T9940BR3

Tape Drive

Product Manual

PRODUCT TYPE **HARDWARE**

STORAGETEK®

T9940BR3
Tape Drive

Product Manual

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

http://sts.stortek.com/sts/tis

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Document Title: T9940BR3 Tape Drive Product Manual

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Summary of Changes

The following table shows the revision history and summary of the changes for this publication.

EC Number	Date	Edition	Change
111781	09/2002	First	Initial Release
111826	03/2003	Second	Refer to this edition for a description of the changes.
111838	04/2003	Third	Added T9940B VolSafe Information, and included geophysical data tape cartridge identification.

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Preface

This manual contains information about installing/operating/maintaining the StorageTek T9940BR3 Tape Drive.

■ Organization

This book contains the following information:

■ Comments and Suggestions

A Reader's Comment Form at the back of this publication lets you communicate suggestions or requests for change. StorageTek encourages and appreciates reader feedback.

■ Alert Messages

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

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

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

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

■ Related Publications

The following publications contain additional information about this product.

Publication	Part Number
Fiber-Optics User's Guide	PN 4112245

■ Additional Information

StorageTek offers several methods for you to obtain additional information.

StorageTek's External Web Site

StorageTek's external Web site provides marketing, product, event, corporate, and service information. The external Web site is accessible to anyone with a Web browser and an Internet connection.

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

Customer Resource Center

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

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

e-Partners Site

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

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

Hardcopy Publications

Contact a StorageTek sales or marketing representative to order additional paper copies of this publication or to order other StorageTek customer publications in paper format.

■ Conventions

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

Item	Example	Description of Convention
Buttons	MENU	Font and capitalization follows label on product
Commands	Mode Select	Initial cap
Document titles	*System Assurance Guide*	Italic font
Emphasis	*not* or *must*	Italic font
File names	`fsc.txt`	Monospace font
Hypertext links	Figure 2-1 on page 2-5	Blue (prints black in hardcopy publications)
Indicators	*Open*	Font and capitalization follows label on product
Jumper names	TERMPWR	All uppercase
Keyboard keys	<Y> <Enter> or <Ctrl+Alt+Delete>	Font and capitalization follows label on product; enclosed within angle brackets
Menu names	Configuration Menu	Capitalization follows label on product
Parameters and variables	Device = *xx*	Italic font
Path names	`c:/mydirectory`	Monospace font
Port or connector names	SER1	Font and capitalization follows label on product; otherwise, all uppercase
Positions for circuit breakers, jumpers, and switches	ON	Font and capitalization follows label on product; otherwise, all uppercase
Screen text (including screen captures, screen messages, and user input)	`downloading`	Monospace font
Switch names	Power	Font and capitalization follows label on product
URLs	http:// www.storagetek.com	Blue, (prints black in hardcopy publications)

■ Customer Initiated Maintenance

Customer Initiated Maintenance begins with a telephone call from you to the StorageTek CSS. You receive immediate attention from qualified StorageTek personnel, who record problem information and respond with the appropriate level of support.

To contact the CSS about a problem:

1. Use the telephone to call the StorageTek Customer Support Services at:

   ☎**800.525.0369** (from within the United States)

   ☎**303.673.4056** (from outside the United States)

2. Describe the problem to the call taker. The call taker will ask several questions and will either route your call to or dispatch a support representative.

If you have the following information when placing a service call, the process will be much easier:

Account name	
Site location number	
Contact name	
Telephone number	
Equipment model number	
Device address	
Device serial number (if known)	
Urgency of problem	
Fault Symptom Code (FSC)	
Problem description	

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Safety

This section covers topics that are *essential to all service activity*:

- "Safety Precautions"
- "Electrostatic Discharge (ESD) Damage Prevention" on page xxi
- "Fiber Optic Safety" on page xxiii

Read the following pages and become familiar with these guidelines *before you begin any service activity*.

■ Safety Precautions

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

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

- Avoid electrical shock. Be careful when you work near power connectors and supplies.

- Power off the equipment that is being serviced before you remove a field replaceable unit (FRU) or other component. Remember that dangerous voltages could still be present in some areas even though power is off.

- Ground all test equipment and power tools.

- Lift objects properly; read the information in "Lifting Techniques" on page xx.

- Do not remove, cut, or relocate any floor tiles indiscriminately. Before you manipulate floor tiles, be sure that you understand the customer's environment and receive the customer's approval. Remember, each situation is different.

- Enforce good housekeeping practices in the equipment area to help prevent accidents or fire.

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

Lifting Techniques

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

- Do not twist your body to pick something up or put it down. Twisting puts extreme pressure on your back, especially when you lift or carry objects. Instead of twisting, make the task two separate moves; first, lift, and then use your feet to turn your body.

- Plan the lift: first examine the object and then determine how it will be lifted and where it will be placed.

- Choose the appropriate lifting technique. Examine the weight, size, location, frequency, and direction of the lift. Plan to avoid awkward postures, and determine if material-handling aids are needed.

- Place your feet shoulder-width apart, and place one foot a little behind the other. Keep your back straight because even light loads can significantly increase pressure on the spine when you lean forward.

- Whenever you can, grip a load with your whole hand, and use two hands.

- Carry objects at elbow height and close to your body. The farther away you hold an object, the more force it puts on your lower back.

- Lift with your legs instead of your back. Leg muscles are some of the strongest in your body. When you squat and lift with your legs, you can lift more weight safely.

- Alternate lifting tasks with tasks that are less stressful to the same muscles. This technique ensures that muscles have some recovery time.

Shoulder, Elbow, Wrist, and Hand Safety

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

- Work within your safety zone–the area between shoulder level and knuckle level of your lowered hands. You face less chance of injury when you work or lift in this area.

- Keep your elbows bent to keep loads close to your body and to decrease the amount of force necessary to do the job. If you use this posture, you will put less weight and pressure on your shoulder.

- Be sure to keep your wrists straight. Avoid bending, extending, or twisting your wrists for long periods of time.

- Do not use a pinch grip to lift large or heavy loads because the way you lift also can affect the tendons in your hand. When you grasp an object between your thumb and fingers, you put a lot of tension on hand and wrist tendons. Use both hands–use one for a while, and then use the other–to give them rest.

■ Electrostatic Discharge (ESD) Damage Prevention

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

CAUTION:
POTENTIAL DAMAGE TO EQUIPMENT. Handle ESD-sensitive components *only* under ESD-protected conditions. To meet this requirement, always use a grounding kit and always follow these ESD precautions and procedures when you are servicing equipment or handling ESD-sensitive components.

ESD Precautions

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

- Wear ESD protection whenever you install, remove, maintain, or repair equipment.

