channel attachment - System i \(OS/400\)” on page 225](#)
 - [“Checking channel attachment - AIX” on page 225](#)
 - [“Checking channel attachment - Linux” on page 229](#)
 - [“Checking channel attachment - HP-UX” on page 232](#)
 - [“Checking channel attachment with NTUTIL under Windows ” on page 236](#)
 - [“Checking channel attachment - Solaris” on page 230](#)

2. Verify the fibre topology and try to isolate which part of the Fibre Channel network is experiencing problems. Verify that the switch hub configuration, host adapter, host software levels, and device drivers are supported.

See *Storage Area Network (SAN) Guide and Fibre Support Information* in [“Website information” on page xviii](#) for the latest information.

3. If the problem exists on a few drives, use the “Single tape drive on Fibre Channel loop” procedure; otherwise -
 - a. Disconnect all except one failing drive on the Fibre Channel.
 - b. Test the fibre connection to determine whether a failure occurs on that drive. If it does, use the “Single tape drive on Fibre Channel loop” procedure.
 - c. Continue to connect one drive at a time onto the fibre loop.

4. When the problem is corrected, restore all of the Fibre Channel cables to their correct position, then return to the procedure that sent you here or go to [“End of call” on page 185](#).

Intermittent Fibre Channel errors

1. Verify the Fibre Channel topology. Check the maximum length of the cables. Verify that a problem exists between the drive, drive cable, and the device to which it is attached. Use switch, hub, or other fibre product service guides as appropriate. Verify that the switch hub configuration, host adapter, host software levels, and device drivers are supported.

See *Storage Area Network (SAN) Guide and Fibre Support Information* in [“Website information” on page xviii](#) for the latest information.


Note: Refer to [“Fibre Channel attachments” on page 177](#) to ensure that all of the Fibre Channel cables are installed correctly.


2. Obtain the errors reported by the drive to the host. Refer to **Message** section for details. For example, if the drive is attached to a System p (RS/6000) AIX, run *tapeutil*. Select option **9**, Error Log Analysis. Gather all possible error information.
3. If appropriate, refer to other fibre products documentation to try to isolate which part of the storage area networks (SAN) is experiencing problems. Verify that SAN configurations are correct (such as switch zoning for drive sharing).
4. Start a device driver trace to capture information. For example, if you are using the AIX tape device driver, type *atrc* to start the trace. See the device driver documentation for information.
5. On the next failure, get a 3592 drive microcode dump. Send the dump and the device driver trace to your next level of support for analysis.

FID 83 or E5 - Microcode problem

If FID 83 or E5 is displayed on the drive, go to step 1. If FID 83 or E5 is not currently displayed on the drive, go to step 2.

1. If FID 83 or E5 is displayed on the drive -
 - a. From the FID display, write down the support data (12 character string).
 - b. Call your next level of support with the FID and support data to determine whether this problem is a new or known microcode problem.
 - c. For known microcode problems, ask your next level of support if a fix is available on the latest EC level. If a fix is available, update the drive to the latest EC level.

If a fix is not yet available, tell the customer that Engineering is aware of the problem and is working on a fix. Install the fix when it is available.
 - d. For new microcode problems, you must provide a microcode dump, the reported FID, and FID support data to your next level of support.
 - e. For certain errors that are detected while this diagnostic test runs, the drive automatically collects dump information. If the dump icon  is displayed when FID 83 or E5 is displayed, retrieve the dump and provide it to your next level of support. See [“Dump maintenance utilities” on page 210](#) for microcode dump procedures.
 - f. If the dump icon is not displayed when FID 83 or E5 is displayed, a dump must be forced:
 - 1) Check with the customer to determine whether they collected a dump for this current problem.

The dump icon  is not displayed if the customer already collected the dump.
 - 2) If the customer has the dump data, provide it to your next level of support.
 - 3) If the customer does not have dump data or is not sure, go to the **CE Dump** menu, and select **Force Dump**. A dump is available when the dump icon is displayed.

- 4) Retrieve the dump and provide it to your next level of support. See [“Dump maintenance utilities” on page 210](#) for microcode dump procedures.
2. If FID 83 or E5 is not currently displayed on the drive:
 - a. Look at the FID log for the most recent FID 83 or E5 entry. From the FID log, write down the support data (12 characters). Call your next level of support with the FID and support data to determine whether this problem is a new or known microcode problem.
 - b. For known microcode problems, ask your next level of support if a fix is available with the latest EC level. If a fix is available, update the drive to the latest EC level.

If a fix is not available, tell the customer that Engineering is aware of the problem and is working on a fix. Install the fix when it is available.
 - c. For new microcode problems, a dump is needed. Check with the customer to determine whether they collected a dump for this problem when the FID and the dump icon were displayed. See [“Dump maintenance utilities” on page 210](#) for microcode dump procedures.

If the customer has the dump information, provide the dump, the FID, and the FID support data to your next level of support.

If no dump exists, go to step 3.
 3. Determine whether the customer can easily re-create the FID 83 or E5 message.

If the customer can easily complete the operations or run the job that caused the 83 message, wait until it occurs and follow the procedure that starts at step 2.

If the customer cannot easily re-create the message or it is an inconvenient time, the following options exist to acquire the dump for the next level of support:

 - a. Ask the customer to allow the problem to recur, leave the drive with FID 83 or E5 message displayed, then call for service.

--OR--
 - b. You can set a microcode trap. See [“Setting the error match trap \(to get dump\)” on page 246](#) for detailed instructions.

From the 12 character support data, complete the following steps -

 - 1) Use the first 4 characters (if not starting with ‘A’ such as Axxx). If the first 4 characters are Axxx, use the second set of 4 characters.
 - 2) From the **CE Microcode Traps** menu, select **Microcode Trap** under the **CE Utilities** menu. Select the 4 FSC characters. Use the **Saved Traps** option so that **POR** or **Reset** cannot reset the trap. Select **Add Saved FSC Trap** from the **CE Saved Traps** menu. With this trap set, a dump is automatically taken when this FSC is encountered and the dump icon displays.
 - 3) The customer can retrieve the dump for you or call you when the dump icon appears.
 4. Return to the procedure that sent you here or go to [“End of call” on page 185](#).

FID 84 or E6 - Isolating fault between microcode and hardware

Note: A font is a family of characters of a specific size and style.

FID 84 or E6 might display on the service panel in a large font (normal FID), or in a small font and accompanied by several lines of support data (abnormal display condition).

- If FID 84 or E6 displays in a large font, use [“FID 84 or E6 - Normal FID display procedure” on page 241](#).

--OR--

- If FID 84 or E6 displays in a small font, use [“FID 84 or E6 - Smaller font \(abnormal display condition\)” on page 242](#).

FID 84 or E6 - Normal FID display procedure

Use either the “FID currently displayed on drive” on page 241, or the “FID not currently displayed on drive” on page 241 procedure.

FID currently displayed on drive

1. From the FID display, write down the support data (12 character string). Call your next level of support with the FID and support data to determine if this problem is a new or a known microcode problem.
2. For known microcode problems, ask your next level of support if a fix is available on the latest EC level. If a fix is available, update the drive to the latest EC level.

If a fix is not yet available, tell the customer that Engineering is aware of the problem and is working on a fix. Install the fix when it is available.



3. You determined that the fault might be a new microcode problem or a hardware problem. Because it might be a potential new microcode problem, get a microcode dump.

Dump Icon Also Displayed

For certain errors that are detected while this diagnostic test is running, the drive automatically collects dump information. Retrieve the dump.

Dump Icon Not Displayed

For certain errors that are detected while this diagnostic test is running, the drive automatically collects dump information, other failures require you to force a microcode dump.

4. Check with the customer to determine whether they collected a dump for this problem. (If a dump was previously collected, it might be the reason that no dump icon  appears now).
5. If the customer has the dump data, save it for now.
6. If the customer does not have the dump data, or is not sure, go to the **CE Main Dump** menu, and select **Force Dump**. A dump is available when the dump icon is displayed.
7. Retrieve the dump; save it for now. See “Dump maintenance utilities” on page 210.
8. Test the drive.
 - a. From the service panel, press **Change Mode** .
 - b. Select **CE Offline Mode > Verify Fix/Diag > Test Device**.

Load a CE scratch tape when you are prompted to load a tape cartridge.

If you get a new or a different FID, go to “FID entry point” on page 6 with that information.

--OR--

If you get the same FID (84 or E6), a hardware problem exists. Do not save the microcode dump. Go to “FID entry point” on page 6. Complete the actions for the next FRU in the FID 84 list.

--OR--

If an error does not occur, suspect a new microcode problem or an intermittent electronics problem. Call your next level of support and provide them with the dump and the 12 character support data.

9. Return to the procedure that sent you here, or go to “End of call” on page 185.

FID not currently displayed on drive

1. Look at the **Error Log** for the most recent FID 84 or E6 entry.
2. From the **Error Log**, record the support data (12 character string). Call your next level of support with the FID and support data to determine whether this problem is a new or a known microcode problem.
3. For known microcode problems:

- a. Ask Support if a fix is available on the latest EC Level. If a fix is available, update the drive to the latest EC level.
 - b. If a fix is not available, tell the customer that Engineering is aware of the problem and is working on a fix. Install the fix when it is available.
4. This issue might be a new microcode problem or a hardware problem.
- a. From the service panel, press **Change Mode** **Y**.
 - b. Select **CE Offline Mode > Verify Fix/Diag > Test Device**.
 If you get a new or a different FID, go to [“FID entry point” on page 6](#) with that information.
 If you get the same FID (FID 84 or E6), a hardware problem exists. Do not save the microcode dump. Go to [“FID entry point” on page 6](#). Complete the actions for the next FRU for FID 84.
5. If an error does not occur, suspect a new microcode problem or an intermittent electronics problem. You must get a dump.
- a. A dump might exist. Check with the customer to determine whether they collected a dump for this problem when the FID and the dump icon were displayed.
 If the customer has the dump data, provide the dump, the FID, and the FID support data to your next level of support.
 - b. If no dump exists, go to step 6.
6. Determine whether the customer can easily re-create the FID message.
- If the customer can easily run operations or the job that caused the message, wait until it occurs and follow the procedure for the FID currently displayed.
 - If the customer cannot easily re-create the message, or if it is an inconvenient time, the following options exist to acquire the dump for your next level of support.
 Ask the customer to allow the problem to recur. When the problem does recur, the customer must leave the drive with the FID 84 or E6 message displayed, then call for service.
 If the dump icon is displayed when the problem recurs, the customer can retrieve a dump (if the host device driver software supports dumps).
 If the dump icon is not displayed when the problem recurs, the customer can select **Force Error Dump** (from the operator **Services** menu), which provides a FID FF and the dump icon. FID FF indicates that a dump was forced (information message). The icon is for the FID 84 or E6, so now the customer can retrieve a dump (if the host device driver software supports dumps).
- You can set a **Microcode Trap**. See [“Setting the error match trap \(to get dump\)” on page 246](#) for information.
 - a. From the 12 character support data, use the first 4 characters (if it does not start with ‘A’ such as Axxx). If the first 4 characters are Axxx, use the second set of 4 characters.
 - b. From the **CE Microcode Traps** menu, select **Microcode Trap** under the **CE Utilities** menu. Select the 4 FSC characters. Use the **Saved Traps** option so that **POR** or **Reset** cannot reset the trap. Select **Add Saved FSC Trap** from the **CE Saved Traps** menu. With this trap set, a dump is automatically taken when this FSC is encountered and the dump icon displays.
 - c. The customer can retrieve the dump for you or call you when the dump icon appears.
7. Complete [“End of call” on page 185](#) or return to the procedure that sent you here.

FID 84 or E6 - Smaller font (abnormal display condition)

FID1 84 or E6 displays on the service panel in a small font, followed by 4 lines of support data. A font is a family of characters of a specific size and style. As the following example shows, each line contains 8 characters -

	FID1	E6
FSC	AAAA	BBBB
FSC	CCCC	DDDD

When the information is displayed (that is, EEEE is repeated), the service panel is frozen (you cannot select another menu, and the pushbuttons do not respond). Therefore, you cannot use the service panel or cannot get dumps from the host or with the service panel.

1. Obtain as much information as possible about the job that is running, any drive operations, and the failure scenario. Record the information that displayed on the service panel (including the 4 lines of support data). Save this information. Your next level of support might request it.
2. Reset the drive (see “Services menu” on page 97). The drive automatically runs the power-on self-test (POST).
3. Use [Figure 78 on page 243](#) to help you resolve this condition.

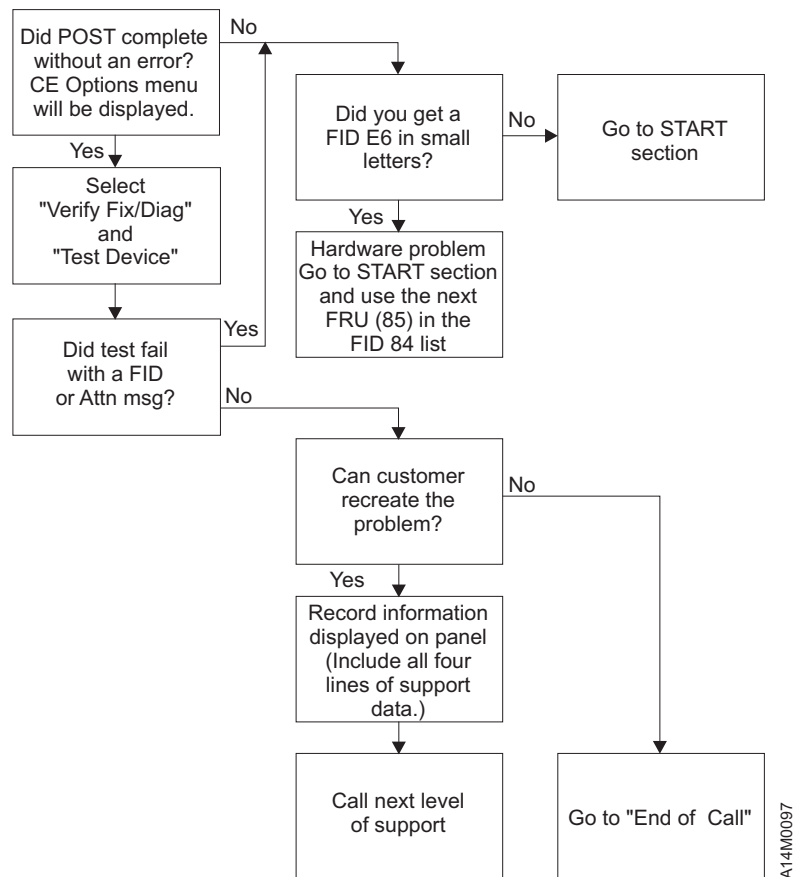


Figure 78: Flow diagram for FID 84 or E6 in a smaller font

FID 87 or F2 - Isolating fault between media and hardware

A FID 87 or F2 is generated when the drive experiences an error and cannot determine whether the error was caused by the tape cartridge, a customer job, or by a problem in the drive hardware. The FID 87 or F2 is not displayed on the drive. It is logged in the sense information that is returned to the host system. If the customer receives errors when reading or writing to the drive and there is no FID displayed on the drive, a FID 87 or F2 is probably returned in the sense information to the host. If needed, refer to [Chapter 3, “Messages,” on page 39](#) to determine how to obtain service information from the host system.

Use this procedure to determine the cause of the read or write errors.

1. Determine which VOLSER numbers or cartridges are potential problem.

- a. Ask the customer to note which cartridges (VOLSER numbers) fail during the operation. (It is possible to have multiple bad cartridges.)
 - b. If the customer received MIM Messages at the host or if you have MIM messages, get the “Message Code” and associated VOLSER number, if available. See [“Message codes” on page 45](#) and [Figure 12 on page 42](#).
If a bad cartridge cannot be identified at the time of failure, the **VOLSER** field of the MIM is blank and the VOLSER Valid Flag is **00**; VOLSER not Valid.
 - c. If the customer received TapeAlerts at the host or you have TapeAlerts, get the TapeAlerts and the VOLSER number for the suspect cartridge. Complete the action that is stated in [“TapeAlert reporting” on page 12](#).
 - d. Examine the FID F2 log by using the “LOGS” option of the CE menu on the service panel. Record both the FIDs and the associated VOLSER numbers. See [“CE FID FE Log menu” on page 135](#). The F2 log displays entries for as many as 10 of the most recent occurrences of the F2 error. Each entry consists of 4 lines of information that pertain to the error:
 - The first line provides an alternate FID number that you can use to isolate the problem.
 - The second line displays the first and last FSCs and the microcode link.
 - The third line provides a power-on date/time stamp that is correlated with power-on hours in the **Show Statistics** menu, or a **Current Time Stamp** option (if available).
 - The fourth line provides the VOLSER number of the suspect cartridge, if available.
2. Examine the cartridge for damage. For example, the leader pin might not be attached or the cartridge might be cracked. If the cartridge is damaged, ask the customer to repair or replace the cartridge.
- Note:** A repaired cartridge might be used long enough to recover data from that cartridge. When the data is recovered, the cartridge must be discarded by the customer.
3. Clean the drive by inserting a cleaning cartridge. See [“Excessive Clean messages” on page 183](#).
4. Try the operation again with the suspect drive and the suspect cartridge.
- **Job Successful** - Problem fixed. Go to [“End of call” on page 185](#).
 - **Job Failed** - If the same drive error code is reported, collect a dump for later use, and go to Step 5. If a different error code is reported, complete the corrective action for that error code.
5. If extra cartridges or drives are available, you can use either method or both methods to isolate the problem.
- a. If another cartridge is available, try the operation again with the suspect drive.
 - **Job Successful** - The suspect cartridge might be marginal. Go to Step 6a to further isolate.
 - **Job Failed** - If a different drive error code is reported, complete the action that is associated with that error code. If the same error appears, the drive might be marginal. Go to Step 6b to further isolate.
 - b. If another drive is available, try the operation again with the suspect cartridge.
 - **Job Successful** - The drive might be marginal. Go to Step 6b to further isolate.
 - **Job Failed** - If a different drive error code is reported, complete the action that is associated with that error code. If the same error appears, the media might be marginal. Go to Step 6a to further isolate.
6. To further isolate, run the necessary diagnostic tests to test the condition of the drive or media.



Attention: The **Test Media** option overwrites data that is written on the tape. Before proceeding, have the customer copy data to a known, good cartridge, or otherwise move data for safe keeping. Use this test only when directed by your next level of support. You also can run this test when it is requested by the customer after you made the customer aware that data is lost.

- a. **Marginal Media:** - Run the Media Test (Use the option **Test Media** on the [“CE Verify Fix/Diag menu”](#) on page 108).
- **Diagnostic Successful** - The problem might be job-specific. Try another job with the suspect media.
 - **Job Successful** - The problem is job-specific.
 - **Job Failed** - If a different drive error code is reported, complete the action that is associated with the error code. If the same error code is reported, have the customer discard the media.
 - **Diagnostic Failed** - If a different drive error code is reported, complete the action that is associated with the error code. If the same error code is reported, have the customer discard the media.
- b. **Marginal Drive** - Use the option **Test Device** on the [“CE Verify Fix/Diag menu”](#) on page 108 to complete the long, drive test. See [“Verifying the fix”](#) on page 185 to further isolate.
- **Diagnostic Successful** - Run the original job with the suspect cartridge.
 - **Job Successful** - Calibration corrected the problem.
 - **Job Failed** - If a different drive error code is reported, complete the action that is associated with that error code. If the same error code is reported, go to the FID 85, in Chapter 8, [“Locations, checks, adjustments, removals, and replacements,”](#) on page 251 for your installation to replace the drive canister.
 - **Diagnostic Failed** - If a different drive error code is reported, complete the action that is associated with the error code. If the same error code is reported, go to the FID 85, in Chapter 8, [“Locations, checks, adjustments, removals, and replacements,”](#) on page 251 for your installation to replace the drive canister.