- Keep ESD-sensitive printed-circuit components in their ESD-protective packages until you have taken all ESD-preventive steps and you are ready to install the component.

- Do not allow anyone to touch or handle an unprotected ESD-sensitive component unless that person has taken all ESD precautions.

- Reinstall all equipment covers and close all equipment doors after you have completed the work.

- If the grounding-kit work surface has been exposed to temperatures above 66ºC (150ºF) or below 4.5ºC (40ºF), acclimate the work surface to room temperature before you unroll it.

- Immediately place any component that you have removed into an ESD-protective package.

- Keep the grounding-kit work surface clean.

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

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

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

ESD-Protection Procedure

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

Prepare the Work Area

1. Before you service the equipment, unfold the grounding-kit work surface completely and place it on a convenient surface.

2. Attach one end of the ground cord to the work surface; secure the snap fastener.

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

3. Slip on an ESD wrist strap. Make sure that the strap is comfortable and makes contact with the entire circumference of your wrist.

4. Snap one end of the coil cord to the wrist band.

Access the Equipment

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

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

6. Attach the free end of the coil cord to the most appropriate place:

   a. If you are working on components from a small piece of equipment, attach the free end of the coil cord to the grounding-kit work surface. In addition, be sure that you touch an unpainted metal surface on the equipment before you touch an internal component.

   b. If you are working on components from a large piece of equipment, attach the free end of the coil cord to a grounding jack or to an unpainted metal surface inside the equipment.

Replace Components

7. Remove the defective component and place it on the work surface.

8. Remove the replacement component from its ESD-protective package, and install the component in the equipment.

9. Place the defective component in the ESD-protective package.

Clean Up

10. Disconnect the ground cords from the equipment.

11. Reinstall all equipment covers and close all equipment doors.

12. Disconnect the coil cord from your wrist, and, if necessary, disconnect the ground cord from the work surface.

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

■ Fiber Optic Safety

StorageTek products use both light emitting diodes (LEDs) and laser multi-mode transmitter-receiver (transceiver) modules. LED transceivers use low power and are not as dangerous as laser transceivers.

WARNING:
EYE HAZARD. Never look directly into a fiber-optic cable, a fiber-optic connector, or a laser transmitter-receiver module. Hazardous conditions might exist from laser power levels that are capable of causing injury to the eye.

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

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

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

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

CLASS 1 LASER
LUOKAN 1 LASERLAITE
KLASSE 1 LASER APPARAT

Laser Product Label

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

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

Fiber-Optic Cable Handling

Observe these precautions when you handle fiber-optic cables:

- Do not coil the cable to less than 96 mm (3.75 in.) in diameter.

- Do not bend the cable to less than 12 mm (0.5 in.) in radius. StorageTek recommends that a cable's bend radius be no less than 20 times the diameter of the cable.

- Do not pull on the cables; carefully place them into position.

- Do not grasp the cables with pliers, grippers, or side cutters; do not attach pulling devices to the cables or connectors.

- Keep cables away from sharp edges or sharp protrusions that could cut or wear through the cable; make sure that cutouts in the equipment have protective edging.

- Protect the cable from extreme temperature conditions.

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

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

- Install the connector's protective cover whenever the connector is not connected.

Fiber-Optic Cable Installation

Follow these guidelines when you install fiber-optic cables:

1. **Cable routing:**

   - **Raised floor:** You may install fiber-optic cables under a raised floor. Route them away from any obstruction, such as existing cables or other equipment.

   - **Cable tray or raceway:** Place the cables in position; do not pull them through the cable tray. Route the cables away from sharp corners, ceiling hangers, pipes, and construction activity.

   - **Vertical rise length:** Leave the cables on the shipping spool, and lower them from above; do not pull the cables up from below. Use proper cable ties to secure the cable.

   - **General:** Do not install fiber-optic cables on top of smoke detectors.

2. **Cable management:**

   - Leave at least 4.6 m (15 ft) of cable at each end for future growth.

   - Use strain reliefs to prevent the weight of the cable from damaging the connector.

   - Review all information in this manual and in any related manuals about safely handling fiber-optic cables.

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

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

3. **Connector protection:**

   - Insert connectors carefully to prevent damage to the connector or fiber.

   - Leave the connector's protective cover in place until you are ready to make connections.

   - Replace the connector's protective cover when the connector is disconnected.

   - Clean the connector before making a connection. Make sure that there are no obstructions and that keyways are aligned.

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Notices

Please read the following compliance and warning statements for this product.

CAUTION:
Cables that connect peripherals must be shielded and grounded; refer to cable descriptions in the instruction manual. Operation of this equipment with cables that are not shielded and correctly grounded might result in interference to radio and TV reception.

Changes or modifications to this equipment that are not expressly approved in advance by StorageTek will void the warranty. In addition, changes or modifications to this equipment might cause it to create harmful interference.

■ FCC Compliance Statement

The following compliance statement pertains to Federal Communications Commission Rules 47 CFR 15.105:

Note: This equipment has been tested and found to comply to the limits for Class A digital devices 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 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 or her own expense.

■ CISPR 22 and EN55022 Warning

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.

■ Japanese Compliance Statement

The following compliance statement in Japanese pertains to VCCI EMI regulations:

> この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

English translation: This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may occur, in which case, the user may be required to take corrective actions.

■ Taiwan Warning Label Statement

The following warning label statement (in Kanji) pertains to BSMI regulations in Taiwan, R.O.C.:

> 警告使用者: 這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

English translation: This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.

■ Internal Code License Statement

The following is the Internal Code License Agreement from StorageTek:

NOTICE
INTERNAL CODE LICENSE
PLEASE READ THIS NOTICE CAREFULLY BEFORE INSTALLING AND OPERATING THIS EQUIPMENT. THIS
NOTICE IS A LEGAL AGREEMENT BETWEEN YOU (EITHER AN INDIVIDUAL OR ENTITY), THE END USER, AND
STORAGE TECHNOLOGY CORPORATION ("STORAGETEK"), THE MANUFACTURER OF THE EQUIPMENT. BY
OPENING THE PACKAGE AND ACCEPTING AND USING ANY UNIT OF EQUIPMENT DESCRIBED IN THIS
DOCUMENT, YOU AGREE TO BECOME BOUND BY THE TERMS OF THIS AGREEMENT. IF YOU DO NOT
AGREE WITH THE TERMS OF THIS AGREEMENT, DO **NOT** OPEN THE PACKAGE AND USE THE EQUIPMENT. IF
YOU DO NOT HAVE THE AUTHORITY TO BIND YOUR COMPANY, DO **NOT** OPEN THE PACKAGE AND USE
THE EQUIPMENT. IF YOU HAVE ANY QUESTIONS, CONTACT THE AUTHORIZED STORAGETEK DISTRIBUTOR
OR RESELLER FROM WHOM YOU ACQUIRED THIS EQUIPMENT. IF THE EQUIPMENT WAS OBTAINED BY YOU
DIRECTLY FROM STORAGETEK, CONTACT YOUR STORAGETEK REPRESENTATIVE.