Note: If you cannot locate the cartridge that was used when the failure occurred, try the operation again with an available cartridge, as if it were the suspect cartridge. Go to Step 6b.

- **Pass** - Ask the customer to label the cartridge for identification if the error recurs.
- **Fail** - Complete the action that is associated with the error code.

FID FF - Operator action or host program error

FID FF is always presented to the host. FID FF problems also display on the service panel.

The [“CE FID FF Log menu”](#) on page 136 provides a log of a filtered subset of all sense data sent to the host with a FID of FF. Use this log to assist you in diagnosing a FID FF problem.

FID FF displayed on service panel and message display

FID FF is displayed on the service panel and the 8 character message display of the operator bezel (it also went to the host).

- FID FF is automatically displayed when the **Force Error Dump** is selected from the operator **Services** menu. This action causes a FID FF with expert systems data of E009 XXXX XXXX.

Action: If you no longer need the dump, press **Reset** to remove the dump icon and the FID message.

- The FID message can be removed without removing the dump icon, by selecting **Enter** on the operator **Services** menu.

FID FF displayed at host only - not on service panel or message display


FID FF is not displayed on the service panel or the 8 character message display of the operator bezel (it went to host only).

- The host receives this FID, but this FID is not presented on the drive service panel. If FID FF was reported in host error log with a SIM message, complete the action indicated in SIM message codes (for example, 55 - Clean Device). See [Figure 11](#) on page 40.

- This FID can be presented if a Write command is issued to a WORM tape cartridge that is at a point on the tape that was already written once.
- This FID can be presented for an invalid and unsupported SCSI command or parameter, which is a SCSI application program software problem. Sense data is sent to the host.
- This FID also can be presented for a drive operator procedural problem.


The service representative must look in the drive error log for any ATTN DRV messages (which might cause the FID FF to be sent to the host with sense data). If any of these ATTN messages are present in the error log, use that data to complete further isolation for the FID FF cause.

Suspected microcode problem

1. Press **Reset** on the service panel.
2. From the service panel, press **Change Mode** .
3. Select **CE Offline Mode > Verify Fix/Diag > Test Device**.
4. Load a CE scratch tape when you are prompted to load a tape cartridge.
5. If you get a FID, go to [“FID entry point”](#) on page 6 to analyze the FID.
6. If the drive tests successfully complete, the problem might be a microcode problem or an intermittent hardware problem.


Go to [“Problem determination”](#) on page 182 or [“FID 83 or E5 - Microcode problem”](#) on page 239 for problem determination.
7. If the failure still occurs, collect as much information as you can from the customer, and contact your next level of support.

Setting the error match trap (to get dump)

The dump icon  appears when the dump is available, and this icon remains on the screen to indicate that trace data is stored in the device. In addition, when the error match trap is hit, an ATTN DRV FSC Trap Taken message is displayed on the operator panel. If an FID 83 or E5 occurs, it might overlay the **ATTN DRV** message. The dump icon is still displayed, with the ATTN DRV message that exists behind the dump icon.

Note: *Normal* error match traps are volatile and are lost if you press **Reset**, power OFF the device, or the microcode recovery occurs (with Check-1, FMR, and so on). *Saved* error match traps cannot be lost by completing a reset, and requires a special procedure for removal. See the [“Removing the error match trap”](#) on page 247 procedure for details.

To set an error match trap -

1. From the service panel, press **Change Mode** .
2. Select **CE Offline Mode > Utilities > Microcode Trap**.
3. When the **CE Microcode Trap** menu is displayed, 4 characters that match the wanted error code (FSC) must be entered. Select each character and modify to the wanted value.
4. With the **CE Microcode Trap** menu still selected, four options are presented -
 - a. Add FSC Trap
 - b. Remove FSC Trap
 - c. List FSC Traps
 - d. Saved Traps

There are two options available to set the trap -

Use option **a** - Select **Add FSC Trap** that saves the *normal* trap until the next microcode reset. Selection of this option ends the procedure. Skip to Step 7 for completion of the procedure.

--OR--

Use option **d** - Select **Saved Traps** to save the *saved* trap in the drive until the trap is manually removed. A microcode reset does not eliminate a *saved* trap from the drive.

Selecting the **Saved Traps** option from the **CE Microcode Trap** menu causes the **CE Saved Traps** menu to display.

Note: Only three saved traps can be active at a time. If more than three are selected, the procedure is not successful. To see how many saved traps are active, select **Saved Traps** from the **CE Microcode Trap** menu, and select the **List Saved FSC Traps** option.

5. Select **Add Saved FSC Trap** from the **CE Saved Traps** menu to save the trap.
See [“Removing the error match trap” on page 247](#) to remove a saved FSC trap.
6. Select **Cancel** when the status screen comes up.
7. Select **Cancel** to return to the previous CE menu. Repeat this step as needed to return to previous CE menus.
8. Complete [“End of call” on page 185](#) or return to the procedure that sent you here.

Removing the error match trap

Note: This procedure is similar to the [“Setting the error match trap \(to get dump\)” on page 246](#) procedure, except that it removes the trapset in the previous procedure. See the definition of *normal* trap versus *saved* trap in the [“Setting the error match trap \(to get dump\)” on page 246](#) procedure.

1. From the service panel, press **Change Mode** **Y**.
2. Select **CE Offline Mode > Utilities > Microcode Trap**.

It is necessary to distinguish between removal of a *normal* trap or a *saved* trap. If the trap is known to be *normal*, go to [“Removing a NORMAL trap” on page 248](#). If the trap is known to be *saved*, go to [“Removing a SAVED trap” on page 248](#). If the *type* of trap is unknown but the error code is known, continue with this procedure.

- a. Select **Saved Traps** from the **CE Microcode Trap** menu.
- b. Select **List Saved FSC Traps** from the **CE Saved Traps** menu. The list is displayed.
- c. Check the list of Saved FSC traps for a match of the error code.
- d. If there is no match, the trap is presumed to be *normal*. Select **Cancel** twice to return to the **CE Microcode Trap** menu. Skip to [“Removing a NORMAL trap” on page 248](#).

--OR--

If there is a match, select the appropriate error code.

- e. Select **Remove Saved FSC Trap** from the **CE Remove Saved FSC Trap** menu. Success or failure of the CE action is indicated on the service panel.
- f. Select **Cancel** twice to return to **CE Microcode Trap** menu. Repeat this step as needed to return to previous CE menus.

This procedure completes removal of a known, saved FSC trap.

3. Complete [“End of call” on page 185](#) or return to the procedure that sent you here.

Removing a NORMAL trap

Known normal error code

If the error code is unknown, go to [“Unknown normal error code” on page 248](#). If the error code is known, continue with this procedure.

1. With the **CE Microcode Trap** menu still selected, 4 characters that match the error code (FSC) must be set. Select each character and modify to the wanted value.
2. Select the **Remove FSC Trap** option from the **CE Microcode Trap** menu. The service panel indicates success or failure of the CE action.
3. Select **Cancel** to return to **CE Utilities** menu and repeat this step as needed to return to the previous CE menu.

This procedure completes the removal of a known, normal FSC trap.

4. Complete [“End of call” on page 185](#) or return to the procedure that sent you here.

Unknown normal error code

1. With the **CE Microcode Trap** menu displayed, select **List FSC Traps**. The list is displayed.
2. Select the error code to be removed from the list.
3. Select **Remove FSC Trap** from the **CE Remove FSC Trap** menu. The service panel indicates success or failure of the CE action.
4. Select **Cancel** to return to the **CE Microcode Trap** menu. Repeat this step as needed to return to previous CE menus.

This procedure completes the removal of an unknown, normal FSC trap.

5. Complete [“End of call” on page 185](#) or return to the procedure that sent you here.

Removing a SAVED trap

Known saved error code

If the error code is unknown, go to [“Unknown saved error code” on page 248](#). If the error code is known, continue with this procedure.

1. From the **CE Microcode Trap** menu (still displayed), select **Saved Traps**.
2. The **CE Saved Traps** menu is displayed. Four characters that match the error code (FSC) must be set. Select each character and modify to the wanted value.
3. Select the **Rmv Saved FSC Trap** option from the **CE Saved Traps** menu. The service panel indicates success or failure of the CE action.
4. Select **Cancel** to return to **CE Microcode Trap** menu. Repeat this step as needed to return to previous CE menus.

This procedure completes removal of a known, saved FSC trap.

5. Go to [“End of call” on page 185](#) or return to the procedure that sent you here.

Unknown saved error code

1. From the **CE Microcode Trap** menu (still displayed), select **Saved Traps**.
2. Select **List Saved FSC Traps** from the **CE Saved Traps** menu. The list is displayed.
3. Select the error code to be removed (from the list).
4. Select **Rmv Saved FSC Trap** from the **CE FSC Trap List** menu. The service panel indicates success or failure of the CE action.
5. Select **Cancel** to return to the **CE Saved Traps** menu. Repeat this step as needed to return to previous CE menus.

This procedure completes removal of an unknown, saved FSC trap.

6. Go to “End of call” on page 185 or return to the procedure that sent you here.

Setting default density

This procedure outlines how you reset the drive factory setting to format a data cartridge as if it were installed in another model of drive. An example of changing density is assigning an EH8 drive to write a JC cartridge exclusively in E07 format.

Notes:

- This function is only allowed from BOT.
- The default setting is **00**.

Note: Default density options might not work correctly with certain device drivers. If you experience difficulty, contact your next level of support for information.


1. From the service panel, press **Change Mode** , and select **CE Offline Mode > Config/Install > Drv Options > Default Density**.
2. Use Table 156 on page 249 to verify that you can reset the drive factory setting to allow the drive to operate with a different density or to change the density. An example of changing density is assigning an EH8 drive to write a JC cartridge exclusively in E07 format.

Table 156: Default density selections. BOT is an abbreviation for 'beginning of tape.'

Default density selection	Drive behavior		
	Format that is used when writing at BOT	Format that is used when writing, and not at BOT ¹	Model type reported to host in response to Inquiry command
EH7 with 00 selection	E07	E07	E07
EH7 with 53 selection	E07	E07	E07
EH7 with 54 selection	E07	E07	E07
EH7 with FF selection	E07	E07 or E08	E07
EH8 with 00 selection	E08	E07 or E08	E08
EH8 with 54 selection	E07	E07 or E08	E08
EH8 with 55 selection	E07 or E08	E07 or E08	E08
EH8 with FF selection	E07 or E08	E07 or E08	E08
55F with 00 selection	55F	E08 or 55F	55F
55F with 54 selection	E07	E07 or E08	55F
55F with 55 selection	E08 or 55F	E08 or 55F	55F
55F with 56 selection	55F	E08 or 55F	55F
55F with FF selection	E08 or 55F	E08 or 55F	55F
60F with 00 selection	60F	E07, E08, 55F, or 60F	60F
60F with 54 selection	E07 or E08	E07, E08, 55F, or 60F	60F
60F with 55 selection	E08 or 55F	E07, E08, 55F, or 60F	60F
60F with 56 selection	55F or 60F	E07, E08, 55F, or 60F	50F
60F with 57 selection	60F	60F	60F

Table 156: Default density selections. BOT is an abbreviation for 'beginning of tape.' (continued)

Default density selection	Drive behavior		
	Format that is used when writing at BOT	Format that is used when writing, and not at BOT ¹	Model type reported to host in response to Inquiry command
60F with FF selection	E07, E08, 55F, or 60F	E07, E08, 55F, or 60F	60F

¹The drive writes on a data cartridge in the existing format of the cartridge.

- After you change this factory setting that is accessible through the options on this menu, continue to select **Cancel** to return to the **CE Options** menu.
- Reset the drive by pressing **Change Mode** **Y**. Select **Operator Mode > Services > Reset Drive**.
- Go to “End of call” on page 185 or return to the procedure that sent you here.

Setting drive encryption

Although your 3592 drive is encryption **capable**, the customer must order a feature code to give you the authority to **enable** drive encryption. The feature code which allows you to enable encryption also contains the installation instructions. See [Table 138 on page 168](#).

Notes:

- Encryption does not provide write-protection, but provides read-protection only. Encrypted data in a tape cartridge is not protected from being overwritten.
 - Refer to the *External Key Manager, Introduction, Planning, and User's Guide* for information. See “Related information” on page xviii.
 - Inform the customer that the **Encryption Key Manager** configuration must be updated if you are installing an encryption-capable drive for the first time or you are enabling encryption on a previously-installed encryption-capable drive. This issue is not a concern if you are replacing an encryption-capable drive FRU.
 - To maintain FIPS PUB 140-2 certification for a tape drive, load only FIPS-certified microcode into that tape drive. The latest drive microcode that is available might not be FIPS certified.
- From the service panel, press **Change Mode** **Y**, and select **CE Offline Mode > Config/Install > Drv Options > Drv Encryption > Method Config**.

Notes:

- You can use the **Reset to Default** selection while encryption is set to return the drive to the default encryption setting.
 - Do not use the other menu items, such as **Custom** or **Advanced Settings**, unless directed by your next level of support.
 - You can find a complete list of menu items, beginning with “DRV Encryption menu” on page 121.
- The customer can advise you which method they wish to use to manage encryption. Select that method (such as **System**, **Application**, or **Library**).
 - At the **CE Save Data?** menu, select **Yes** to save your settings.
To disable encryption, from the **Method Config** menu select **Disable**.
 - Return to the procedure that sent you here.

Chapter 8. Locations, checks, adjustments, removals, and replacements

These topics provide reference and procedural information for Field Replaceable Units (FRUs).

Rack FRU locations, removals, and replacements

The FRUs in [Figure 79 on page 251](#) are identified by their FID number. For example, 82 is FID 82, the power supply. [Table 157 on page 251](#) shows the FRU names for the FID numbers in [Figure 79 on page 251](#). [Figure 79 on page 251](#) shows two drive canisters installed.

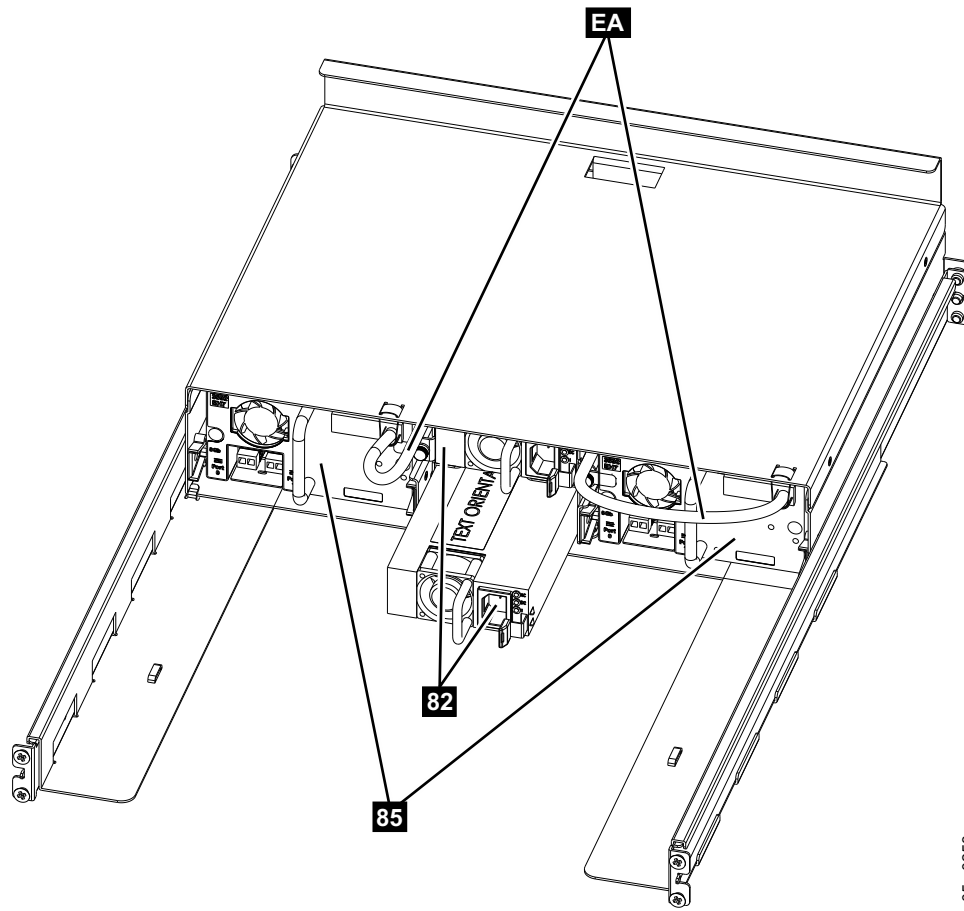


Figure 79: Drive enclosure FRU locations in a rack

Table 157: FID numbers and FRU names

FID number	FRU name	Procedure location page
82	Rack power supply	“FID 82: Power supply” on page 252
85	Rack drive canister	“FID 85: Drive canister” on page 252
EA	Rack cables FRU kit	“FID EA: Cables FRU kit” on page 255

FID 82: Power supply

Before you begin this procedure, see [“Power problems MAP” on page 193](#) to isolate the failing power supply.

See [Figure 79 on page 251](#) for FRU location 82. Use [Figure 80 on page 252](#) as you follow this procedure.

All 3592 dc power supplies are hot-pluggable. To minimize the impact on customer operations, one dc power supply can be unplugged and removed while the remaining power supply continues to provide dc power to both 3592 drives in the enclosure.



Attention: Do not disconnect the AC power from both power supplies in the same enclosure at the same time, unless both drives in the enclosure are already offline, and you want to disconnect power to both drives.

Removing the power supply

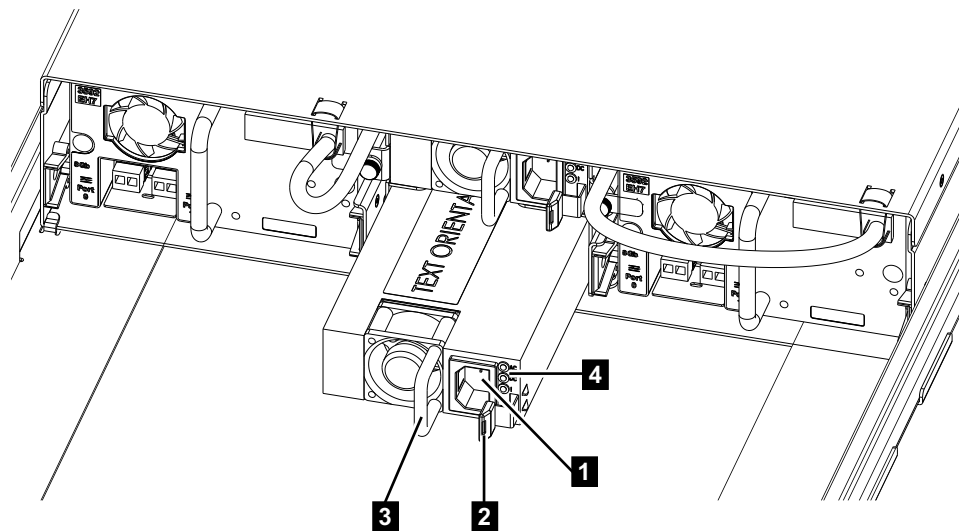


Figure 80: Removing the lower power supply

1. Complete [“Preparing the tape drive for service” on page 183](#) for both drives in the enclosure, then return here.

Note: It is not necessary to vary the drive offline or to make the drive unavailable to the customer if you are removing only one power supply. If you are removing only one power supply, go to Step 2.