1. **Definitions:** The following terms are defined as follows:

   a. "Derivative works" are defined as works based upon one or more preexisting works, such as a translation or a musical arrangement, or any other form in which a work may be recast, transformed, or adapted. A work consisting of editorial revision, annotations, elaboration, or other modifications which, as a whole, represent an original work of authorship, is a Derivative work.

   b. "Internal Code" is Microcode that (i) is an integral part of Equipment, (ii) is required by such Equipment to perform its data storage and retrieval functions, and (iii) executes below the user interface of such Equipment. Internal code does not include other Microcode or software, including data files, which may reside or execute in or be used by or in connection with such Equipment, including, without limitation, Maintenance Code.

   c. "Maintenance Code" is defined as Microcode and other software, including data files, which may reside or execute in or be used by or in connection with Equipment, and which detects, records, displays, and/or analyzes malfunctions in the Equipment.

   d. "Microcode" is defined as a set of instructions (software) that is either imbedded into or is to be loaded into the Equipment and executes below the external user interface of such Equipment. Microcode includes both Internal Code and Maintenance Code, and may be in magnetic or other storage media, integrated circuitry, or other media.

2. The Equipment you have acquired by purchase or lease is manufactured by or for StorageTek and contains Microcode. By accepting and operating this Equipment, you acknowledge that StorageTek or its licensor(s) retain(s) ownership of all Microcode, as well as all copies thereof, that may execute in or be used in the operation or servicing of the Equipment and that such Microcode is copyrighted by StorageTek or its licensor(s).

3. StorageTek hereby grants you, the end user of the Equipment, a personal, nontransferable (except as permitted in the transfer terms in paragraph 7 below), nonexclusive license to use each copy of the Internal Code (or any replacement provided by StorageTek or your authorized StorageTek distributor or reseller) which license authorizes you, the end user, to execute the Internal Code solely to enable the specific unit of Equipment for which the copy of Internal Code is provided to perform its data storage and retrieval functions in accordance with StorageTek's (or its licensor's) official published specifications.

4. Your license is limited to the use of the Internal Code as set forth in paragraph 3 above. You may not use the Internal Code for any other purpose. You may not, for example, do any of the following:

   (i) access, copy, display, print, adapt, alter, modify, patch, prepare Derivative works of, transfer, or distribute (electronically or otherwise) or otherwise use the Internal Code;

   (ii) reverse assemble, decode, translate, decompile, or otherwise reverse engineer the Internal Code (except as decompilation may be expressly permitted under applicable European law solely for the purpose of gaining information that will allow interoperability when such information is not otherwise readily available); or

(iii) sublicense, assign, or lease the Internal Code or permit another person to use such Internal Code, or any copy of it.

If you need a backup or archival copy of the Internal Code, StorageTek, or your authorized StorageTek distributor or reseller, will make one available to you, it being acknowledged and agreed that you have no right to make such a copy.

5. Nothing in the license set forth in paragraph 3 above or in this entire Notice shall convey, in any manner, to you any license to or title to or other right to use any Maintenance code, or any copy of such Maintenance Code. Maintenance Code and StorageTek's service tools and manuals may be kept at your premises, or they may be supplied with a unit of Equipment sent to you and/or included on the same media as Internal Code, but they are to be used only by StorageTek's customer service personnel or those of an entity licensed by StorageTek, all rights in and to such Maintenance Code, service tools and manuals being reserved by StorageTek or its licensors. You agree that you shall not use or attempt to use the Maintenance Code or permit any other third party to use and access such Maintenance Code.

6. You, the end user, agree to take all appropriate steps to ensure that all of your obligations set forth in this Notice, particularly in paragraphs 4 and 5, are extended to any third party having access to the Equipment.

7. You may transfer possession of the Internal Code to another party only with the transfer of the Equipment on which its use is authorized, and your license to use the Internal Code is discontinued when you are no longer an owner or a rightful possessor of the Equipment. You must give such transferee all copies of the Internal Code for the transferred Equipment that are in your possession, along with a copy of all provisions of this Notice. Any such transfer by you is automatically (without further action on the part of either party) expressly subject to all the terms and conditions of this Notice passing in full to the party to whom such Equipment is transferred, and such transferee accepts the provisions of this license by initial use of the Internal Code. You cannot pass to the transferee of the Equipment any greater rights than granted under this Notice, and shall hold StorageTek harmless from any claim to the contrary by your transferee or its successors or assigns. In addition, the terms and conditions of this Notice apply to any copies of Internal Code now in your possession or use or which you hereafter acquire from either StorageTek or another party.

8. You acknowledge that copies of both Internal Code and Maintenance Code may be installed on the Equipment before shipment or included with the Equipment and other material shipped to you, all for the convenience of StorageTek's service personnel or service providers licensed by StorageTek, and that during the warranty period, if any, associated with the Equipment, and during periods in which the Equipment is covered under a maintenance contract with StorageTek or service providers licensed by StorageTek, both Internal Code and Maintenance Code may reside and be executed in or used in connection with such Equipment, and you agree that no rights to Maintenance Code are conferred upon you by such facts. StorageTek or the licensed service provider may keep Maintenance Code and service tools and manuals on your premises but they are to be used only by StorageTek's customer service personnel or those of service providers licensed by StorageTek. You further agree that upon (i) any termination of such warranty period or maintenance contract period; or (ii) transfer of possession of the Equipment to another party, StorageTek and its authorized service providers shall have the right with respect to the affected Equipment to remove all service tools and manuals and to remove or disable all Maintenance Code and/or replace Microcode which includes both Internal Code and Maintenance Code with Microcode that consists only of Internal Code.

Overview

This chapter provides an overview of the T9940B Tape Drive and its operation.

■ T9940B Tape Drive

The T9940B Tape Drive (Figure 1-1) is a small, modular, high-performance tape drive for the enterprise and client-server environment for high-capacity storage application. The drive is capable of storing 200 GB of uncompressed data, using the same tape cartridge as the T9940A Tape Drive (60 GB). In addition to the increased data capacity, the T9940B Tape Drive has enhanced serviceability by the presence of a Maintenance Port (standard RJ45 receptacle) on the drive's rear panel. Qualified service technicians can access internal performance and event logs through the Maintenance Port using TCP/IP protocol and servicing software tools. Data files stored on the tape cartridge are not accessible via the Maintenance Port. Data and control I/O is by the 2-GB Fibre Channel (FC) ports. Presently, the T9940B Tape Drive is only available with Fibre Channel, Fabric-Aware interface.

Figure 1-1. T9940B Tape Drive
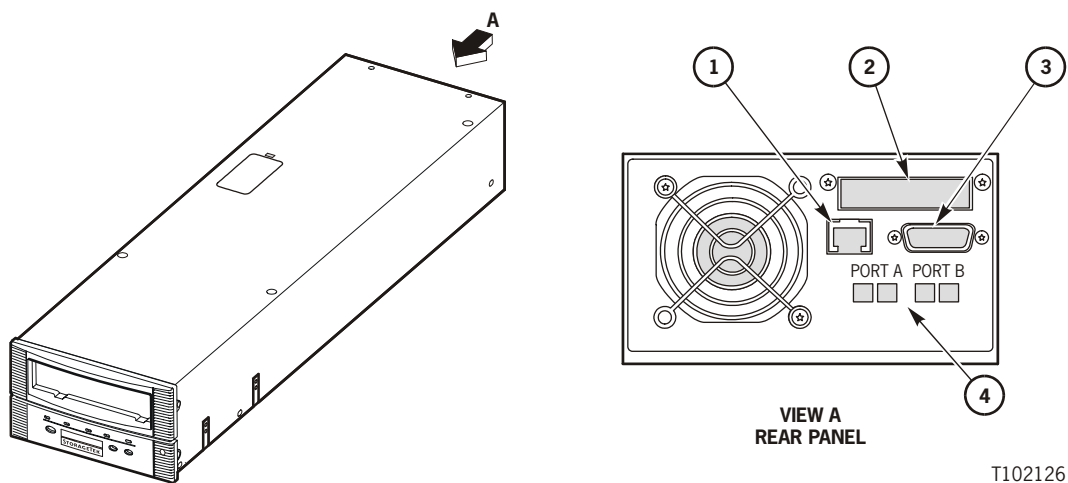
T102126

1. Maintenance Port (RJ45)
2. Drive Power Connector
3. Serial Interface Connector
4. FC Interface Ports

Operator Panel

The T9940B Tape Drive front panel (Figure 1-2) is the operator's interface with the drive, and features:

- Loading slot
- Pushbutton switches
- Indicator lights
- 10-character, alphanumeric display

Figure 1-2. T9940B Operator Panel

T102_114
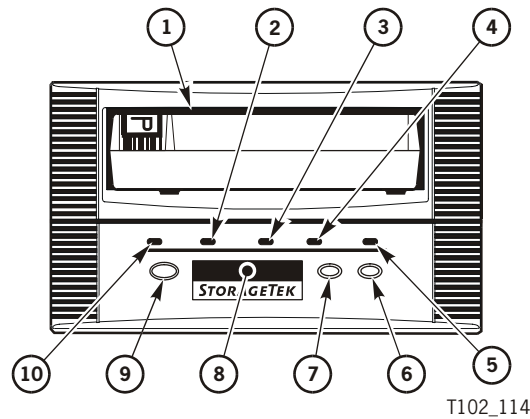
1. Loading slot
2. Activity indicator
3. Clean indicator
4. Service indicator
5. IPL switch
6. Select switch
7. Menu switch
8. Display
9. Unload switch
10. Power indicator

Loading Slot

The loading slot accepts a T9940 tape cartridge. After the cartridge is manually inserted, a mechanism seats the cartridge and threads the tape. (See "Load a Tape Cartridge" on page 4-10.)

Switches

The blue pushbutton switches on the operator panel (Figure 1-2 on page 1-2) are listed below with their functions.

Unload

Pressing the Unload switch causes a loaded tape cartridge to rewind and eject.

CAUTION:
DATA LOSS. DO NOT PRESS THE Unload SWITCH TWICE DURING A WRITE OPERATION.

Pressing the Unload switch once during a write operation causes the drive to try to write the remaining data before the tape cartridge unloads. An operator display of UnWr *xxxx* (unwritten data, where *xxxx* is the fault symptom code) means that some data is not written to the tape. Pressing Unload a second time causes the unwritten data to be lost. Before you press Unload again, see UnWr *xxxx* in Table 5-3 on page 5-4.

Menu

Pressing the Menu switch accesses the menu system, steps through a series of submenus, or answers "No" to a displayed question. Pressing the Menu switch the first time causes the Online/Offline selection to display.

Select

Pressing the Select switch accesses a displayed submenu, steps through possible options of a submenu, or answers "Yes" to a displayed question.

IPL

Pressing the IPL switch causes the drive to execute an initial program load (IPL) sequence. During IPL, the drive firmware loads from non-volatile memory in an EEPROM, to drive RAM. The same process occurs at power-on.

Indicators

The indicators on the operator panel (Figure 1-2 on page 1-2) are listed below with their functions.

Power

The green *power* indicator means:

Off   The power is off.

Flashing   The drive is non-operational for one of the following reasons:

        - It is powering on, and executing IPL.
        - It is saving diagnostic data to the EEPROM.
        - It failed a power-on diagnostic.

On steadily The drive has successfully completed power-on and IPL.

Activity

The green *activity* indicator means:

Off   A tape cartridge is not loaded or has ejected.

Flashing   The tape media in the cartridge is moving.

On steadily A tape cartridge is loaded and the drive is ready.

Clean

The amber *clean* indicator means:

Off   The drive does not require cleaning.

On   The drive requires cleaning because a firmware defined length of tape has passed over the read/write head, or firmware defined error/s have occurred.

Service

The red *service* indicator means:

Off   An error was not detected.

Flashing   An error was detected and diagnostic data might have been collected.

On steadily A hardware error was detected; the drive is not functional. If initiating an IPL does not resolve the situation, contact authorized service personnel.

Display

The 10-character alphanumeric display on the operator panel (Figure 1-2 on page 1-2) presents drive menus and allows you to view configuration and status information such as:

- Compression
- Data Security Erase
- Drive ID or address
- Interface
- Language
- Emulation mode
- Library address
- Serial number
- Firmware release level

The operator panel display is formed by a horizontal group of ten character segments. Each character segment is formed by an array of 35 LEDs—five wide and seven high. Each array can form an upper or lower case alpha character, a numerical digit, or a special character, such as an asterisk (*).