2. See [Figure 80 on page 252](#). Disconnect the AC power cord from the power supply (1) you are removing.
3. Press the orange tab (2) to the left to unlock the power supply for removal. To install, push the supply in until it locks in position.
4. Use the handle (3) to pull the power supply out of the enclosure.

Replacing the power supply

1. Complete the Remove procedure in the reverse order, then return here.
2. Ensure that the AC and DC LEDs on the power supply are ON. See (4) in [Figure 80 on page 252](#) for the location of the LEDs.
3. Go to [“End of call” on page 185](#).

FID 85: Drive canister

See [Figure 79 on page 251](#) for FRU location 85. Use [Figure 81 on page 253](#) as you follow this procedure. Complete [“Offloading the dump to flash memory” on page 211](#) if the drive did not complete an automatic memory dump to flash memory.

Notes:

- The 3592 drive canisters are hot-pluggable. To minimize the impact on the customer's operation, one of the drive canisters can be unplugged and removed while power is still supplied to the remaining drive in the enclosure.
- Avoid touching the bezel while this procedure is completed. Contaminants from your fingers can affect performance of the library accessor.
- Before you order a drive FRU, determine the model number from the label on the failing drive and not from the service panel.

Removing the drive canister from an enclosure

1. Disconnect the canister cable (1 in Figure 81 on page 253) from the rear of the drive.

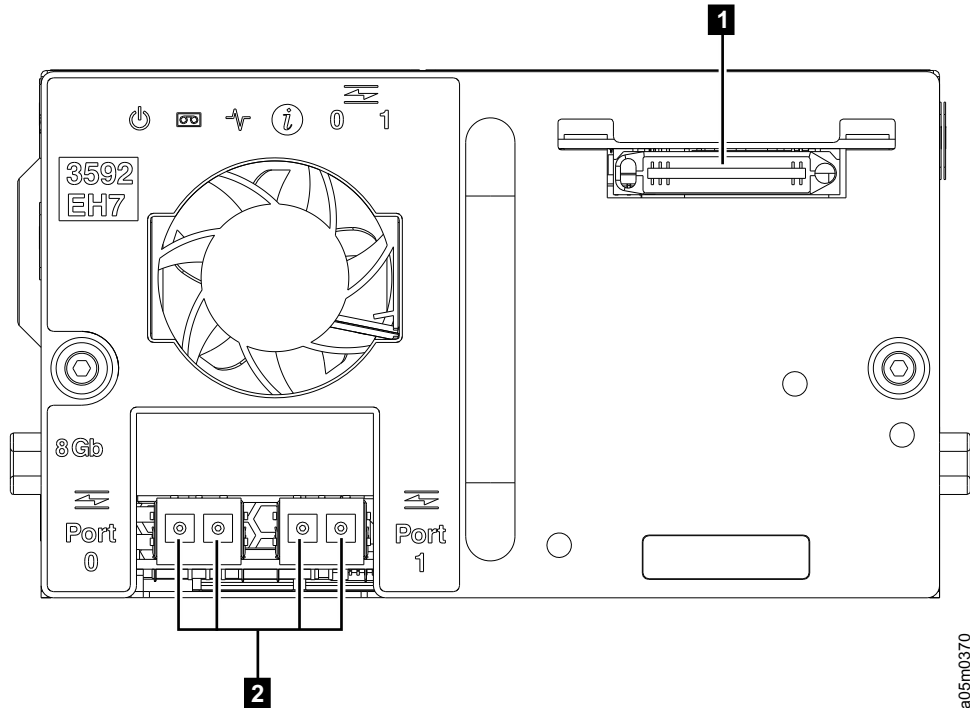
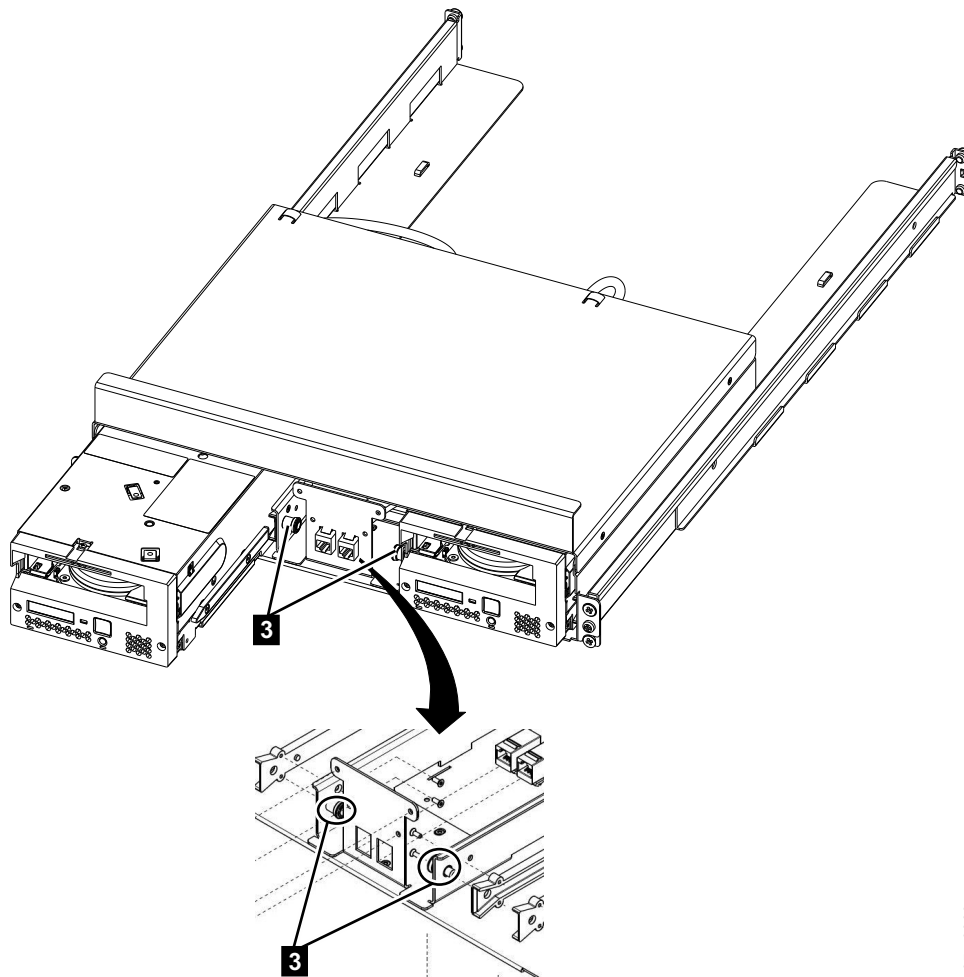


Figure 81: Drive canister connectors

2. Remove the fibre cable connectors (2) from the back of the drive that is to be removed.
3. See Figure 82 on page 254, which shows the removal of the canister from the front side of the rack. Use your other hand to support the drive canister from underneath the metal case. Release the spring plunger (3 in Figure 82 on page 254) and remove the drive from the enclosure.



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Figure 82: Front of the drive canister, showing the spring plunger

Replacing or reinstalling the drive canister


1. Remove the drive canister from the packaging by grasping the handle. Support the drive canister from the underside with your other hand. Avoid touching the bezel.
You can reuse any FRU packaging to pack the failed drive canister for return.
2. Record the serial number of the failed drive canister onto the RID tag label of the new drive canister. The RID tag label is placed on the canister latch, next to the LED status label. See [“Labels” on page 158](#) for information.
3. Release the spring plunger (3 in [Figure 82 on page 254](#)) and insert the drive into the enclosure.
4. Install the drive cable. See (1) in [Figure 81 on page 253](#). When power is applied, the POST diagnostic test runs.
5. Connect to the virtual operator panel. See [“Connecting and disconnecting the laptop from the drive” on page 186](#).
6. If an error message or FID appears, go to [“Maintenance starting point” on page 1](#) to correct the condition, then return here.
7. When the POST diagnostic test completes with no errors, continue with the next step.
8. Connect the fibre cables to the back of the drive canister. See (2) in [Figure 81 on page 253](#).
9. Complete [“End of call” on page 185](#), then return here.
10. Pack the removed drive canister (for return shipment) into the packaging from which you removed the new drive canister. Return the failed drive canister through your parts supply channel. See [“Relocating or storing the drive” on page 180](#) if you do not have the original packaging.

11. Use your local procedures to report the FRU part number for the FID.

Call Reporting Note: After you install the drive, report the drive part number usage against the 3592 drive machine type and model, not against the library machine type and model.

FID EA: Cables FRU kit



Attention:  The Rack Mount Card (RMC) is ESD sensitive. See “[Electrostatic discharge \(ESD\) sensitive parts](#)” on page 192 before ESD-sensitive parts are handled.

See [Figure 79](#) on page 251 for FRU location EA. The cables FRU kit contains the rack mount card cable.

Removing the cables

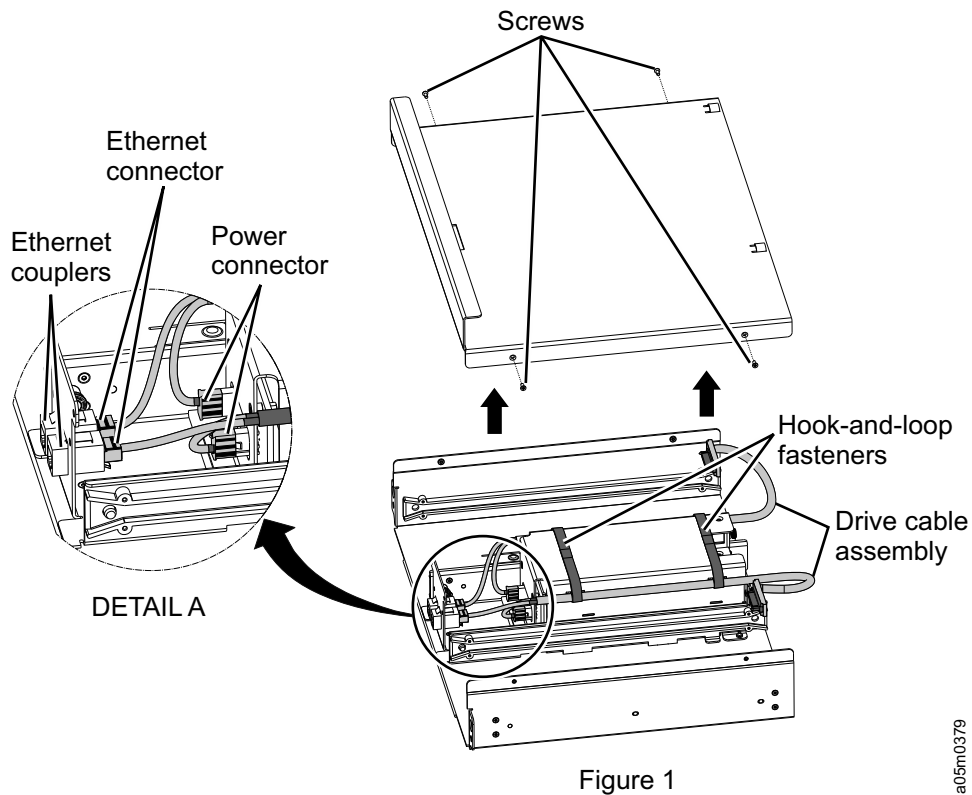
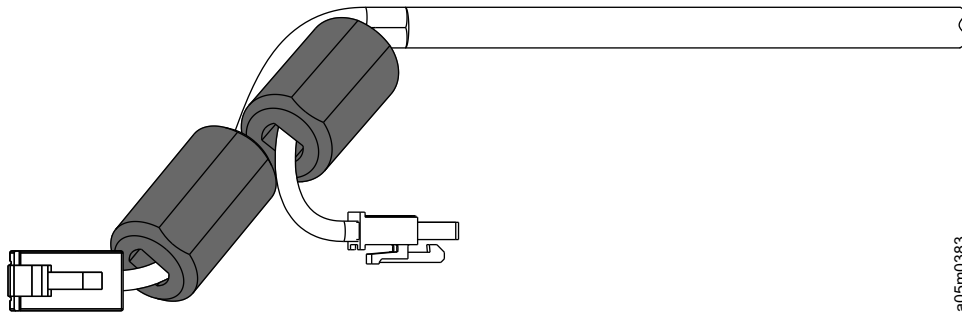


Figure 83: Removing the top cover, showing the cable assembly

1. Complete “[Preparing the tape drive for service](#)” on page 183, then return here.
2. Complete “[Removing the drive canister from an enclosure](#)” on page 253, then return here.
3. Remove the enclosure from the rack. See “[Removing the enclosure from a rack](#)” on page 258.
4. Place the enclosure on a table or work area.
5. Remove four screws from the top cover ([Figure 83](#) on page 255) and lift the cover from the enclosure.
6. Remove the hook-and-loop fasteners (2 for each cable).
7. Disconnect the Ethernet and power connector ([Figure 83](#) on page 255, DETAIL A) and remove the cable.
8. Remove the Ethernet coupler, if necessary.

Replacing the cables

1. Install the Ethernet coupler, if necessary. See [Figure 83](#) on page 255
2. Install the two ferrite beads on the cable assembly, if necessary. See [Figure 84](#) on page 256.



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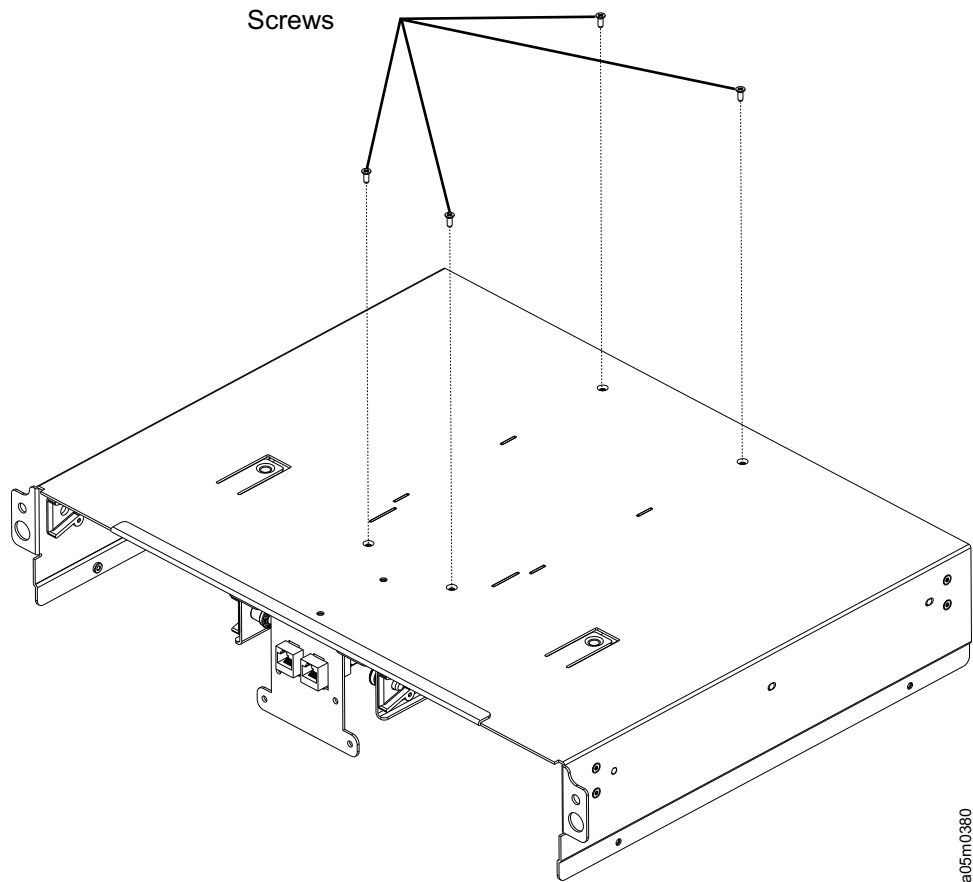
Figure 84: Ferrite beads on the cable assembly

3. Connect the Ethernet and power connectors.
4. Route the cable as shown in [Figure 83 on page 255](#) and fasten the hook-and-loop fasteners.
5. Replace the top cover and screw it down with four screws.
6. Insert the enclosure into the rack. See [“Removing the enclosure from a rack” on page 258](#).
7. Install the drive canisters. See [“FID 85: Drive canister” on page 252](#) for the procedure for removing and replacing a drive canister.

Removing the Rack Mount Card (RMC)

The Rack Mount Card (RMC) allows both power supplies to share the load to the two drive canisters. If one power supply fails, the RMC selects the remaining power supply to provide power to both drive canisters. This card can be removed and replaced, if needed.

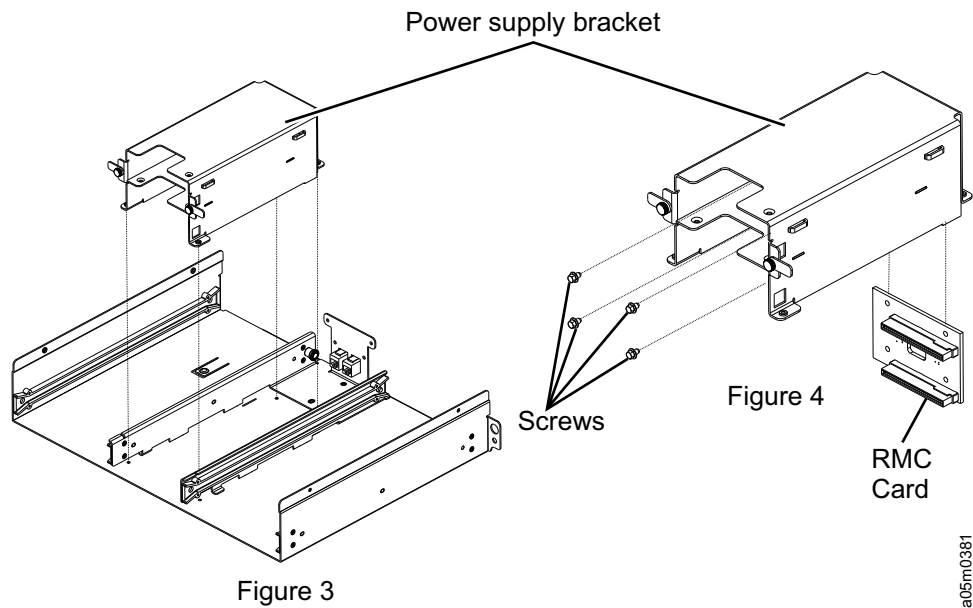
1. Complete [“Preparing the tape drive for service” on page 183](#), then return here.
2. Remove the drives. See [“FID 85: Drive canister” on page 252](#)
3. Remove the enclosure from the rack. See [“Removing the enclosure from a rack” on page 258](#).
4. Remove both cables. See [“FID EA: Cables FRU kit” on page 255](#).
5. Remove power supplies. See [“FID 82: Power supply” on page 252](#).
6. Turn the enclosure upside down.
7. Remove the four screws that secure the power supply bracket. See [Figure 85 on page 257](#).