Tape Bar

The operator panel display can also present a type of bar chart (tape bar) to represent the amount of tape that has been written and read. The tape bar is a configuration option activated by authorized service personnel. Once activated, it displays on the operator panel, alternating with other messages.

When the tape bar is activated, the segment arrays simultaneously show the percentage of the total tape length that has been written and read (see Figure 1-3 on page 1-6). Each LED column represents 2% of the tape length, and each segment represents 10%.

Write Bar

The LEDs forming the write bar advance from left to the right of the display as data is written to tape. The write bar uses the full height of the display. As the lit LEDs fill the display, note that only every other LED is lit. The point at which the write bar ends is the percentage of tape written (50% on Figure 1-3 on page 1-6). The remainder of the display is bordered with fully lit top and bottom LED rows, representing the unwritten area of the tape.

Read Bar

As data is read from the tape, the read bar forms in the center of the write bar as a single row of unlit LEDs. This row is bordered above and below by single rows of lit LEDs. The read bar also begins at the left side of the display and advances to the right. The point at which the read bar ends is the percentage point of tape that has just been read (24% on Figure 1-3 on page 1-6).

Figure 1-3 is a simplified view of a tape bar display that shows a tape that is 50% written and 24% read.

Figure 1-3. Tape Bar
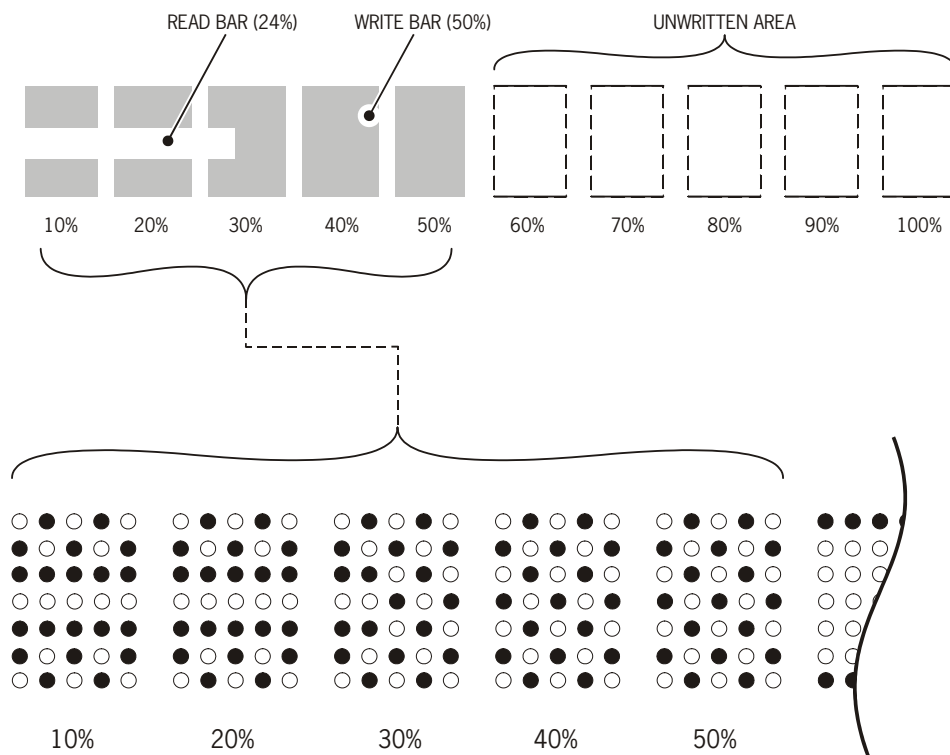
The tape bar gets its information from the media information region (MIR) on the tape. The MIR is written to the tape when the tape cartridge is unloaded. If the MIR is bad, the tape bar does not display. To rebuild the MIR, see "Build MIR" on page 4-17.

■ T9940 Tape Cartridge

Two T9940 data tape cartridges standard or geophysical; and a T9940 cleaning cartridge can be used in either the T9940A or T9940B Tape Drives. A VolSafe (append only) data tape can be used only with the T9940B Tape Drive.

The data cartridges can hold 60 GB of uncompressed data when written by a T9940A (low-density data format); or, 200 GB of uncompressed data when written by a T9940B (high-density data format). Low-density data cartridges can be read, but not appended by T9940B drives. High-density data cartridges cannot be read nor appended by T9940A drives.

The geophysical data cartridge is similar to the standard data cartridge, but has been tested to a higher standard, and has a larger customer label area.

The T9940B VolSafe data cartridge only allows new data to append to the cartridge which prevents over-write of previously written data.

Note: T9940B drive firmware release level 1.32.423 or higher is required to support T9940B VolSafe data cartridges.

The cleaning cartridge media has a dry-abrasive surface which is good for 100 cleaning operations.

Tape cartridge distinguishing features:

- Media ID label (1, Figure 1-4 on page 1-8):
    - Standard data cartridge: **P** (T9940 data), on white background
    - Geophysical data cartridge: **P** (T9940 data), on white background
    - VolSafe data cartridge: **P** (T9940B data), on yellow background
    - Cleaning cartridge: **W** (T9940 cleaning), on white background

- Manufacturer label area (2, Figure 1-4):
    - Standard and geophysical data cartridge: standard coloring
    - Cleaning cartridge: standard coloring
    - VolSafe data cartridge: yellow background

- Customer label area (3, 4, Figure 1-4):
    - Standard, VolSafe, and cleaning cartridge: standard size
    - Geophysical data cartridge: enlarged size

- Write-protect switch/sensor area (6, 7, Figure 1-4):
    - Standard and geophysical data cartridge: black
    - Cleaning cartridge: black switch, white sensor area
    - VolSafe data cartridge: black switch, yellow sensor area

Cartridge Support Contacts:

- Authorized StorageTek Selling Agent for labeled cartridges.
- EDP/Colorflex at 1-888-438-8362, or http://www.colorflex.com for labels.
- StorageTek Sales Support at 1-800-ask4stk or sales_support@storagetek.com (e-mail) for technical questions.

Figure 1-4 illustrates the distinguishing features of T9940 Tape Cartridges.

Figure 1-4. T9940 Tape Cartridge
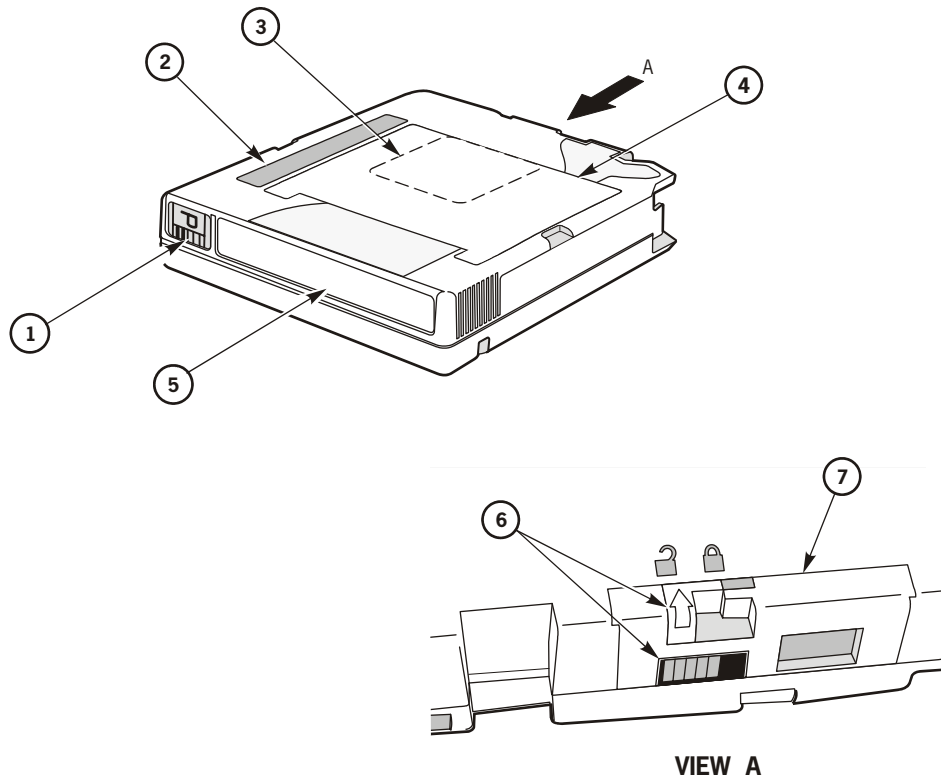
T9940 Tape Cartridge (T102_136)

1. Media ID label (**P** = data, **W** = cleaning),
2. Manufacturer label area (yellow background on VolSafe data cartridge)
3. Customer label area (standard, VolSafe, and cleaning cartridge)
4. Enlarged customer label area (geophysical data cartridge)
5. VOLSER label area
6. Write-protect switch
7. Sensor area (yellow on VolSafe data cartridge, white on cleaning cartridge)

■ Media Information Region

The T9940B Tape Drive uses information recorded on each tape cartridge to access and manage that tape cartridge while mounted on the drive. This information is recorded at the beginning of the tape in an area known as the Media Information Region (MIR). The MIR contains information that falls into two major categories:

- Statistical counters
- Data pointers

The MIR does not contain any user data, but information about the tape cartridge and the data recorded on the tape. The MIR is normally updated every time the tape cartridge is loaded. The existence of the MIR is usually transparent to the user unless some problem is encountered with the MIR. The following sections describe MIR processing and some potential implications of MIR problems.

Normal MIR Processing

Every time a tape cartridge is loaded, the MIR is read from the tape media and saved in the drive memory. All subsequent MIR accesses (until the tape cartridge is unloaded) is saved with the memory resident MIR. When the MIR is loaded in memory an invalid flag is written in the tape resident MIR. The tape resident MIR is marked invalid because it does not reflect results of activity from the current mount.

User Data

Statistical counters reflecting read/write activity, error activity, cumulative mounts and other information are updated with tape cartridge usage. The user data information is basically a directory (map) used to locate the data on the physical media. Since user data is compressed and written in drive controlled blocks on the tape media, a map is needed to locate the data after it is written. This map provides an index between user block id's and the physical block on tape media.

User Block ID

Once the data is written, accessing this directory allows the drive to optimize access to user data. A read to a user block id is translated to the physical location on tape and the drive determines the quickest method to read the block. If the block is some physical distance from the current location a calculation will result in a high-speed locate to the block location, which is followed by a normal speed read.

When the tape cartridge is unloaded, as part of the unload process, the memory resident MIR information is written to the tape resident MIR and the MIR invalid flag is turned off.

Exceptional MIR Processing

There are several instances when the MIR process departs from the normal MIR processing.

Write Protect

When the tape cartridge is write-protected, the MIR is not rewritten and statistical information for that mount is not captured. If the tape cartridge is in a library that logically write-protects the tape cartridge, the MIR is updated on each mount.

Major Error/Power Off

Note: Major errors or unexplained errors are called SNOs (should not occur) by engineering. You may see this in the SRM or hear the acronym when talking to technical support or engineering.

If a tape cartridge is mounted and the drive SNO's or looses power, the memory resident MIR is not written, and the tape resident MIR continues to be marked invalid. Since a SNO results in the drive performing an IPL and ejecting the tape cartridge, in a production environment, it may not be obvious that a SNO has taken place and the MIR is marked invalid.

Invalid MIR Impact

The impact of an invalid MIR occurs in several areas. Since the MIR enables high speed positioning, an invalid MIR forces all operations to a slow speed mode. This has no impact on a sequential read from the beginning of tape. Any operation using locate, defaults to a sequential slow speed read to the requested block, which can result in longer processing time.

Invalid MIR Recognition

An invalid MIR recognition occurs during the following circumstances.

1. An invalid MIR may be suspected if a user sees poor performance on a specific tape cartridge.

2. The drive also posts a 36B2 informational FSC whenever a tape cartridge with an invalid MIR is loaded. Review the logged data for 36B2 FSCs and corrective action taken.

3. If the suspected tape cartridge is write protected, mounted on a drive, and a manual drive dump taken, examine the dump to determine if the MIR is marked invalid.

Invalid MIR Correction

Once a tape cartridge has an invalid MIR, some action is required to revalidate the MIR. An invalid MIR can be validated in several ways.

1. The simplest and quickest method is to write to the tape beginning with block id 0. The MIR will be valid when the tape cartridge is unloaded.

2. Appending to the tape cartridge will also create a valid MIR, although a slow speed read must first be done to the end of existing user data.

3. Reading to the end of existing user data in a single mount will also create a valid MIR.

   Note: This is done at normal read speeds and takes up to 120 minutes for a full tape cartridge.

The memory resident MIR is always rebuilt to the last block read. This can result in seemingly conflicting performance from a single tape cartridge.

Notes:

- If a tape cartridge with an invalid MIR is mounted for long periods of time with locates to different locations, locate times will be inconsistent depending on whether the locate is to a record that is already in the rebuilt MIR, or if some low speed positioning is required.

- The longer a tape cartridge is mounted and the more activity occurs, the more complete the memory resident MIR becomes. When the tape cartridge is unloaded, the tape resident MIR is still marked invalid, unless the tape was read to end of data (EOD). The next mount of the tape cartridge reverts to slow speed positioning.