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Figure 85: Unscrewing the power supply bracket

8. Turn the enclosure upright and remove the power supply bracket. See Figure 3 in [Figure 86 on page 257](#).



a05m0381

Figure 86: Removing the power supply bracket

9. Remove the four screws that fasten the card to the power supply bracket and remove the card. See [Figure 4 in Figure 86 on page 257](#).

Replacing the Rack Mount Card (RMC)

1. Install the RMC by using four screws.
2. Position the power supply bracket into the enclosure and turn the enclosure upside down.
3. Install four screws to secure the power supply bracket to the enclosure.
4. Turn the enclosure over.
5. Install both power supplies. See [“FID 82: Power supply” on page 252](#).
6. Install both cables. See [“FID EA: Cables FRU kit” on page 255](#).
7. Insert the enclosure into the rack. See [“Removing the enclosure from a rack” on page 258](#).
8. Install the drives. See [“FID 85: Drive canister” on page 252](#).

Removing the enclosure from a rack

1. Remove the two filter assembly screws and remove the assembly, if installed. See **7** and **8** in [Figure 55 on page 170](#).
2. Remove the drives. See [“Removing the drive canister from an enclosure” on page 253](#).
3. Disconnect the power cables from the power supplies. See [“Removing drive canister power” on page 183](#).
4. Remove the two screws that secure the enclosure to the rack. See **4** in [Figure 55 on page 170](#).
5. Remove the enclosure from the rack.

Chapter 9. Parts catalog information

This parts catalog provides information about the EH7/EH8/55F/60F FRU list. Also, see “Special tools and customer supplies” on page 35.

3592 EH7/EH8/55E/55F/60F Rack FRU list

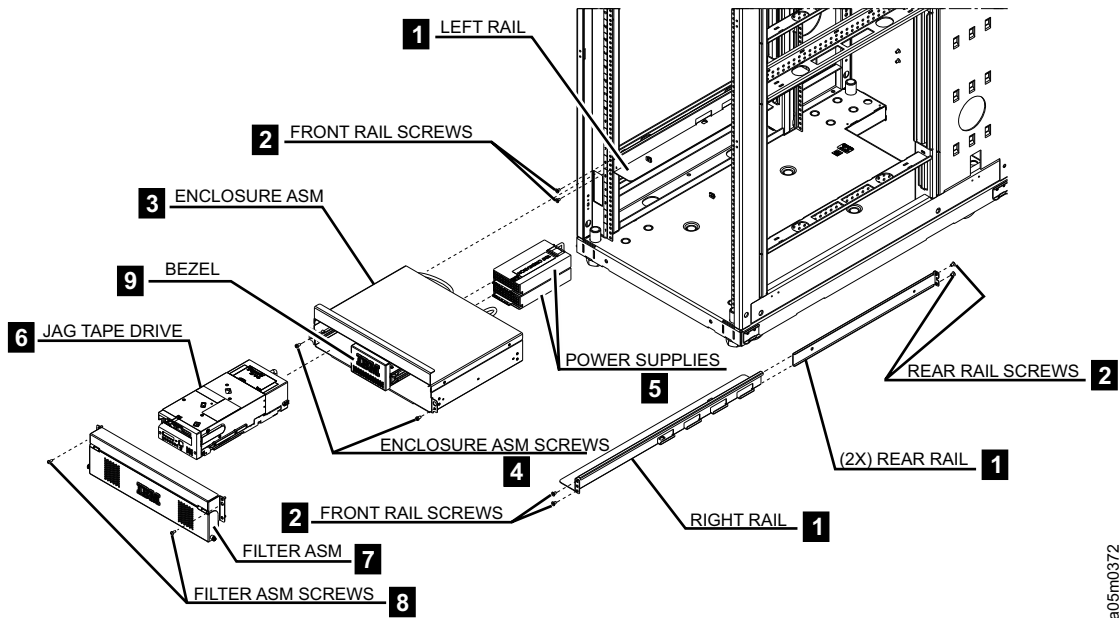


Figure 87: Exploded Rack Mount view

Table 158: 3592 EH7/EH8/55F/60F Rack FRU list

FRU name	ASM Index	Part Number	Description
Rail assembly	1	2727429	Rack Mount Rail Kit
Enclosure assembly	3	NP	Non-orderable P/N: 38L7515
Power supply	5	69Y5949	Power supply - Quantity of 2 per enclosure
EHx tape drive	6	EH7 - 00VJ449 EH8 - 00VJ453	EH7 drive EH8 drive
55x tape drive	6	55F - 01PL500	55F drive
60x tape drive	6	60F - 02FJ974	60F drive

Table 158: 3592 EH7/EH8/55F/60F Rack FRU list (continued)

FRU name	ASM Index	Part Number	Description
Filter assembly	7	2726479	RPQ Filter Assembly - Uses 2 standard 80 mm filters. (Customer provided)
Bezel	9	2726357	Enclosure front panel.
Drive filler panel	-	17R7289	Required if enclosure has only one drive
Power cable	-	39M5377	Quantity of 2 per enclosure required.
Rack Mount Cable Kit	-	2726346	Includes Ethernet coupler, cable, enclosure screws, hook-and-loop fastener, and ferrite beads
Rack Mount Card Kit	-	2726347	Includes card, enclosure screws, and card-mounting screws.
Cable, Laptop Straight Through Ethernet (Patch)	-	95P2817	3.2 m (10') Ethernet
Cable, 10 m (33 ft) LC/LC	-	41V2120	Host interface cable
Cable, 25 m (82 ft) LC/LC	-	15R8848	Host interface cable
Cable, 80 m (262 ft) LC/LC	-	41V2123	Host interface cable
Cartridge, CE Scratch Tape, JK type	-	46X9869	See “Cartridge type indicator” on page 25.
Cartridge, Cleaning (For 3592 rack) Customer orderable only	-	18P8792	See “Cleaning cartridge” on page 40.
Label, Repair Identification (RID) Tag	-	12X4129	See Figure 53 on page 171 for location.

Appendix A. ITDT support

ITDT is a customer tool and is installed with the IBM device drivers on the customer's server. With the customer's permission, it can also be used by service personnel to aid in diagnosing tape drive problems. The IBM Tape Diagnostic tool (ITDT) is available in two versions:

- Standard Edition (ITDT-SE) - The command line version.
- Graphical Edition (ITDT-GE) - The GUI version for the following operating systems -
 - Microsoft Windows operating systems
 - Linux operating systems

Both versions provide the user with a single diagnostic program for *tapeutil* applications. Both ITDT-SE and ITDT-GE contain *tapeutil* function with ITDT-SE also providing scripting capability.

Tip: The term *tapeutil* is a synonym for the tool that is delivered with the device driver. For example, this tool is named *tapeutil* on UNIX operating systems. It is named *ntutil* on Microsoft Windows operating systems.

The available advanced operations that are provided by the IBM Tape Diagnostic tool are run on tape drives and tape libraries. By using this function, the customer runs maintenance and diagnostic tasks to determine tape drive issues. This action significantly reduces product downtime and increases productivity.

The IBM Tape Diagnostic tool is designed to

- Run quick or extended diagnostic tests on tape drives
- Start tape library self-test operations
- Retrieve memory dumps from tape drives and libraries
- Complete a firmware update on tape drives or libraries
- Test the performance of the environment by completely writing a cartridge and measuring performance
- Verify tape drive compression
- Measure system performance
- Retrieve and display cartridge usage information
- Verify the encryption environment

This test is used to verify whether data on the cartridge was written encrypted.

- Scan the system to discover all supported tape and library devices
- Run a connection test

This test is used to verify that all devices are attached properly.

- Run a sequence of subtests to check whether the tape device is defective and output a pass/fail result.



Attention: When this test is run, all data on the cartridge is overwritten.

- Complete a full write function

This function writes the entire cartridge, overwriting all previous data with a selectable block size that contains either compressible or incompressible data and then outputs performance data.



Attention: When this test is run, all data on the cartridge is overwritten.

- Complete a system test

Writes different block sizes with compressible and incompressible data and then outputs performance data.



Attention: When this test is run, all data on the cartridge is overwritten.

- Complete a tape usage function to retrieve statistical data and error counters
- Complete a manual inspect function for devices not recognized

The ITDT-SE provides the most important functions of the previous *tapeutil* tools. As an extension of the current *tapeutil* variants, the set of operations and functions available with ITDT-SE is identical across all supported operating systems (unless a particular function is not available on a particular system).

Dedicated device drivers for tapes and libraries can be installed on the target system. An application is installed that uses the tape/library devices. When this configuration exists, ITDT-SE can coexist with the application so that when the application disables the device internally, ITDT-SE can run the diagnostic tests on that device.

Accessing ITDT

IBM maintains the current levels of the ITDT tool chain and documentation on the Internet at <http://www.ibm.com/support/fixcentral>.

This portal gives access to the download area where the following procedure guides you to the correct download:

1. In the **Product Group** menu, select **System Storage**.
2. In the **Product Family** menu, select **Tape Systems**.
3. In the **Product Type** menu, select **Tape drivers and software**.
4. In the **Product** menu, select **Tape Diagnostic Tool (ITDT)**.
5. Select your platform, and press **Continue**.

You can also navigate to the ITDT web page:

1. Go to the **Select fixes** page http://www-933.ibm.com/support/fixcentral/swg/selectFixes?parent=Tape%2Bdrivers%2Band%2Bsoftware&product=ibm/Storage_Tape/IBM+Tape+Diagnostic+Tool+ITDT&release=1.0&platform=All&function=all.
2. Under **Product selector**, choose **IBM Tape Diagnostic Tool ITDT**.
3. Under **Filter your content**, choose the **Fix status**, **platform**, and **component** that you want.
4. Alternately, you can click the link on the right side to download the version of ITDT for your operating system.

TAPEUTIL in Sun (Solaris) system environment

A SCSI Tape and Medium Changer utility program that is called **tapeutil** is provided with the IBM SCSI tape and Medium Changer device driver for Solaris. It is installed in the `/opt/IBMtape` directory as part of the `IBMtape` package. This program fulfills several purposes:

- It provides the following service aids for IBM tape subsystems:
 - Query Device Type/Verify Device Attachment
 - Query Device Serial Number
 - Query Device Microcode Level
 - Force Device Diagnostic Dump
 - Store Device Diagnostic Dump
 - Download Device Microcode
- It provides a menu-driven test tool for exercising or testing IBM tape and medium changer devices with a full suite of supported operations:
 - Reading/Writing Data
 - Tape Motion Commands
 - Setting/Displaying Device Information/Status
 - Mounting/Demounting Cartridges
 - Cartridge Inventory
- In addition to the menu-driven front end, the **tapeutil** program provides a command-line interface that is convenient for use in shell scripts.

Note: When you use the command-line calls to the **tapeutil** program, the tape device opens and closes for each invocation. Configuration parameters that are changed in one call to the **tapeutil** program are returned to default values when the device is closed.

- The source code for the **tapeutil** program is provided for example purposes, and is installed in the `/opt/IBMtape` directory during the `IBMtape` package installation. This source code is commented and demonstrates calls to all of the supported device driver entry points and *ioctl* commands. Thus, the application developer has a starting point for interfacing to the `IBMtape` device driver.

The **tapeutil** program provides both an interactive menu-driven interface and a command-line interface. If the **tapeutil** program is started with no command-line parameters, the menu-driven version is started. If you are using the menu-driven version, use option 1 to open the device to be operated on. You then can select other options.

The user is prompted for more information if it is required for the specific options selected. The results of a command are displayed after the command is run. If an error occurs for the command, error information and device sense data are displayed. You can close the device by using option 2, or it closes automatically after you select the **Quit** option. The menu is automatically displayed when the program is first started. To prevent unnecessary scrolling of the screen, the menu is not automatically displayed again after each command. It is instead refreshed only after the M (menu refresh) command is entered.

Figure 88 on page 264 shows the menu that is displayed by the **tapeutil** program.

IBM SCSI TAPE & MEDIUM CHANGER UTILITY PROGRAM	
GENERAL COMMANDS 1: Open Device 2: Close Device D: Device Type M: Menu Refresh Q: Quit Program	BASIC SCSI COMMANDS 9: Test Unit Ready 10: Inquiry 11: Request Sense 12: Reserve 13: Release 50: Log Sense 51: Mode Sense
SERVICE COMMANDS 3: Serial/Subsys Number 4: Query Microcode Level 5: Force Dump 6: Store Dump 7: Download Microcode	MEDIUM CHANGER COMMANDS 14: Move Medium 15: Position To Element 16: Element Information 17: Inventory 18: Audit 19: Lock/Unlock Door
TAPE DRIVE COMMANDS	
20: Read Data 21: Write Data 22: Write File Mark 23: Erase Tape 24: Rewind 25: Retension 26: Offline 27: Load/Unload Tape 28: Forward Space File 29: Backward Space File 30: Forward Space Record	32: Locate End Of Data 33: Get Record Size 34: Set Record Size 35: Get Device Status 36: Get Device Info 37: Get Media Info 38: Get Position 39: Set Position 43: Display Message 45: Report Density 49: Read/Write Test

Figure 88: TAPEUTIL **Program** menu – Sun Solaris system

If command-line parameters are provided when the program is started, the command-line mode is started. For each command-line execution of the program, the device is first opened. The specific command is issued, and the device is then closed. The program can be driven from within a shell script, if wanted. Results of the operation are displayed only when run in verbose mode. No information is displayed when not in verbose mode. This information is useful for quiet shell script implementations. A completion code, as defined in `/usr/include/sys/errno.h` for the operation that is requested, is always returned from the program upon exit (in both verbose and quiet mode).

Use the `tapeutil` program in command-line mode, as follows:

```
tapeutil -f device -o operation [options]
```

where **device** is the name of the tape device special file (for example: `/dev/rmt/1st`) and **operation** is one of the values that are listed here. The device special file and the operation are required. The specific **options** associated with a particular operation are indicated in [Table 159 on page 264](#), [Table 160 on page 265](#), [Table 161 on page 265](#), and [Table 162 on page 265](#). Parameters that are enclosed in square brackets are optional. All others are required.

Service Commands	Syntax
Query Serial Number	<code>tapeutil -f f.-o qsn [-w w][-v]</code>
Query Microcode Level	<code>tapeutil -f f.-o qmc [-w w][-v]</code>
Force Dump	<code>tapeutil -f f.-o fdp [-w w][-v]</code>
Store Dump	<code>tapeutil -f f.-o sdp [-w w][-v] -z z</code>
Download Microcode	<code>tapeutil -f f.-o dmc [-w w][-v] -z z</code>
Format Cartridge	<code>tapeutil -f f.-o fmt [-w w][-v]</code>

Table 159: Service commands and syntax (continued)

Service Commands	Syntax
Query Device Type	tapeutil -f f .-o chk [-w w][-v]

Table 160: Basic SCSI commands and syntax

Basic SCSI Commands	Syntax
Test Unit Ready	tapeutil -f f .-o tur [-w w][-v]
Inquiry	tapeutil -f f .-o inq [-w w][-v]
Request Sense	tapeutil -f f .-o req [-w w][-v]
Reserved	tapeutil -f f .-o res [-w w][-v]
Reserved	tapeutil -f f .-o rel [-w w][-v]

Table 161: Medium Changer commands and syntax

Medium Changer Commands	Syntax
Move Medium	tapeutil -f f .-o mov [-w w][-v] -s s -d d
Position To Element	tapeutil -f f .-o pos [-w w][-v] -s s
Element Information	tapeutil -f f .-o ele [-w w][-v]
Inventory	tapeutil -f f .-o inv [-w w][-v]
Audit	tapeutil -f f .-o aud [-w w][-v]
Lock/Unlock Door	tapeutil -f f .-o lck [-w w][-v] -x x

Table 162: Tape drive commands and syntax

Tape Drive Commands	Syntax
Read	tapeutil -ff.-o rea [-w w][-v] -b b -n n -m m
Write	tapeutil -f f .-o wri [-w w][-v] -b b -n n -m m [-r r] [-z z]
Write File Mark	tapeutil -f f .-o eof [-w w][-v] --c c
Erase Tape	tapeutil -f f .-o era [-w w][-v]
Rewind	tapeutil -f f .-o rew [-w w][-v]
Retension	tapeutil -f f .-o ret [-w w][-v]
Offline	tapeutil -f f .-o off [-w w][-v]
Load/Unload Tape	tapeutil -f f .-o lod [-w w][-v] -x x
Forward Space File	tapeutil -f f .-o fsf [-w w][-v] -c c
Backward Space File	tapeutil -f f .-o bsf [-w w][-v] -c c
Forward Space Record	tapeutil -f f .-o fsr [-w w][-v] -c c
Backward Space Record	tapeutil -f f .-o bsr [-w w][-v] -c c

Table 162: Tape drive commands and syntax (continued)

Tape Drive Commands	Syntax
Locate End of Data	tapeutil -f f.-o eod [-w w][-v]
Get Record Size	tapeutil -f f.-o grs [-w w][-v]
Set Record Size	tapeutil -f f.-o srs [-w w][-v]
Get Device Status	tapeutil -f f.-o gds [-w w][-v]
Get Device Information	tapeutil -f f.-o gdi [-w w][-v]
Get Media Information	tapeutil -f f.--o gmi [-w w][-v]
Get Position	tapeutil -f f.-o gpo [-w w][-v] -t t
Set Position	tapeutil -f f.-o spo [-w w][-v] -t t -x x
Get Parameter	tapeutil -f f.-o gpa [-w w][-v] -t t
Set Parameter	tapeutil -f f.-o spa [-w w][-v] -t t -x x
Sync Buffer	tapeutil -f f.-o syn [-w w][-v]
Display Message	tapeutil -f f.-o msg [-w w][-v] -t t -y y1,y1

Note: Starting the **tapeutil** program with the **-h** flag (for example, **tapeutil -h**) or the **-?** flag (for example, **tapeutil -?**) displays the usage help information.

The supported flags, their meanings, their associated operations, and their acceptable ranges are as follows:

Flag

description

- ?** Usage Help (stand-alone flag) {no value required}.
- b** Block Size (rea, wri) {0 < (block size x blocking factor) <2097152}.
- c** Operation Count (eof, fsf, fsr, bsf, bsr) {0 - 65535}.
- d** Destination Address (mov) {device-specific, determine range from Element Info}.
- f** Device Special file name (always required) {/dev/ramt/0mn or similar}.
- h** Usage Help (stand-alone flag) {no value required}.
- m** Multiples to Read or Write (rea, wri) {0 - 2097152}.
- n** Blocking Factor (rea, wri) {0 > (block size x blocking factor) <2097152}.
- o** Operation (always required) {refer to previous list}.
- r** Random Seed (wri) {0 - 65535}.
- s** Source Address (mov, pos) {device-specific, determine range from Element Info}.
- t** Type of Parameter Value.

- (gpo) {1=logical block, 2=physical block}.
- (spo) {1=logical block, 2=physical block}.
- (gpa) {1=block size, 2=compression, 3=buffering, 4=immediate, 5=trailer, 6=write protect, 7=acf mode, 8=capacity, 9=sili}.
- (spa) {1=block size, 2=compression, 3=buffering, 4=immediate, 5=trailer, 6=write protect, 8=capacity, 9=sili}.
- (msg) {1=display msg0, 2=display msg1, 3=flash msg0, 4=flash msg1, 5=alternate msg1/msg2}.

-v

Verbose Mode (optional for all commands, stand-alone flag) {no value that is required, absence of flag means quiet mode}.

-w

Open Mode (optional for all commands) {1=read/write, 2=read only (default), 3=write only, 4=append}.

-x

Parameter Value.

- (lck) {1=lock, 2=unlock}.
- (lod) {1=load, 2=unload}.
- (srs) {0 - 65536}.
- (spo) {0 - 65535}.
- (spa) {0 - 65535}.

-y

Messages (msg) {message1, message2}.

-z

Input/Output file name.

- (sdp) {path and name of the file in which to store memory dump}.
- (dmc) {path and name of the microcode image file}.
- (wri) {path and name of the file that contains write data pattern}.

Note:

1. For read and write operations, the size of one buffer of data that is transferred during a single read or write command is determined by the product of the *Block Size* value and the *B Factor* value. The number of these buffers that are transferred is determined by *Multiplier* value. The actual total number of bytes transferred is then (Block Size) x (Blocking Factor) x (Multiplier). If the device is set to fixed block mode (block size not equal to zero), the product of *Block Size* and *Blocking Factor* must be a multiple of the device block size setting.
2. For information on the Get Parameter (gpa) and Set Parameter (spa) operations, refer to the STIOG_GET_PARM and STIOG_SET_PARM ioctl commands that are described in the *Programming Reference*.

The following examples help to demonstrate and clarify the command-line usage of the **tapeutil** program. For all examples, substitute the actual value of the special file that is associated with the target device.

- To query the serial number of the device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0st -o qsn -v
```

- To request inquiry data from the device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0st -o inq -v
```

- To move a cartridge from cell 32 to the tape drive (16):

```
/opt/IBMtape/tapeutil -f /dev/rmt/0smc -o mov -s 32 -d 16 -v
```

- To set the block size of the device to 64 K:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0st -o spa -t 1 -x 65535 -v
```

- To write 100 64-K blocks of data to the tape device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0stn -w 1 -o wri -b 65535  
-n 1 -m 100 -v
```

- To write two file marks to the tape device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0stn -w 1 -o eof -c 2 -v
```

- To rewind the tape device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0stn -o rew -v
```

- To read 100 64-K blocks of data from the tape device:

```
/opt/IBMtape/tapeutil -f /dev/rmt/0stn -o rea -b 65535 -n 1 -m  
100 -v
```


TAPEUTIL in HP-UX system environment

Introduction

A SCSI Tape and Medium Changer utility program that is called **tapeutil** is provided with the IBM SCSI Tape and Medium Changer device driver for HP-UX. It is installed in the `/usr/bin` directory. The **tapeutil** program fulfills several purposes:

- It provides the following service aids for IBM tape subsystems:
 - Query Device Type/Verify Device Attachment
 - Query Device Serial Number
 - Query Device Microcode Level
 - Force Device Diagnostic Dump
 - Store Device Diagnostic Dump
 - Download Device Microcode
- It provides a menu-driven test tool for exercising or testing IBM tape and medium changer devices with a full suite of supported operations:
 - Reading/Writing Data
 - Tape Motion Commands
 - Setting/Displaying Device Information/Status
 - Mounting/Demounting Cartridges
 - Cartridge Inventory
- In addition to the menu-driven front end, the **tapeutil** program provides a command-line interface that is convenient for use in shell scripts.
- The source code for the **tapeutil** program is provided for example purposes, and is installed in the **tapeutil** directory during the **tapeutil** package installation. This source code is commented and demonstrates calls to all of the supported device driver entry points and *ioctl* commands. Thus, the application developer has a starting point for interfacing to the HP-UX device driver.

The **tapeutil** program provides both an interactive menu-driven interface and a command-line interface. If the **tapeutil** program is started with no command-line parameters, the menu-driven version is started. In the menu-driven version, the device to be operated on is opened with option 1. Other options can then be selected. The user is prompted for information if required for the specific options selected. The results of a command are displayed after it is run. If an error occurs for the command, error information and device sense data are displayed. The device can be closed with option 2, or it automatically closes when the **Quit** option is selected. The menu is automatically displayed when the program is first started. To prevent unnecessary scrolling of the screen, the menu is not automatically displayed again after each command. Instead, it is refreshed only after the M (menu refresh) command is entered.

Interactive menu-driven interface

Figure 89 on page 270 shows the menu that is displayed by the **tapeutil** program when the program is invoked, and no command-line parameters are entered:

IBM SCSI TAPE & MEDIUM CHANGER UTILITY PROGRAM	
GENERAL COMMANDS 1: Open Device 2: Close Device D: Device Type M: Menu Refresh Q: Quit Program	BASIC SCSI COMMANDS 9: Test Unit Ready 10: Inquiry 11: Request Sense 12: Log Sense Page 13: Mode Page
SERVICE COMMANDS 3: Query Serial Number 4: Query Microcode Level 5: Force Dump 6: Store Dump 7: Download Microcode 8: Query Driver Level	MEDIUM CHANGER COMMANDS 14: Reserve On Close 15: Release 16: Prevent/allow Media Removal
TAPE DRIVE COMMANDS	
26: Read Data 27: Write Data 28: Write File Mark 29: Erase Tape 30: Rewind 31: Retension 32: Offline 33: Load/Unload Tape 34: Forward Space File 35: Backward Space File 36: Forward Space Record 37: Backward Space Record 38: Locate End of Data 39: Get Parameter	40: Set Parameter 41: Sync Buffer 42: Display Message 43: Report Tape Density 44: Check Device Type 45: Get Record Size 46: Set Record Size 47: Get Device Status 48: Get Device Info 49: Get Media Info 50: Get Position 51: Set Position 52: Set MT/ST Mode

Figure 89: TAPEUTIL **Program** menu – HP-UX system

Command-line mode

If command-line parameters are provided when the **tapeutil** program is started, the command-line mode is started. For each command-line execution of the program, the device is first opened. The specific command is issued, and the device is then closed. The program can be driven from within a shell script if wanted. Results of the operation are displayed only when run in verbose mode. No information is displayed when not in verbose mode. This operation is useful for quiet shell script implementations. A completion code, as defined in `/usr/include/sys/errno.h` for the operation that is requested is always returned from the program upon exit (in both verbose and quiet mode).

Command-line commands and syntax

The usage of the **tapeutil** program in command-line mode is as follows:

```
tapeutil -f device -o
operation [options]
```

where **device** is the name of the tape device special file (for example: `/dev/rmt/1m`) and **operation** is one of the values that are listed here. The device special file and the operation are required. The specific **options** associated with a particular operation are indicated in [Table 163 on page 270](#), [Table 164 on page 271](#), [Table 165 on page 271](#) and [Table 166 on page 271](#). Parameters that are enclosed in square brackets are optional. All others are required.

Service Commands	Syntax
Query Serial Number	<code>tapeutil -f f.-o qsn [-w w][-v]</code>
Query Microcode Level	<code>tapeutil -ff.-o qmc [-w w][-v]</code>

Table 163: Service commands and syntax (continued)

Service Commands	Syntax
Force Dump	tapeutil -ff.-o fdp [-w w][-v]
Store Dump	tapeutil -f f.-o sdp [-w w][-v] -z z
Download Microcode	tapeutil -ff.-o dmc [-w w][-v] -zz
Format Cartridge	tapeutil -f f.-o fmt [-w w][-v]
Query Device Type	tapeutil -f f.-o chk [-w w][-v]

Table 164: Basic SCSI commands and syntax

Basic SCSI Commands	Syntax
Test Unit Ready	tapeutil -f f.-o tur [-w w][-v]
Inquiry	tapeutil -f f.-o inq [-w w][-v]
Request Sense	tapeutil -f f.-o req [-w w][-v]
Reserved	tapeutil -f f.-o res [-w w][-v]
Reserved	tapeutil -f f.-o rel [-w w][-v]

Table 165: Medium Changer commands and syntax

Medium Changer Commands	Syntax
Move Medium	tapeutil --ff.-o mov [-w w][-v] -s s -dd
Position To Element	tapeutil -ff.-o pos [-w w][-v] -s s
Element Information	tapeutil -f f.-o ele [-w w][-v]
Inventory	tapeutil -f f.-o inv [-w w][-v]
Audit	tapeutil -f f.-o aud [-w w][-v]
Lock/Unlock Door	tapeutil -f f.-o lck [-w w][-v] -x x

Table 166: Tape drive commands and syntax

Tape Drive Commands	Syntax
Read	tapeutil -f f.-o rea [-w w][-v] -b b -n n -m m
Write	tapeutil -f f.-o wri [-w w][-v] -b b -n n -m m [-r r] [-z z]
Write File Mark	tapeutil -f f.-o eof [-w w][-v] -c c
Erase Tape	tapeutil -f f.-o era [-w w][-v]
Rewind	tapeutil -ff.-o rew [-w w][-v]
Retension	tapeutil -f f.-o ret [-w w][-v]
Offline	tapeutil -f f.-o off [-w w][-v]
Load/Unload Tape	tapeutil -f f.-o lod [-w w][-v] -x x

Table 166: Tape drive commands and syntax (continued)

Tape Drive Commands	Syntax
Forward Space File	tapeutil -f f .-o fsf [-w w][-v] -c c
Backward Space File	tapeutil -f f .-o bsf [-w w][-v] -c c
Forward Space Record	tapeutil -f f .-o fsr [-w w][-v] -c c
Backward Space Record	tapeutil -f f .-o bsr [-w w][-v] -c c
Locate End of Data	tapeutil -f f .-o eod [-w w][-v]
Get Record Size	tapeutil -f f .-o grs [-w w][-v]
Set Record Size	tapeutil -f f .-o srs [-w w][-v]
Get Device Status	tapeutil -f f .-o gds [-w w][-v]
Get Device Information	tapeutil -f f .-o gdi [-w w][-v]
Get Media Information	tapeutil -f f .-o gmi [-w w][-v]
Get Position	tapeutil -ff.-o gpo [-w w][-v] -t t
Set Position	tapeutil -f f .-o spo [-w w][-v] -t t -x x
Get Parameter	tapeutil -f f .-o gpa [-w w][-v] -t t
Set Parameter	tapeutil -ff.-o spa [-w w][-v] -t t -x x
Sync Buffer	tapeutil -f f .-o syn [-w w][-v]
Display Message	tapeutil -f f .-o msg [-w w][-v] -tt -yy 1,y1

Note: Starting the **tapeutil** program with the **-h** flag (for example, **tapeutil -h**) or the **-?** flag (for example, **tapeutil -?**) displays the usage help information.

Flag descriptions

The supported flags, their meanings, their associated operations, and their acceptable ranges are as follows:

Flag descriptions

- ?**
Usage Help (stand-alone flag) {no value required}.
- b**
Block Size (rea, wri) {0 < (block size x blocking factor) <2097152}.
- c**
Operation Count (eof, fsf, fsr, bsf, bsr) {0 - 65535}.
- d**
Destination Address (mov) {device-specific, determine range from Element Info}.
- f**
Device Special file name (always required) {/dev/ramt/0mn or similar}.
- h**
Usage Help (stand-alone flag) {no value required}.
- m**
Multiples to Read or Write (rea, wri) {0 - 2097152}.
- n**
Blocking Factor (rea, wri) {0 > (block size x blocking factor) <2097152}.

- o**
Operation (always required) {refer to previous list}.
- r**
Random Seed (wri) {0 - 65535}.
- s**
Source Address (mov, pos) {device-specific, determine range from Element Info}.
- t**
Type of Parameter Value.
 - (gpo) {1=logical block, 2=physical block}.
 - (spo) {1=logical block, 2=physical block}.
 - (gpa) {1=block size, 2=compression, 3=buffering, 4=immediate, 5=trailer, 6=write protect, 7=acf mode, 8=capacity, 9=sili}.
 - (spa) {1=block size, 2=compression, 3=buffering, 4=immediate, 5=trailer, 6=write protect, 8=capacity, 9=sili}.
 - (msg) {1=display msg0, 2=display msg1, 3=flash msg0, 4=flash msg1, 5=alternate msg1/msg2}.
- v**
Verbose Mode (optional for all commands, stand-alone flag) {no value that is required, absence of flag means quiet mode}.
- w**
Open Mode (optional for all commands) {1=read/write, 2=read only (default), 3=write only, 4=append}.
- x**
Parameter Value.
 - (lck) {1=lock, 2=unlock}.
 - (lod) {1=load, 2=unload}.
 - (spo) {0 - 65535}.
 - (spa) {0 - 65535}.
- y**
Messages (msg) {message1,message2}.
- z**
Input/Output file name.
 - (sdp) {path and name of the file in which to store memory dump}.
 - (dmc) {path and name of the microcode image file}.
 - (wri) {path and name of the file that contains write data pattern}.

Note:

1. For read and write operations, the size of one buffer of data that is transferred during a single SCSI read or write command is determined by the product of the *Block Size* value and the *B Factor* value. The number of these buffers that are transferred is determined by *Multiplier* value. The actual total number of bytes transferred is then (Block Size) x (Blocking Factor) x (Multiplier). If the device is set to fixed block mode (block size not equal to zero), the product of *Block Size* and *Blocking Factor* must be a multiple of the device block size setting.
2. For information on the Get Parameter (gpa) and Set Parameter (spa) operations, refer to the STIOG_GET_PARM and STIOG_SET_PARM *ioctl* commands that are described in the *Programming Reference*.

Examples

The following examples help to demonstrate and clarify the command-line usage of the **tapeutil** program. For all examples, substitute the actual value of the special file that is associated with the target device.

- To query the serial number of the device

```
/opt/IBMtape/tapeutil -f /dev/rmt/0m -o qsn -v
```

- To request inquiry data from the device

```
/opt/IBMtape/tapeutil -f /dev/rmt/0m -o inq -v
```

- To move a cartridge from cell 32 to the tape drive (16)

```
/opt/IBMtape/tapeutil -f /dev/rmt/0smc -o mov -s 32 -d 16 -v
```

- To write 100 64-K blocks of data to the tape device

```
/opt/IBMtape/tapeutil -f /dev/rmt/0mn -w 1 -o wri -b 65535  
-n 1 -m 100 -v
```

- To write two file marks to the tape device

```
/opt/IBMtape/tapeutil -f /dev/rmt/0mn -w 1 -o eof -c 2 -v
```

- To rewind the tape device

```
/opt/IBMtape/tapeutil -f /dev/rmt/0mn -o rew -v
```

- To read 100 64-K blocks of data from the tape device

```
/opt/IBMtape/tapeutil -f /dev/rmt/0mn -o rea -b 65535  
-n 1 -m 100 -v
```

TAPEUTIL in Windows system environment (NTUTIL)

NT utility program

The device is supported on Intel-based processors with a minimum processor level of Intel 486DX or Pentium with sufficient RAM and disk space for operation of the Microsoft Windows NT or Windows 2000 operating system.

The utility has these general characteristics:

- Can be driven interactively or from a file (batch mode)
- Allows specification of wanted results from each step of the test so that the test can be self-checking
- Allows testing of all device driver interfaces with both valid and invalid parameters

Starting NTUTIL

The tool can be started as a command from the command prompt or from within a shell script.

```
ntutil <-f input-file> <-o output-file> <-t tape-path-special-file-name>  
      <-c changer-path-special-file-name> <-l library-mode-on>  
      <-d debug-trace-on>
```

The options are -

-f input-file	Specifies the input file for batch mode. If a file is specified, NTUTIL will execute in batch mode and read input from this file. The default for this file is NTUTIL.in.
-o output-file	Specifies the output file. The default for this file is NTUTIL.out.
-t tape-path-special-file-name	Specifies the special file value (for example, tape0) to substitute on the "open" statement in the input file.
-c changer-path-special-file-name	Specifies the changer device special file value (for example, 1b0.1.2.3) to substitute when executing an open (for both batch and interactive mode). The special value def_lun_1 specifies that an open uses the default lun associated with the tape-special-file-name.
-l library-mode-on	Specifies that an open will open both the tape path special file and the changer path special file (for both batch and interactive mode).
-d debug-trace-on	Turns on internal tracing printouts in the output file. Used only to debug the tool itself.

Note: If no parameters are specified, NTUTIL operates in interactive mode.

Interactive mode

When NTUTIL is started without the -f flag, it defaults to running in interactive or manual mode. This mode allows a developer to interactively determine the kind of testing to be done. When in interactive mode, NTUTIL provides a menu of functions that are completed.

The two modes are -

- Base mode (LUN0) commands such as open/close/read/write.

- Library mode (LUN0 and LUN1) that supports open/close/read/write plus media mover commands such as read element status and move media.

The 3592 library must be in Random 2 LUN mode. Also, the other devices must be in Random mode, both when booted and to operate NTUTIL in library mode.

Base mode (only LUN 0 is accessed) is shown in [Figure 90 on page 276](#).

Library mode (LUN 0 and LUN 1 are accessed) is shown in [Figure 91 on page 277](#).

Base mode

The **Base mode** menu follows:

```

MANUAL TEST MENU:
+-----+-----+
| 1: set device special file          2: display symbols          |
| 3: set block size R/W (now !0 fixed) 4: set block count (R/W)   |
| 5: set return error when fail       6: set/reset trace         |
| 7: set exit on unexpected result    8: Library Mode           |
+-----+-----+
|20: open                             21: close                    |
|22: read                              23: write                     |
|24: read and display block           25: flush (buffer->media)  |
|26: read block id                    27: erase                     |
|28: locate block id                  29: display block data     |
+-----+-----+
|30: write filemark(s)                31: rewind                   |
|32: forward space filemark(s)        33: unload                    |
|34: reverse space filemark(s)        35: load                      |
|36: forward space record(s)         37: return error            |
|38: reverse space record(s)         39: test unit ready         |
|43: set media parms (block size)    44: set dev parms (comp.   |
|46: get device information          47: restore data            |
|48: get medium information          49: inquiry                  |
|53: space EOD                       54: display message        |
+-----+-----+
|70: system command                  |
|                                     |
+-----+-----+
|80: Force Dump                      81: Read Dump                |
|82: Update Code                     83: Log Sense                 |
|84: Get Last Sense                   85: Get Version               |
|86: Associative/Persistent WProtect 87: Read/Write Test          |
|88: List Registered Devices          89: Get MTDevice info        |
+-----+-----+
|99: return to main menu              |
|                                     |
+-----+-----+
enter selection:

```

Figure 90: Base mode: Windows environment

Library mode

The **Library mode** menu follows:

MANUAL TEST MENU:

```
+-----+
| 1: set device special file          2: display symbols          |
| 3: set block size R/W (now !0 fixed) 4: set block count (R/W)   |
| 5: set return error when fail       6: set/reset trace        |
| 7: set exit on unexpected result     8: Base Mode              |
+-----+
|10: ioctl return library inventory    11: ioctl move medium     |
|12: ioctl initialize element status   |
+-----+
|20: open                             21: close                   |
|22: read                             23: write                   |
|24: read and display block           25: flush (buffer->media)  |
|26: read block id                   27: erase                   |
|28: locate block id                 29: display block data    |
+-----+
|30: write filemark(s)                31: rewind                 |
|32: forward space filemark(s)        33: unload                 |
|34: reverse space filemark(s)        35: load (3592 Sys Mode)   |
|36: forward space record(s)          37: return error          |
|38: reverse space record(s)          39: test unit ready       |
|43: set media parms (block size)     44: set dev parms (comp.) |
|46: get device information            |
|48: get medium information            49: inquiry                |
|53: space EOD                        54: display message       |
+-----+
|70: system command                   |
+-----+
|80: Force Dump                       81: Read Dump              |
|82: Update Code                      83: Log Sense              |
|84: Get Last Sense                   85: Get Version            |
|86: Associative/Persistent WProtect  87: Read/Write Test        |
|88: Find Devices                     89: Get MTDevice info     |
+-----+
|99: return to main menu              |
+-----+
enter selection:
```

Figure 91: Library mode: Windows environment

TAPEUTIL in Linux system environment

The devices must be fully installed, and the host device driver must be configured and available before you attempt to run **IBMtapeutil**. For information about using this procedure or for more information on **IBMtapeutil** and other tools available with the 3592 device driver, see *IBM Tape Device Drivers: Installation and User's Guide* (GC35-0154).