Invalid MIR Detection for RTD T9940B

The drive generates a 36B2 FSC after mounting a tape cartridge with an invalid MIR. The VSM is designed to accept any exceptional event from the drive and pass that information to the host to create the appropriate OBR or MDR record. This information should be seen in the log in the same manner as a directly attached drive. Open a pinnacle issue if this process does not occur.

MIR Revalidation

The MIR on a tape cartridge with live data is revalidated upon the unload after the tape has reached EOD. Any method that causes the drive to position to EOD can be used.

Note: The tape must be at EOD, not just the last active data on the tape cartridge. Use any utility to position the tape to EOD.

■ Rack-mount Configuration

The T9940BR3 is a dual-drive, rack-mount tray configuration (Figure 1-5) containing two independent T9940B Tape Drives, internally mounted on a common shock-isolated platform. Each drive is powered by a separate, wall-mounted power supply.

Figure 1-5. T9940BR3 Rack-mount Configuration
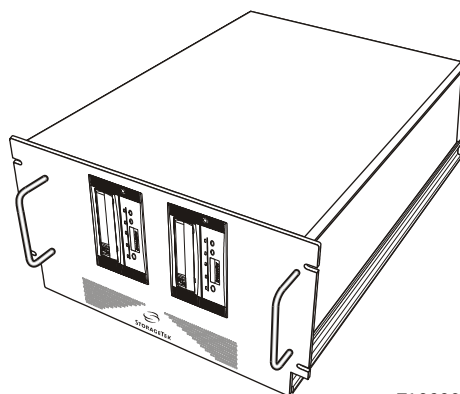
T102097

The T9940BR3 rack-mount tray chassis rear panel (Figure 1-6) Interface and Maintenance Port connectors are connected to each shock-mounted drive by internal jumper cables. The Power switch controls AC input power distributed to both wall-mounted power supplies.

Figure 1-6. T9940BR3 Chassis Rear Panel
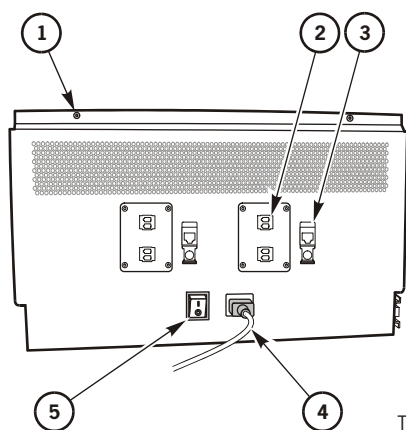
T102068

1. Cover Screw (8x)
2. FC Interface Ports (2x, each drive)
3. Maintenance Port (RJ45) (2x)
4. AC Power Receptacle
5. Power Switch

The T9940BR3 rack-mount tray can be installed in any standard 19-in rack cabinet that is at least 28.5 inches deep. Up to four T9940BR3 rack-mount trays will fit into the StorageTek RACK001 cabinet (Figure 1-7). The T9940BR3 rack-mount tray can also be mixed with any other rack tray in the same rack cabinet, up to the vertical space available.

Figure 1-7. StorageTek RACK001
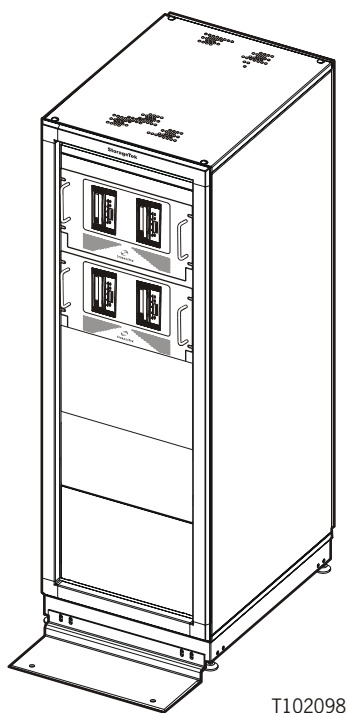
T102098

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Installation

<div style="text-align: right">2</div>

This chapter provides site planning information and instructions for installing the T9940BR3 drive tray into a StorageTek equipment rack (RACK001) in a raised-floor computing center. If you are not using the RACK001 or a raised-floor environment, you might need to adapt the instructions to meet your needs.

In addition, instructions are provided for installing interface cables and TCP/IP (transmission control protocol/internet protocol) maintenance port cables.

■ Tools and Test Equipment

The following table lists the tools and test equipment needed for installing the T9940BR3.

Table 2-1. Tools and Test Equipment

Equipment/Tool	PN	Description
Blank data cartridge	312868001	T9940 tape cartridge with P label
Fiber-optic cleaning supplies	404628901 6168 404702701 404702801	Alcohol pads Cloth pads Texwipe® micro swabs Texwipe foam swabs
Tool kit	4019	Standard tool kit for service personnel

■ Site Preparation

By performing site preparation, you can avoid situations that can result in delays when installing the T9940BR3. This manual provides information on equipment rack power connectors and dimensions.

The T9940BR3 can be ordered with a power cord for use with the RACK001 or either of two external cords: a domestic power cord (NEMA 5-15) or an international power cord.

If you are using a different rack, it might not contain an internal power strip for connecting T9940BR3 drives. Therefore, you might need to plan for external connections. You might also need to replace the connector on the international cord.

Verify Site Power Drop Connector

The power drop connections described here are for the RACK001 and the T9940BR3.

Table 2-2. Site Power Drop Connectors

Where Used	Cable Part Number	Cable Connector Description	Customer Supplied Connector/Receptacle
T9940BR3	10083242	IEC320 120 VAC 10 A	*See* Note 1
Rack N. America (Canada, U.S)	10083625	NEMA-5-15P (3-prong) 120 VAC 15 A	NEMA-5-15R
Rack Domestic	3127950*xx*	HUBBELL type 320P6W 250 VAC 15 A (IEC309)	HUBBELL: 320C6W inline 320R6W wall receptacle Russellstoll: RS320C6W inline RS320R6W wall receptacle
Rack Domestic	3127949*xx*	Russellstoll type 3720DP 250 VAC 15 A	Russellstoll: RS3913 inline RS3743 wall receptacle
Rack Export	10083302	10 A cable without a connector	Customer supplies connector

Notes:

    1. Plugs into a power strip in the equipment rack (RACK001).

Floorspace

Figure 2-1 lists the service clearances for the equipment rack, RACK001.

Figure 2-1. RACK001 Floor Plan

NOTE:

Unless otherwise noted, dimensions are in millimeters (inches).