Note: You might need the assistance of your customer to run **IBMtapeutil** at the host console.

IBMtapeutil run procedure

Included in your customer's Linux 3592 device driver package is the tape and medium changer utility **IBMtapeutil**. **IBMtapeutil** can be used from the customer's host console to exercise supported tape drives and medium changers. Two sets of procedures are available.

- Interactive mode.
- Command-line mode. See [“Command-line mode”](#) on page 280.

Interactive mode

Because the interactive mode requires little knowledge of the Linux operating system language, it might be your preferred choice. The results that you see on your customer's host console might be different from [Figure 92 on page 279](#). The examples that you find in this procedure are based on this example figure. If your installation's menu of interactive mode commands appears different, change the command entries in the example to reflect your installation's menu.

```

----- General Commands: -----
    1: Open a Device          7: Request Sense
    2: Close a Device       8: Log Sense Page
    3: Inquiry              9: Mode Sense Page
    4: Test Unit Ready     10: Switch Tape/Changer Device
    5: Reserve Device      11: Create Special Files
    6: Release Device      12: Query Driver Version
    Q: Quit IBMtapeutil

----- Tape Commands: -----
    20: Rewind              33: Set Block size
    21: Forward Space Filemarks 34: Retension Tape
    22: Backward Space Filemarks 35: Query/Set Tape Position
    23: Forward Space Records  36: Query Tape Status
    24: Backward Space Records 37: Load Tape
    25: FSFM                38: Unload Tape
    26: BSFM                39: Lock Tape Drive Door
    27: Space to End of Data  40: Unlock Tape Drive Door
    28: Read and Write Tests  41: Take Tape Offline
    29: Write Filemarks      42: Enable/Disable Compression
    30: Read or Write Files  43: Flush Driver's Buffer
    31: Erase                44: Self Test
    32: Reset Drive         45: Display Message

----- IBMtape Commands: -----
    46: Query Sense         52: Locate Tape Position
    47: Query Inquiry      53: Read Tape Position
    48: Query/Set Tape Paramters 54: Query Mtdevice Number
    49: Query/Set Tape Position 55: Synchronize Buffers
    50: Query/Set MT/ST Mode  56: List Tape Filemarks
    51: Report Density Support

----- Service Aid Commands: -----
    70: Dump Device        72: Load Ucode
    71: Force Dump        73: Reset Drive

-----
    99: Back To Main Menu

Enter Selection
-----

```

Figure 92: TAPEUTIL Program Commands menu - Linux environment (Interactive mode command). This example assumes that your device is attached at /dev . IBMtape0 and that your device has no cartridge in the drive.

The following example opens the tape drive device, loads a writable scratch tape, completes a short write/read, and unloads the tape drive. Because the data on the tape is overwritten, use only a cartridge that your customer agreed to provide for the conversion to a scratch tape. Any data that was on the tape when your customer provided it to you is permanently deleted when you run this procedure.

Note: When the **Hit<Enter> to continue...** message appears or when you are prompted to enter information, follow the instructions, and press **Enter**. Verify any information that the utility displays by using the appropriate hardware manual.

1. Open a Linux window.
2. Mount a writable scratch cartridge in the drive. For non-library drives, manually load the scratch cartridge into the drive.
3. Enter **IBMtapeutil**. A menu displays.
4. Enter **1** (Open a Device).
5. Enter /dev/IBMtape0 when prompted for the device name. If the device you are testing is not an IBMtape0, enter the actual device number.
6. Enter **1** (Read/Write).
7. Enter **3** (Inquiry). Specify 0 when prompted for an inquiry page.
8. Enter **4** (Test Unit Ready) until no error occurs.
9. Enter **20** (Rewind).
10. Enter **28** (Read and Write Tests)
11. Enter **1** (Read and Write). Press **Enter** three times to accept the defaults and to run the test.
12. Enter **38** (Unload Tape).

13. Enter **2** (Close a Device).
14. Enter **Q** (Quit the program).
15. Remove the scratch tape cartridge
 - a. By using Library Manager, if the drive is in a library.

--OR--

- b. Manually, if the drive is not in a library.

Command-line mode

Command-line mode requires extra knowledge. Consider using interactive mode. See *IBM Tape Device Drivers: Installation and User's Guide* for more information about command structure and console language syntax for Command-line mode.

<i>Table 167: TAPEUTIL Program menu – Linux environment (Command-line mode)</i>		
General Subcommands		
tur	inquiry [Page]	print "Text"
reserve	release	reqsense
qryversion	logpage "Page"	modepage "Page"
Tape Subcommands		
bsf [Count]	bsr [Count]	eof [Count]
fsf [Count]	fsr [Count]	weof [Count]
fsfm [Count]	bsfm [Count]	asf [Count]
compress	tell	seek [Count]
nocompress	rewind	sync
load	erase	display "Message"
unload	retension	read -d Destination [-cCount]
qrypos	seod	write -s Source
setpos (Blockid)	status	rtest [-b Blocksize] [-c Count] [-r Repetition]
offline	parms	wtest [-b Blocksize] [-c Count] [-r Repetition]
rewoffl	list	rwtest [-b Blocksize] [-c Count] [-r Repetition]
prevent	lock	setblk [Count]
allow	unlock	density
qryinquiry	qrysense	append mtdevice
Medium Changer Subcommands		
allow	prevent	audit [Address [Count]]
inventory	mount [Slot]	position "Destination"
elementinfo	unmount [Slot]	move "Source" "Destination"
devids	exchange "Source" "Dest1" "Dest2"	
Service Aid Subcommands		
dump [Filename]	force dump	ucode "Name"

TAPEUTIL in AIX environment

The tape utility program is included in the AIX Atape device driver file set. For information about using **tapeutil** in an AIX environment, use AIX documentation such as the *IBM Tape Device Drivers Installation and User's Guide*.

Appendix C. Metric conversion and similar comparisons

Use this section to convert values between the metric and the US standards. To convert other values that are not shown in the tables:

- From millimeters to inches, multiply millimeters by 0.03937 ([Table 168 on page 282](#))
- From millimeters to feet, multiply millimeters by 0.00328
- From centimeters to inches, multiply centimeters by 0.3937
- From centimeters to feet, multiply centimeters by 0.0328
- From meters to inches, multiply meters by 39.37
- From meters to feet, multiply meters by 3.2808 ([Table 169 on page 283](#))
- From inches to millimeters, multiply inches by 25.4 (See note atop [Table 170 on page 283](#))
- From inches to centimeters, multiply inches by 2.54 ([Table 170 on page 283](#))
- From inches to meters, multiply inches by 0.0254 (See note atop [Table 170 on page 283](#))
- From feet to millimeters, multiply feet by 304.801
- From feet to centimeters, multiply feet by 30.48 ([Table 170 on page 283](#))
- From feet to meters, multiply feet by 0.3048 ([Table 171 on page 283](#))
- From millimeters to centimeters, multiply millimeters by 0.10
- From centimeters to millimeters, multiply centimeters by 10.0
- From grams to ounces, multiply grams by .035274
- From grams to pounds, multiply grams by .0022046
- From ounces to grams, multiply ounces by 28.349527
- From kilograms to pounds, multiply kilograms by 2.2046 ([Table 172 on page 284](#))
- From pounds to kilograms, multiply pounds by 0.45359 ([Table 173 on page 284](#))
- From Centigrade to Fahrenheit, multiply degrees by 1.8, and add 32 ([Table 174 on page 285](#))
- From Fahrenheit to Centigrade, subtract 32 from degrees, and multiply by 0.555 ([Table 175 on page 285](#))
- For kilobytes to kibibytes, kibibytes to kilobytes, and for other like binary terms (mega, giga), see [Table 178 on page 287](#)

MM	IN.	MM	IN.	MM	IN.	MM	IN.	MM	IN.
1	0.039	11	0.433	21	0.827	31	1.220	41	1.614
2	0.078	12	0.472	22	0.866	32	1.259	42	1.653
3	0.118	13	0.512	23	0.905	33	1.299	43	1.693
4	0.157	14	0.551	24	0.945	34	1.338	44	1.732
5	0.196	15	0.590	25	0.984	35	1.378	45	1.771
6	0.236	16	0.629	26	1.024	36	1.417	46	1.811
7	0.275	17	0.669	27	1.063	37	1.456	47	1.850
8	0.315	18	0.708	28	1.102	38	1.496	48	1.889
9	0.354	19	0.748	29	1.142	39	1.535	49	1.929

Table 168: Millimeters-to-inches conversion (continued)

10	0.3937	20	0.787	30	1.180	40	1.575	50	1.968
----	--------	----	-------	----	-------	----	-------	----	-------

Table 169: Meters-to-feet conversion

M	FT	M	FT.	M	FT.	M	FT.
1	3.28	11	36.09	21	68.9	35	114.83
2	6.56	12	39.37	22	72.2	40	131.23
3	9.84	13	42.65	23	75.4	45	147.63
4	13.12	14	45.93	24	78.7	50	164.04
5	16.40	15	49.21	25	82	60	196.85
6	19.68	16	52.49	26	85.3	75	246.06
7	22.96	17	55.77	27	88.6	100	328.08
8	26.25	18	59.05	28	91.9	200	656.16
9	29.52	19	62.34	29	95.1	500	1640
10	32.81	20	65.61	30	98.42	1000	3280

Table 170: Inches/feet-to-centimeters conversion. For millimeters, after inches are converted to centimeters, move the decimal point one place to the right; so 1.0 in. = 25.4 mm. To convert inches (or feet) to meters after inches (or feet) are converted to centimeters, move the decimal point two places to the left; so 48 in. = 1.2 m.

IN.(FT)	CM	IN.(FT)	CM	IN.(FT)	CM	IN.(FT)	CM
1	2.54	13	33.02	25	63.50	48(4)	121.92
2	5.08	14	35.56	26	66.04	60(5)	152.4
3	7.62	15	38.10	27	68.58	72(6)	182.88
4	10.16	16	40.64	28	71.12	84(7)	213.36
5	14.34	17	43.18	29	73.66	96(8)	243.84
6	15.24	18	45.72	30	76.20	100(8.3)	254
7	17.78	19	48.26	31	78.74	108(9)	274.32
8	20.32	20	50.80	32	81.28	120(10)	304.8
9	22.86	21	53.34	33	83.82	132(11)	335.28
10	25.40	22	55.88	34	86.36	144(12)	365.76
11	27.94	23	58.42	35	88.90	156(13)	396.24
12(1)	30.48	24(2)	60.96	36(3)	91.44	168(14)	426.72

Table 171: Feet-to-meters conversion

FT	M	FT	M	FT	M	FT	M	FT	M
----	---	----	---	----	---	----	---	----	---

Table 171: Feet-to-meters conversion (continued)

1	0.30	11	3.3	21	6.4	31	9.4	41	12.5
2	0.60	12	3.6	22	6.7	32	9.7	42	12.8
3	0.91	13	3.9	23	7.0	33	10	43	13.1
4	1.2	14	4.3	24	7.3	34	10.4	44	13.4
5	1.5	15	4.6	25	7.6	35	10.7	45	13.7
6	1.8	16	4.9	26	7.9	36	10.9	50	15.2
7	2.1	17	5.2	27	8.2	37	11.3	100	30.5
8	2.4	18	5.5	28	2.4	38	11.6	200	60.9
9	2.7	19	5.8	29	8.8	39	86	500	152.4
10	3.04	20	6.1	30	9.1	40	88	1000	304.8

Table 172: Kilograms-to-pounds conversion

KG	LB	KG	LB	KG	LB	KG	LB	KG	LB
1	2.2	11	24.3	21	46.3	31	68.3	45	99.2
2	4.4	12	26.5	22	48.5	32	70.5	50	110.2
3	6.6	13	28.6	23	50.7	33	72.7	75	165.3
4	8.8	14	30.8	24	52.9	34	74.9	100	220.5
5	11.0	15	33.0	25	55.1	35	77.2	200	440.9
6	13.2	16	35.3	26	66.1	36	79.4	250	551
7	15.4	17	37.5	27	77.2	37	81.6	500	1102
8	17.6	18	39.7	28	88.2	38	83.8	1000	2205
9	19.8	19	41.9	29	99.2	39	86	2000	4409
10	22.0	20	44.0	30	110.2	40	88.1	5000	11023

Table 173: Pounds-to-kilograms conversion

LB	KG	LB	KG	LB	KG	LB	KG
1	0.45	11	4.9	21	9.5	35	15.9
2	0.9	12	5.4	22	9.9	40	18.1
3	1.4	13	5.9	23	10.4	45	20.4
4	1.8	14	6.3	24	10.9	50	22.7
5	2.3	15	6.8	25	10.9	75	34.0
6	2.7	16	7.2	26	11.8	100	45.4
7	3.2	17	7.7	27	12.2	250	113.4
8	3.6	18	8.2	28	12.7	500	226.8

Table 173: Pounds-to-kilograms conversion (continued)

9	4.1	19	8.6	29	13.1	1000	453.6
10	4.5	20	9.1	30	13.6	2000	907.2

Table 174: Celsius-to-Fahrenheit conversion

°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
-40	-40	9	48.2	19	66.2	29	84	39	102.2
0	32	10	50	20	68	30	86	40	104
1	33.8	11	51.8	21	69.8	31	87.8	41	105.8
2	35.6	12	53.6	22	71.6	32	89.6	42	107.6
3	37.4	13	55.4	23	73.4	33	91.4	43	109.4
4	39.2	14	57.2	24	75.2	34	93.2	44	111.2
5	41	15	59	25	77	35	95	45	113
6	42.8	16	60.8	26	79	36	96.8	50	122
7	44.6	17	62.6	27	81	37	98.6	100	212
8	46.4	18	64.4	28	82	38	100.4	180	356

Table 175: Fahrenheit-to-Celsius conversion

°F	°C	°F	°C	°F	°C	°F	°C
-40	-40	40	4.4	80	26.6	105	40.5
-30	-34.4	45	7.2	85	29.4	110	43.3
-20	-28.9	50	10	90	32.2	115	46.1
-10	-23.3	55	12.8	95	35	120	48.8
0	-17.7	60	15.5	98.6	36.96	125	51.6
10	-12.2	65	18.3	100	37.7	130	54.4
20	-6.7	68	20	101	38.3	135	57.2
30	-1.1	70	21.1	102	38.9	140	60
32	0	72	22.2	103	39.4	212	100
35	1.7	75	23.9	104	40	355	179.2

Table 176: SI Base Units and Derived SI Units. Add the SI prefixes in Table 177 on page 286 to the SI Base Units in this table to create compound terms (Derived SI Units). This table contains all the base units, but only a sampling of derived units.

SI Base Units	
Dimension Measured	Unit of Measurement
Length	meter

Table 176: SI Base Units and Derived SI Units. Add the SI prefixes in Table 177 on page 286 to the SI Base Units in this table to create compound terms (Derived SI Units). This table contains all the base units, but only a sampling of derived units. (continued)

Mass	kilogram
Time	second
Electric Current	ampere
Thermodynamic Temperature	kelvin
Amount of Substance	mole
Luminous Intensity	candela
Examples of Derived SI Units	
One thousand meters	kilometer
Thousandth of a second	millisecond
Millionth of an ampere	microampere

Table 177: Mathematical power-to-common term comparison (American system). Use these prefixes with the base SI units in Table 176 on page 285 to create compound algebraic and mathematical terms, called "derived SI units."

Prefix	Equivalent (American) Ordinal Number	Mathematical Power
yotta	septillion	10^{24}
zetta	sextillion	10^{21}
exa	quintillion	10^{18}
peta	quadrillion	10^{15}
tera	trillion	10^{12}
giga	billion	10^9
mega	million	10^6
kilo	thousand	10^3
----	----	10
milli	thousandth	10^{-3}
micro	millionth	10^{-6}
nano	billionth	10^{-9}
pico	trillionth	10^{-12}
femto	quadrillionth	10^{-15}
atto	quintillionth	10^{-18}

Table 178: Binary measuring units-to-decimal measuring units conversion. The Base 10 (decimal) column is provided to depict the difference between two Base Numbering systems.

Base 2 (Binary) Measuring Unit	Base 2 Name (Symbol)	Base 2 Term and Mathematical Power	Base 10 (Decimal - Shown for Comparison)
2^{10}	kibi (Ki or KiB)	kilobinary (2^{10}) ¹	kilo = 10^3
2^{20}	mebi (Mi or MiB)	megabinary (2^{10}) ²	mega = 10^6 or $(10^3)^2$
2^{30}	gibi (Gi or GiB)	gigabinary (2^{10}) ³	giga = 10^9 or $(10^3)^3$
2^{40}	tebi (Ti or TiB)	terabinary (2^{10}) ⁴	tera = 10^{12} or $(10^3)^4$
2^{50}	pebi (Pi or PiB)	petabinary (2^{10}) ⁵	peta = 10^{15} or $(10^3)^5$
2^{60}	exbi (Ei or EiB)	exabinary (2^{10}) ⁶	exa = 10^{18} or $(10^3)^6$
2^{70}	zebi (Zi or ZiB)	zettabinary (2^{10}) ⁷	zetta = 10^{21} or $(10^3)^7$
2^{80}	yobi (Yi or YiB)	yottabinary (2^{10}) ⁸	yotta = 10^{24} or $(10^3)^8$

Appendix D. Minimum microcode requirements

Use the following table to determine the minimum microcode level required for the your tape drive.

Note: The third character in a string like "D3I1" is the uppercase alphabetic character "I" as with the first letter in the term "IBM."

Minimum requirements for Rack Mount tape drives

Use Table 179 on page 288 to determine the minimum microcode level at which your Rack Mount tape drive must be before you begin service. If your microcode is at a lower level, contact your next level of support for assistance. Also, see [“Microcode maintenance” on page 217](#) to read about updating drive microcode and to estimate how long it takes to update drive microcode.

With this drive...	...your microcode must be at this minimum level
EH7 drive	D3I3_A85
EH8 drive	D3I4_689
55F drive	D3I4_7A4
60F drive	D3I5_44F

Appendix E. Notices

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Feature Code 4804 must be installed in an equipment rack with metal front, rear, and side covers or doors to be in compliance with all applicable national regulations concerning electromagnetic compatibility (EMC), including the following and their successors:

- Part 15 of the FCC Rules (USA)

- ICES-003 (Canada)
- Directive 2014/30/EU (European Union EMC Directive)
- Agreement of Voluntary Control Council for Interference by Information Technology Equipment (Japan VCCI)
- Act No. 8867 (Republic of Korea Radio Waves Act)
- New Zealand Radiocommunications Regulations 2001
- Australia Radiocommunications Act 1992
- CNS 14348-2006 (Taiwan BSMI regulation for EMC)
- Regulation 2004/108/AT (Turkey Electromagnetic Compatibility Regulation)
- EMC Regulations of the Eurasian Economic Union

If a cable is attached to one of the RJ45 service ports on Feature Code 4804, a shielded cable must be used.

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Enterprise System/9000	ES/9000	ESCON	FICON
IBM	iSeries	iSystem	Operating System/400
OS/400	POWERparallel	pSeries	pSystem
RISC/6000	RISC System/6000	RS/6000	Series i
Series p	Series x	Series z	System/390
System i (AS400)	System p RS6000 (AIX)	System Storage	System x
System z	TotalStorage	xSeries	xSystem
zSeries	zSystem		

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Symbols

The following symbols are used in this manual.

Symbol

Description



Displays on the service panel to indicate that the device requires service if the processor **Check LED** is on. Also imprinted on the **Change Mode** button to allow the CE to change among the **Operator** mode, the **CE Offline** mode, and the **CE Online** mode.



Displays on the service panel to indicate that trace data is stored in the device. Also printed in text as an **Attention** notice.



Displays on the service panel when flash dump trace data is available in flash memory.



Printed in text and in figures to indicate an ESD-sensitive part.



Printed in text and in figures to indicate that a Class I Laser device is installed.



Displays on the service panel to indicate that the slide bar on the cartridge is set to the file-protected position.



Displays on the service panel to indicate that the host file-protected the volume.



Displays on the service panel to indicate that the slide bar on the cartridge is set to the **not** file-protected position.

Compliance statements

Some of these statements can apply to your installation.

Canada Notice

CAN ICES-3 (A)/NMB-3(A)

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.

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This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

Warning: This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

Germany Notice

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Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV-Vorschriften ist der Hersteller:

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Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55032 Klasse A.

Japan VCCI Council Class A statement

この装置は、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-A

Japan Electronics and Information Technology Industries Association (JEITA) statement

This statement explains the Japan JIS C 61000-3-2 product wattage compliance.

(一社) 電子情報技術産業会 高調波電流抑制対策実施
要領に基づく定格入力電力地 : See Knowledge Center

This statement explains the Japan Electronics and Information Technology Industries Association (JEITA) statement for products less than or equal to 20 A per phase.

高周波電流規格 JIS C 61000-3-2 適合品

For products greater than 20 A, single-phase, the following statements apply.

高周波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」
対象機器（高調波発生機器）です。

- 回路分類 : 6 (単相、PFC回路付)
- 換算係数 : 0

This statement explains the JEITA statement for products greater than 20 A per phase, three-phase.

高周波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」
対象機器（高調波発生機器）です。

- 回路分類 : 5 (3相、PFC回路付)
- 換算係数 : 0

Korea Notice

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서
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taitemi

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f2c00790

Russia Notice

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для снижения которых необходимы дополнительные меры

rusemit

United States Federal Communications Commission (FCC) Notice

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 might not cause harmful interference, and (2) this device must accept any interference received, including interference that might cause undesired operation.

Flat panel display

The fluorescent lamp or lamps in the liquid crystal display contain mercury. Dispose of it as required by local ordinances and regulations.

Monitors and workstations

State of New Jersey: For information about recycling covered electronic devices in the State of New Jersey, go to the New Jersey Department of Environmental Protection website at http://www.state.nj.us/dep/dshw/recycle/Electronic_Waste/index.html.

State of Oregon: For information about recycling covered electronic devices in the state of Oregon, go to the Oregon Department of Environmental Quality site at <http://www.deq.state.or.us/lq/electronics.htm>.

State of Washington: For information about recycling covered electronic devices in the State of Washington, go to the Department of Ecology website at <https://fortress.wa.gov/ecy/recycle/>. Or, telephone the Washington State Department of Ecology at 1-800-Recycle.

IBM cryptographic coprocessor card return program

This machine might contain an optional feature, the cryptographic coprocessor card, which includes a polyurethane material that contains mercury. Follow local ordinances or regulations for disposal of this card. IBM established a return program for certain IBM cryptographic coprocessor cards. More information can be found at <http://www.ibm.com/ibm/environment/products/recycling.shtml>.

Système Internationale d'unités (SI)

A system of abbreviations for terms such as mega and giga is used in this publication. This universally used international system of units is equivalent to a familiar term "the metric system." For **disk** storage capacity, volumes, transmission rates, and other physical measurements, the system is the same; K = 1 000. For terms that apply to processor storage capacity, the SI system prevails. For example, for **disk** storage capacity and other physical and theoretical measurements, the actual value of the base number "K" is 1 000. For **processor** storage capacity, the actual value of the base number is 1 024.

Laser information

This product complies with the performance standards set by the US Food and Drug Administration for a Class I laser product.



Figure 93: Laser safety label - Class I

This product belongs to a class of laser products that do not emit hazardous laser radiation. This classification was accomplished by providing the necessary protective housings and scanning safeguards to ensure that laser radiation is inaccessible during operation or is within Class I limits. This product is reviewed by external safety agencies and obtained approvals to the latest standards as they apply to this product type.

Notes

Use this Notes section for such tasks as documenting tips you learned or shortcuts you discovered while this MI is used to service the product.

Glossary

This glossary defines the special terms, abbreviations, and acronyms that are used in this publication and other related publications. If you do not find the term that you are looking for, see the IBM Glossary of Computing Terms that is at the website - <http://www.ibm.com/ibm/terminology>.

Italicized text indicates that terms are found elsewhere in this glossary.

A

abend

Abnormal end.

ac

Alternating current.

ACS

Automated Cartridge System of a StorageTek silo library.

Access method

A technique for moving data between main storage and input or output devices.

ADI

Automation drive interface.

ADIC

Abbreviation for Advanced Digital Information Corporation. See *Quantum*.

AES

Advanced encryption standard.

AIX

Advanced Interactive Executive.

IBM's implementation of the UNIX operating system. The System p (RS/6000) system, among others, runs the AIX operating system.

ajar

Operator panel message that indicates that either a tape cartridge was inserted into the *throat* of the drive and not fully loaded (drive is not in tray-up position). Or, a tape cartridge was unloaded by the drive (drive is in tray down position), remains in the throat, and is not removed.

AL_PA

Arbitrated loop physical address.

alphanumeric

English language alphabetic or arabic numeric characters.

amber

A variant of the color yellow. Amber LEDs might appear as yellow to you on the back of the drive.

ANSI

American National Standards Institute.

ANSI is the official US representative to the International Organization for Standardization (ISO). ANSI is not government-sponsored.

append

To electronically record data on magnetic tape, but not at *beginning-of-tape*. Contrast with *write*.

AR

Used in Parts Catalog 'Units' column to mean "As Required".

ARTIC

'A real-time interface card' processor.

ASC

Additional sense codes.

ASCII

American National Standard Code for Information Interchange.

A 7 bit coded character set (8 bits including parity check) that consists of control characters and graphic characters.

ASCQ

Additional sense code qualifiers.

asm

Assembly.

Assigning a device

The establishing of the relationship of a device to a running task, process, job, or program.

assignment

The naming of a specific device to complete a function.

asynchronous

Pertaining to two or more processes that do not depend upon the occurrence of specific events such as common timing signals.

Attention (notice)

Alerts the reader to the possibility of risk to a program, device, or system, or to data. Contrast with *caution* and *danger*.

ATTN

Attention.

B**backhitching**

Magnetic tape that makes a slight backward motion before it moves forward.

backup

To make extra copies of documents or software for safekeeping.

baud

A unit of signaling speed equal to the number of discrete conditions or signal events per second.

In asynchronous transmission, the unit of modulation rate corresponding to one unit interval per second. That is, if the duration of the unit interval is 20 milliseconds, the modulation rate is 50 baud. Also, see *baud rate*.

baud rate

In remote communications, the transmission rate that is synonymous with signal events. The *baud* rate, or signal change rate, is expressed in bits per second. Stated another way, the baud rate is a measure of how many times per second a signal changes or might change.

The *default* rate of the IBM 3592 is 9600 baud, with the potential for 115.2 K baud. Also, see *baud*.

beginning-of-tape (BOT)

The location on a magnetic tape that indicates the start of the permissible recording area.

bezel

Decorative, safety, or functional cover or faceplate.

On the 3592 drive, it is the item that is located ahead of the mouth and the throat of the drive canister and is used primarily by the operator. It contains *fiducials*, the eight-character display, and the **Reset** button.

bifurcated

Describes a cable with a standard plug on one end, but splits into two cables on the other end.

A Y-cable is an example of a bifurcated cable.

bit

Binary digit.

Either of the digits 0 or 1 when used in the binary numeration system.

BM or bill of materials

A list of specific types and amounts of direct materials or parts that are expected to be used to produce a job, quantity of output, or product.

BOB

beginning-of-block

BOP

Beginning-of-partition.

BOT

Beginning-of-tape

buffer

A routine or storage that is used to compensate for a difference in rate of flow of data or time of occurrence of events, when data is transferred from one device to another.

bus

A facility for transferring data between several devices that are located between two end points, only one device able to transmit at a specific moment.

BVPD

Backup vital product data.

byte

A group of eight adjacent binary digits (or *bits*).

C**calib**

Abbreviation for 'calibration' that is used in some tables in this *MI*.

canister

Hardware into which a drive can be installed, creating a drive canister. Contrast with *drive*. See also *drive canister*

cartridge identifier (CID)

Worldwide cartridge identifier is the preferred term.

cartridge memory (CM)

A passive, silicon storage device that is stored in each 3592 data cartridge, and is updated just before the cartridge is unloaded. Cartridge memory includes read-only information (like statistics about cartridge and media performance) in a protected area.

caution (notice)

Alerts the reader to possible personal harm to people. Contrast with *attention* and *danger*.

CCW

Channel command word.

CCW chain

A list of channel command words to be completed in sequence.

CDB

Command descriptor block.

CE

IBM *customer engineer*.

CE cartridge

Synonym for *CE scratch tape*.

CEM

Customer engineering memorandum.

CE scratch tape

A tape cartridge that the IBM service representative can use to run various tests, make an FMR tape, or copy a memory dump to tape.

Synonymous with diagnostic cartridge and scratch tape.

cfgmgr

Configuration manager.

channel command

An instruction that directs a data channel, controller, or device to complete an operation or set of operations.

char

Character.

CHK

Check.

CISC

Program offering that preceded *RISC*.

client engineer

Synonym for *customer engineer*.

cm

Centimeter.

CM

Cartridge memory.

concurrent

Refers to diagnostic procedures that can be run on one controller while the rest of the subsystem remains available for customer applications.

contingent connection

Connection between a channel path and a drive that is caused when a unit check occurs during an I/O operation.

controller

Device that provides the interface between a system and one or more tape drives.

Occasionally referred to as *control unit*.

CP

Circuit protector.

Cartridges present.

CP sensor

Cartridge-present sensor.

cradle

Term for rack hardware that can receive a 3592 drive canister.

CRC

cyclic redundancy check.

An error detection technique that is used by the data-link layer to determine whether all the bits that were sent were also received.

CRR

Channel request register.

crypto officer

Title for a process that acts on behalf of the operator to complete cryptographic initialization or management functions (*FIPS* definition).

CSP

Certified spare part.

Critical security parameter (encryption).

CSR

Customer support representative.

Synonym for *customer engineer*.

CSU

Customer setup.

ctrl

Control.

CU

Control unit.

Synonym for *controller*.

CUM

Fix pack tape.

customer engineer

Person who services your IBM equipment. Synonymous with service representative, service support representative, CSR, and CE.

CWS

Control work station.

D**danger (notice)**

Alerts the reader to possible lethal harm to people. Contrast with *attention* and *caution*.

DASD

Direct access storage device.

data

Any representations such as characters or analog quantities to which meaning is or might be assigned.

data buffer

The storage buffer in the controller. This buffer is used to increase the data transfer rate between the controller and the channel.

data check

A synchronous or an asynchronous indication of a condition that is caused by invalid data or incorrect positioning of data.

dc

Direct current.

default

Factory setting, or an attribute, value, or option that is assumed when no value is set or specified.

Can imply the manner in which the drive writes in the absence of any other controls that are set.

decommission

To make a capability permanently unavailable.

degraded

Decrease in quality of output or throughput, or increase in machine error-rate.

density

Refers to the number of simultaneous tracks that can be written and how many linear bits are written per mm of tape (or, the track count and bit density). A higher density has more tracks and more bits per millimeter.

Can imply 'format'.

deprecated

Not favored or fully approved.

deserialize

To change from serial-by-bit to parallel-by-byte.

detented

A part that is held in position with a catch or lever.

DEV

Device.

device

Synonym for drive.

DIAG

Shortened term for a diagnostic routine or the Diagnostic section of this or other Maintenance Information.

diagnostic cartridge

Synonym for *CE scratch tape*.

DIMM

Dual inline memory module.

direct access storage device (DASD)

A storage device in which the access time is independent of the location of the data.

DO sensor

Door-open sensor.

DRAM

Dynamic random-access memory.

drive (magnetic tape)

A mechanism for moving and controlling magnetic tape.

The portion of a *drive canister* which receives and processes tape media that is located inside a tape cartridge. Contrast with *canister*. See also *drive canister*.

drive canister

Assembly that contains a *drive* that is installed into a *canister*. Contrast with *canister* and *drive*.

DRV

drive

E**EASH**

Ethernet-attached serial hub.

EBCDIC

extended binary-coded decimal interchange code.

A coded character set consisting of 8-bit coded characters.

EBTERM

Terminal emulator for OS/2.

EC

Engineering change.

Edge connector.

ECA

Engineering change announcement.

ECC

Error correction code.

Electronic customer care (*TS3000 System Console*).

ECCST

Enhanced capacity cartridge system tape.

EEFMT2

Enterprise Encryption Format 2 recording technology. AES 256-bit encrypted data written recorded at the performance and capacity format used by the native E05 tape drive.

EEFMT3

Enterprise Encryption Format 3 recording technology. AES 256-bit encrypted data written recorded at the performance and capacity format used by the native E06 tape drive.

EEFMT4

Enterprise Encryption Format 4 recording technology. AES 256-bit encrypted data written recorded at the performance and capacity format used by the native E07 tape drive.

EEFMT5

Enterprise Encryption Format 5 recording technology. AES 256-bit encrypted data written recorded at the performance and capacity format used by the native E08 tape drive.

EEFMT6

Enterprise Encryption Format 6 recording technology. AES 256-bit encrypted data written recorded at the performance and capacity format used by the native 60F tape drive.

EEPROM

Electrically erasable programmable read-only memory.

EFMT1

Enterprise Format 1 recording technology. The performance and capacity format used by the J1A tape drive and the E05 tape drive when emulating J1A tape drive to record at increased density.

EFMT2

Enterprise Format 2 recording technology. The performance and capacity format used by the native E05 tape drive to record at increased density.

EFMT3

Enterprise Format 3 recording technology. The performance and capacity format used by the native E06 tape drive to record at increased density.

EFMT4

Enterprise Format 4 recording technology. The performance and capacity format used by the native E07 tape drive to record at increased density.

EFMT5

Enterprise Format 5 recording technology. The performance and capacity format used by the native E08 tape drive to record at increased density.

EFMT6

Enterprise Format 6 recording technology. The performance and capacity format used by the native 60F tape drive to record at increased density.

EIA

Electronic Industries Alliance.

EIA unit

A unit of measure, which is established by the Electronic Industries Alliance, equal to 44.45 mm (1.75 in.).

electrostatic discharge

The flow of current that results when objects that have a static charge come into close enough proximity to discharge. This undesirable discharge can damage equipment and degrade electrical circuitry.

enable

Setting the drive software to be able to complete an action or function, such as to encipher or decipher data on media.

encryption

The process of securing data by enciphering or encoding it. Some *encryption-capable* drives can be made *encryption-enabled*.

encryption-capable

A drive that, not set, can be made able to encipher and decipher data in a data cartridge.

encryption-enabled

A drive that is set to encipher and decipher data in a data cartridge.

end-of-block (EOB)

A code that marks the end of a block of data.

end-of-file (EOF)

A code that marks the end of a file of data.

end-of-tape (EOT)

The end of the recording area on a tape.

enterprise system

Refers to a controller-attached environment. Compare to *open system*.

Enterprise Systems Connection (ESCON)

A set of IBM products and services that provide a dynamically connected environment within an enterprise. The ESCON channel connection allows a tape controller to communicate directly with a System z host processor.

EOB

End-of-block.

EOD

End-of-data.

EOF

End-of-file.

EOT

End-of-tape.

EPO

Emergency power off.

EPROM

Erasable programmable read only memory.

A type of memory chip that can retain its contents without electricity. Unlike a programmable read only memory (*PROM*) which can be programmed only once, the EPROM can be erased by ultraviolet light and reprogrammed.

equipment check

An asynchronous indication of a malfunction.

EREP

Environmental recording, editing, and printing.

error log

A data set or file in a product or system where error information is stored for later access.

errpt

Error report.

ESCON

Enterprise Systems Connection.

ESD

Electrostatic discharge.

F**F**

Designation for a drive type that is fibre-network capable.

fabric

The term that is used to describe a routing structure that receives addressed information and routes it to its appropriate destination. The set of cascaded switches is commonly called a fabric.

factory setting

Setting with which the product is sent from the factory.

failover

Capability of a component, device, or network to automatically switch to a backup component, device, or network when a fault is encountered. This capability helps maintain availability.

fault symptom code (FSC)

A hexadecimal code that is generated by the drive or the controller microcode in response to a detected subsystem error.

FC

Feature code.

Fibre Channel.

FCAL

Fibre Channel arbitrated loop.

FCC

Federal Communications Commission.

FCP

Fibre Channel for SCSI protocol.

An implementation of the SCSI interface command-set for Fibre Channel networks.

FE

Fibre enhanced.

Federal Information Processing Standards

See *FIPS*.

Fibre Channel (FC)

A communications system that is characterized by a large bandwidth, a shared bus, and optical fibre connections.

Fibre Channel arbitrated loop (FCAL)

A type of Fibre Channel network in which the hosts and devices are in a loop configuration. Each node communicates with the next node and messages are passed along to the target.

fibre enhanced

Support for Enhanced Tape Cartridge, which implies WORM or Economy capability.

FID

FRU identifier.

fiducials

Targets that are used for positioning and teaching a physical location to a robot.

field mark

Indicates where a constant or variable field starts.

field replaceable unit (FRU)

An assembly that is replaced in its entirety when any one of its components fails.

file

A named set of records that are stored or processed as a unit. Also referred to as a data set.

file protection

The processes and procedures that are established in an information system that are designed to inhibit unauthorized access to, contamination of, or deletion of a file.

FIPS

Federal Information Processing Standards.

Standards and guidelines that are developed and issued by the National Institute of Standards and Technology (NIST) and approved for Federal computer systems by the Secretary of Commerce. When no acceptable industry standards or solutions exist, NIST develops FIPS to satisfy compelling Federal government requirements, such as for interoperability and for security measures like encryption. The pertinent standard for this publication is FIPS PUB 140-2, Security Requirements for Cryptographic Modules.

fix

Synonym for correct (verb) or correction (noun).

flash dump

A memory dump that is stored in the drive in flash memory.

flash EEPROM

An electrically erasable programmable read-only memory (EEPROM) that can be updated.

FM

Field mark.

FMR

Field microcode replacement.

font

A family of characters of a specific size and style.

footprint

The physical space that is occupied when the product is installed. The footprint is often considered by the customer when floor space is planned.

format

The arrangement or layout of data on a data medium.

The *density* that is used to write at the *beginning of tape*.

formatter

Part of a magnetic tape subsystem that completes data conversion, speed matching, encoding, first level error recovery, and provides interfaces to one or more tape drives.

FP

File protect.

frayed

Damaged, as if by a sharp or abrasive surface or substance.

FRU

Field replaceable unit.

FSC

Fault symptom code.

FSI

Fault symptom index.

FTP

File transfer protocol.

full-duplex

Communications mode that allows transmission or reception of data blocks at the same time.

functional microcode

Microcode that is resident in the machine during normal customer operation.

G**g**

gram.

Gb

Gigabit.

Often associated with data transmission speed, as in *Gbps*.

GB

Gigabyte.

Often associated with storage capacity.

Gbps

Gigabit per second.

Often associated with communication transmission speed.

giga

Prefix for 'billion' in American system (10^9).

gigabit (Gb)

One billion bits.

gigabyte (GB)

One billion bytes.

H**half-duplex**

Communications mode that allows transmission or reception of data blocks but not at the same time.

hard address

A physical address that is assigned through arbitration to the fibre card by the loop initialization sequence.

hertz (Hz)

A unit of frequency equal to one cycle per second. In the US, line frequency is 60 Hz, or a change in voltage polarity 120 times per second. In Europe, line frequency is 50 Hz, or a change in voltage polarity 100 times per second.

hex

Hexadecimal.

Hexagonal-shaped fastener heads and tools.

homologation

Officially sanctioned, approved, ratified, confirmed, or certified.

In IBM terms, homologation is a process that is followed for some products from design start to country regulator authorization that is followed to market the product.

hot-pluggable

Capability of a component to be removed or installed while power is still applied to the product, without electrically damaging that component or affecting the remainder of the product. The customer's operations are not interrupted because the library does not need to be powered off during service activities.

HSARS

Hardware statistical analysis and reporting system.

This information about hardware is placed in non-volatile storage inside the drive. Contrast with VSARS for media (tape).

HVD

High-voltage differential.

A description of a drive type.

HyperTerminal

Terminal emulator that you can run from your notebook.

Hz

Hertz.

I**IBG**

Interblock gap.

IBMLZ1

The improved compression algorithm, which furnishes hardware execution efficiency by using as few machine cycles as possible to compress or decompress a byte. The algorithm achieves good coding efficiency for broad applications and provides data compression with less performance loss.

ID

identifier.

identifier (ID)

In programming languages, a logical unit that names a language object; for example, the names of variables, arrays, records, labels, or procedures. An identifier usually consists of a letter that is optionally followed by letters, digits, or other characters.

One or more characters that are used to identify or name data element and possibly to indicate certain properties of that data element.

A sequence of bits or characters that identifies a program, device, or system to another program, device, or system.

IDRC

Improved data recording capability.

IML

Initial microprogram load.

Improved Data Recording Format

An improved data recording mode that can increase the effective data capacity and the effective data rate when enabled and started.

initial microprogram load (IML)

The action of loading a microprogram from an external storage to writable control storage.

initiator

The component that runs a command. The initiator can be the host system or the tape controller.

INST

Installation.

interblock gap (IBG)

An area on a data medium to indicate the end of a block or physical record.

interface

A shared boundary. An interface might be a hardware component to link two devices or it might be a portion of storage or registers accessed by two or more computer programs.

interposer

The part that is used to convert a 68-pin connector to a 50-pin D-shell connector, for example.

intervention required

Manual action is needed.

INTRO

Introduction.

I/O

Input/output.

IOP

Input/output processor.

IPL

Initial program load.

Synonymous with *IML*.

IPP

IBM method of passing keys.

iSystem

Deprecated IBM term for AS/400 (System i) products, which were formerly known as iSeries products.

IT

Impedance transformer.

Information technology.

ITST

Idle-time self-test.

K**KB**

Kilobytes.

kilo

Prefix for 'thousand' (10^3).

kilobytes (KB)

One thousand bytes.

L**LAN**

Local area network.

In a comparison of geographic breadth, a LAN is a computer network that is smaller than a *MAN* or a *WAN*.

laptop

Laptop computer

LBA

Leader block assembly.

LC

longwave connector or cable.

LC fibre cable is often larger in diameter than SC or shortwave fibre cable.

LCD

Liquid-crystal display.

LDI

Library drive interface.

leader

Tape that is attached to leader block assembly that is unusable for recording/

leader block assembly

Formed, plastic block at the beginning of tape.

LED

Light-emitting diode.

LIC

Library interface card.

LIP

Loop initiated primitive.

LMA

Library manager A.

load

Term for machine operation or command.

Operator motion of inserting a cartridge into the drive.

loadable

The ability to be loaded.

load point

Position in drive where cartridge is fully loaded (with tray down) and drive is ready to read or write.

local area network (LAN)

A computer network within a limited area.

logical partition

A subset of a single server, contains resources such as processors, memory, and input/output devices, and operates as an independent system. If hardware requirements are met, multiple logical partitions can exist within a system.

LPAR

A function that enables the creation of a *logical partition*.

LUN

Logical unit name or number.

LVD

Low-voltage differential.

A description of a drive type.

LZ-1

Lempel-Ziv electronic data compactor.

M**MAC**

Medium access control.

magnetic tape

A tape with a surface layer on which data can be stored by magnetic recording.

MAN

Metropolitan area network.

Data network that is designed for a town or a city. In a comparison of geographic breadth, a MAN is a computer network that is larger than a LAN but smaller than a WAN.

MAP

Maintenance analysis procedure.

In hardware maintenance, a step-by-step procedure that a CE uses to trace a symptom to the cause of a failure.

MAQ

Maintenance agreement qualification.

mask

A pattern of characters that controls the retention or elimination of portions of another pattern of characters. To use a pattern of characters to control the retention or elimination of portions of another pattern of characters.

MB

Megabyte (often expressed as a data rate in MB/s or MB/second, for megabytes per second).

MB/s

One megabyte per second = 10^6 bytes per second = 1,000,000 bytes per second.

Mb

Megabit. One Megabit = 10^6 bits = 1,000,000 bits.

Mb/s

One megabit per second (Mb/s) = 10^6 bits per second = 1,048,576 bits per second.

mebi

Binary prefix for 2^{20} .

media capacity

The amount of data that can be contained on a storage medium, expressed in bytes of data.

mega

Prefix for 'million' (10^6).

megabyte (MB)

One million bytes.

MES

Miscellaneous equipment specification.

metric system

Deprecated term for the *SI* system.

MI

Maintenance information.

MiB

One mebibyte (MiB) = 2^{20} bytes = 1,048,576 bytes.

Mib

One mebibit (Mib) = 2^{20} bits = 1,048,576 bits.

Mib/s

One mebibit per second (Mib/s) = 2^{20} bits per second = 1,048,576 bits per second.

micro

Prefix for 'millionth of ' (10^{-6}).

midtape

Tape that was is not in the first or final 1.8 m (6 ft) of tape in the cartridge.

midtape recovery

Power cycle or reset that occurred while cartridge was loaded. The device is slowly rewinding the tape and ejects the cartridge when the rewind is complete.

milli

Prefix for 'thousandth of' (10^{-3}).

millisecond

A thousandth of a second.

MIM

Media information message.

mm

millimeter.

modifier

That which changes the meaning.

MOST

Mobile service terminal.

Synonym for laptop.

mount a device

To assign an I/O device with a request to the operator.

mouth

Area of drive just beyond operator *bezel* and just before *throat*.

MP

Microprocessor.

Metal particle.

MRPD

Machine reported product data.

ms

Millisecond.

MSG

Message.

MTM

Media test mode.

multipath

Pertains to using more than one path.

N**N/A**

Not applicable.

Not available.

Not assigned.

native

When data capacity, data rates, and data density in this MI is discussed, "native" implies non-compressed.

Deprecated term for IBM-supplied, basic, required, factory *default*, or stand-alone.

NDF

No defect found.

node

In a network, a point at which one or more functional units connect channels or data circuits.

nonvolatile storage (NVS)

Storage device whose contents are not lost when power is removed.

Also known as nonvolatile memory (NVM).

NP

Used in Parts Catalog 'Units' column to mean "Non-procurable".

NTF

No trouble found.

NVRAM

Nonvolatile random-access memory that retains its contents after machine power is removed.

NVS

Nonvolatile storage.

O**OEM**

Original equipment manufacturer.

offline

Pertaining to the operation of a functional unit without the continual control of a computer. Contrast with *online*.

online

Pertaining to the operation of a functional unit that is under the continual control of a computer. Contrast with *offline*.

open system

Refers to a non-controller-attached environment. Compare to *enterprise system*.

overrun

Loss of data because a receiving device is unable to accept data at the rate it is transmitted.

overtighten

To tighten too much.

P**parameter**

A variable that is specific a constant value for a specified application, and that might denote the application.

patch cable

Another name for a laptop Ethernet cable, and when used with this MI, one with straight-through connections.

p bit

Parity bit.

PC

Parity check.

PE

Parity error.

Product Engineer.

PGID

Path group identification.

PM

Preventive maintenance.

pool

A group of physical tape cartridges.

POR

Power-on reset.

port

A physical connection for communication between the tape drive and the host processor.

post

To display a message or code somewhere like on the *LCD* of the service panel or the operator panel, or at the host.

POST

Power-on self test.

power cycle

To remove power from, then restore power to an electrified device.

power-on self test (POST)

A series of diagnostic tests that run automatically when a device is powered ON.

PROC

Shortened term for the Procedures section of this or other Maintenance Information.

PROM

Programmable read-only memory.

PS

Power supply.

PSJ card

Power supply card.

pSystem

Deprecated IBM term for AIX or RS/6000 (System p) products, which were formerly known as pSeries products.

PTF

Program temporary fix.

PVPD

Privileged vital product data.

The data that is contained within the tape drive that requires special passwords to access.

PWR

Power.

R**RAM**

Random access memory.

random access memory

A storage device into which data is entered and from which data is retrieved in a nonsequential manner.

RAS

Reliability, availability, and serviceability.

Abbreviated term for product design characteristics.

record

A collection of related data or words, which are treated as a unit.

recording density

The number of bits in a single linear track measured per unit of length of the recording medium.

recoverable error

An error condition that allows continued execution of a program.

ref

Reference

reg

Register

reinventor

To inventory again.

retension

The process or function of tightening the tape onto a cartridge spool, if it is sensed that the tape has a loose wrap on a spool.

RID tag label

Repair identification tag label.

You attach this label to a drive FRU. It is preinstalled on a factory-direct drive canister.

RISC

Reduced instruction-set computer.

ROM

Read-only memory.

RPQ

Request for price quotation.

RS/6000

Term for IBM AIX-type System p products, which were formerly known as pSeries.

R/W

Read/write.

S

SAN

Storage area network.

A SAN allows information to be accessed, managed, and shared among various storage devices and servers over a network.

SAPR

Solutions assurance product review.

SARS

Statistical analysis and reporting system.

The microcode in the drive that helps determine whether read and write errors are caused by the tape or the hardware.

SC

Shortwave connector or cable.

SC fibre cable is smaller in diameter than LC or longwave fibre cable.

scratch pool

A group of physical tape cartridges that are ready for use.

scratch tape

Synonym for *CE scratch tape*.

SCSI

Small computer system interface.

SDLC

Synchronous data link control.

segment

A part.

sel

Select.

serialize

To change from parallel-by-byte to serial-by-bit.

serializer

A device that converts a space distribution of simultaneous states that represent data into a corresponding time sequence of states.

service representative

Synonym for *customer engineer*.

service support representative

Person who maintains and repairs a customer's data processing equipment.

Another term for a *customer engineer*.

servo

A shortened form of the term *servomechanism*.

servomechanism

A feedback control system in which at least one of the system signals represents mechanical motion.

shelf

See *silo shelf*.

ship group

Items that are provided, usually in a separate package, to the installation site of an IBM product, and are not attached to the product machine frame.

SI

Système Internationale d'unités

This universally used international system of units is equivalent to a familiar term "the metric system". This system consists of seven SI base units: length (meter), mass (kilogram), time (second), electric current (ampere), thermodynamic temperature (kelvin), amount of substance (mole), and luminous intensity (candula).

silo

Name for Sun StorageTek library product that can contain 3592 drives.

silo shelf

Term for *Sun silo* library hardware that can receive a 3592 drive canister. Comparable to *cradle* (rack).

SIM

Service information message.

SLIC

System Licensed Internal Code

Small computer system interface

An input and output bus that provides a standard interface between computer interfaces.

SM

Service memorandum.

smit

System management interface tool.

SMW

Servo manufacturer's word.

SNMP

Simple network management protocol.

SNS

Sense.

soft address

A physical address that is assigned to the fibre card by the loop initialization sequence (for 3584 only; not recommended).

special feature

A feature that can be ordered to enhance the capability, storage capacity, or compleance of a product, but is not essential for its basic work.

SRAM

Static random access memory.

SRC

System reference code.

SS

Status store.

SSC-3

SCSI Stream Commands - 3.

One of the *T10* committee-documented standards. SSC-3 is the third architectural version of the standard.

SSR

Service support representative.

ST

Store.

standard feature

The significant design elements of a product that are included as part of the product.

standby mode

Power management mode that automatically reduces drive fan speed when the drive canister is idle. This mode lowers power dissipation and reduces the risk of airborne-debris contamination.

START

Section in the *MI* where you must begin any maintenance activity.

STK

Storage Technology Corporation (currently Sun Microsystems, Inc.).

stoplock

A position-hold mode that is used when the tape is in a stopped position and is under tension.

Storage Technology Corporation

Sun Microsystems, Inc.

STRSST

Start system service tools.

subsystem

A secondary or subordinate system, capable of operating independently of, or asynchronously with a controlling system.

superscript

Language term for a small alphanumeric character that is positioned higher than adjacent text, like ^A or ¹.

sync

Synchronous (also, synchronize).

Occurring with a regular or predictable time relationship.

System i

Term for IBM AS/400 products that are formerly known as iSeries, then iSystem.

System p

Term for IBM AIX-type products that are formerly known as RS/6000, pSeries, then pSystem.

System x

Term for IBM personal computer/server-type products that are formerly known as xSeries, then xSystem.

System z

Term for IBM S/390-type processor products that are formerly known as zSeries, then zSystem.

T**T10**

Industry organization standards, such as the key path application protocol for receiving and validating encryption keys.

T10 is a Technical Committee of the InterNational Committee on Information Technology Standards (INCITS, pronounced "insights"). INCITS is accredited by and operates under rules that are approved by the American National Standards Institute (ANSI).

tach or tachometer

A device that emits or senses pulses that are used to measure or check speed.

tape alert (TapeAlert)

An industry standard for error reporting.

tape cartridge

A container that holds magnetic tape that can be processed without separating the tape from the container.

tape void

An area in the tape in which no signal can be detected.

target

A name for *fiducial*.

This term is used in some non-IBM documentation to describe the white fiducials or targets that are read by an optical device. They are used to align the cartridge accessor to the drives and cartridge storage cells.

taut

A condition of the tape on a reel, when the tape has no looseness, give, or slack.

TCP/IP

Transmission Control Protocol/Internet Protocol. When in a tape library, the LAN communication path between the host and the library manager.

A set of communication protocols that support peer-to-peer connectivity functions for both local and wide area networks.

TCU

Tape control unit.

Synonym for tape *controller*.

tera

Prefix for 'trillion' in American system (10^{12}).

TH

Thermal

thread/load operation

A procedure that places tape along the tape path.

throat

Cavity of drive that is located beyond *bezel* and *mouth*.

TM

Tapemark.

Trademark.

topology

The spatial arrangement of communication nodes in a Distributed Computing Environment.

TS3000 System Console (TSSC)

IBM product that allows service access to other products.

Formerly called the TotalStorage Master Console.

TSSC

(*TS3000 System Console*).

tty

In the AIX operating system, any device that uses the standard terminal device interface. Tty devices typically complete input and output on a character-by-character basis.

U**UART**

Universal asynchronous receiver/transmitter.

unlabeled tape

A tape cartridge that does not have a VOLSER written on the tape media, and is often identifiable by not having a bar code label that is affixed to it.

unload

Prepare the tape cartridge for removal from the drive.

USB

Universal serial bus.

utilities

Utility programs.

utility programs

A computer program in general support of the processes of a computer. A diagnostic program is an example.

V**vary**

To change the status of a device, as from online to offline, or offline to online. This action makes the device available to systems or other using devices.

VCR

Volume control region.

VOLSER

Volume serial number.

volume

A certain portion of data, together with its data carrier, that can be handled conveniently as a unit.

VPD

Vital product data.

The information that is contained within the tape drive that requires nonvolatile storage that is used by functional areas of the drive, and information that is required for Manufacturing, RAS, and Engineering.

VSARS

Volume statistical analysis and reporting system.

This information about media (volumes) is written into cartridge memory (CM) inside the tape cartridge. Contrast with HSARS for hardware.

VTS

Virtual tape server.

W**WAN**

Wide area network.

In a comparison of geographic breadth, a WAN is larger than a LAN or a MAN.

WEEE

European Union's Waste Electrical and Electronic Equipment standards directive.

word

A character string that is convenient for some purpose to consider as an entity.

worldwide cartridge identifier (WWCID)

A permanent identifier that is associated with a specific tape cartridge, typically stored on the tape itself and the nonvolatile cartridge memory.

worldwide identifier (WWID)

An identifier that uniquely identifies a hardware component, such as the port and node of a drive.

worldwide node name

Consists of a set of eight pairs of hexadecimal numbers that are assigned to a unique card or device, as provided by the IEEE.

This name is the storage area network (SAN) equivalent to the media access control (MAC) address of an Ethernet network.

WORM

Write-once read-many.

wrap

An action that you take by using a special terminating plug or 'wrap tool.' You verify the soundness of a physical communication path by using a wrap tool to connect the input side of a cable or connector to the output side of that same cable or connector. The signal or light that is projected out from a device is wrapped around the wrap tool and returned to its origin.

write

Write command.

To electronically record data on magnetic tape, anywhere from the *beginning-of-tape* to the end of the tape. Contrast with *append*.

write-once read-many (WORM)

A technology that allows data to be written to storage media. That data is permanently unalterable. It can be read multiple times.

WWCID

Worldwide cartridge identifier.

WWID

Worldwide identifier.

WWNN

Worldwide node name.

X**XR**

External register.

XRA

External register address register.

xSystem

Deprecated IBM term for personal computer/server-type (System x) products, which were formerly known as xSeries products.

Z**zeroize**

Reset to zeros or nulls.

Method of erasing electronically stored data, cryptographic keys, and critical security parameters (CSPs) by altering or deleting the contents of data storage to prevent recovery of data (*FIPS* definition).

zSystem

Deprecated IBM term for IBM S/390-type processor (System z) products such as System z9, which were formerly known as zSeries products.

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