REAR

CABLE CUTOUT IN FLOOR

606 (23.9)

153 (6.02)

300 (11.8)

60.5 (2.38)

100 (3.94)

798 (31.4)

1.025 m (40.4)

STABILIZER PLATE

FRONT

SERVICE CLEARANCE FOR SLIDING RACK TRAY

762 (30)

T102087
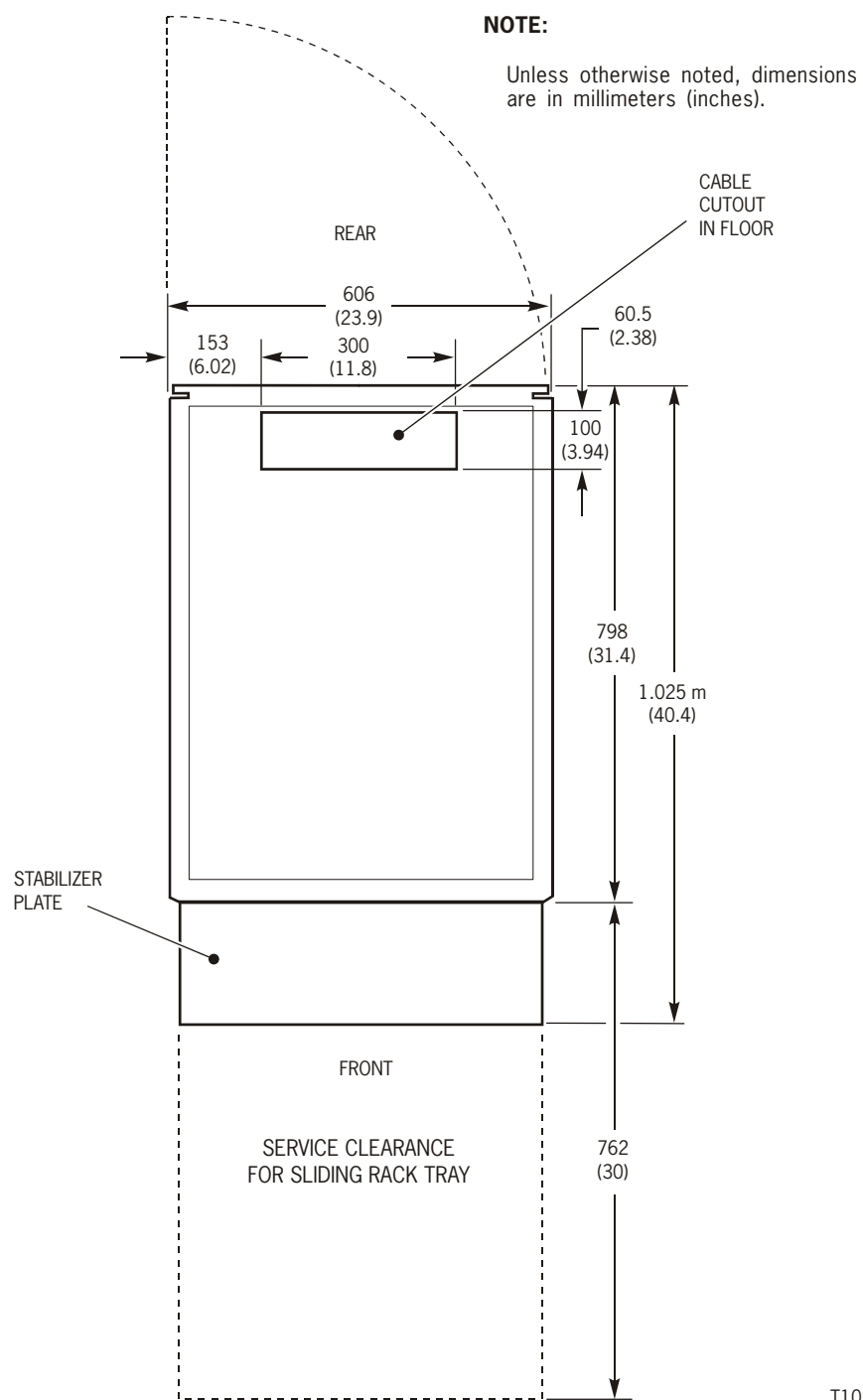
■ Verify Equipment Arrival

Check the equipment against the shipping invoice to make sure that all the ordered equipment has arrived.

Note: You can only check some items, such as cables, after unpacking the equipment.

■ Unpack the Shipment

Follow these steps to unpack the equipment:

WARNING:
PERSONAL INJURY OR EQUIPMENT DAMAGE. **AVOID FLOOR OPENINGS, CABLES, AND OTHER OBSTRUCTIONS THAT MIGHT INJURE YOU OR DAMAGE THE EQUIPMENT WHILE YOU ARE MOVING AND POSITIONING THE EQUIPMENT.**

1. Move the equipment as close as possible to the installation area. Racks have casters and can be rolled into the final position while the T9940BR3 ships on a pallet.

2. Follow the unpacking instructions located on the shipping carton.

   Note: Make arrangements to dispose of the shipping cartons and packaging material.

3. Remove all component packages, and place them aside.

4. Make sure the serial number of the unit corresponds with the shipping invoice.

5. Report any missing or incorrect contents.

6. Cut the plastic bag surrounding the T9940BR3.

7. Remove the eight screws from the top cover of the T9940BR3, and lift the cover off the tray.

   Note: If the cover has slots instead of holes, you may loosen the screws instead of removing them.

---

8. Follow these steps to remove the internal packing material:

   a. Locate the internal foam packing blocks (see the following figure).

   b. Grasp a block and rotate it away from the drive and toward the rear of the chassis until the lower extension of the block clears the drive carriage.

   c. Remove the block.

   d. Repeat Steps 8b and 8c until all blocks are removed.

1. Foam packing blocks
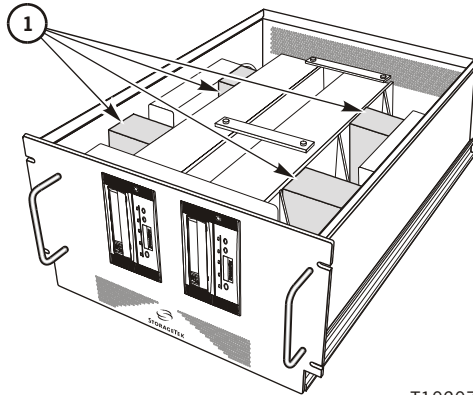
T102076

9. Inspect the power cord at each power supply. Reconnect the cord if necessary.

   Note: Power cords can be disconnected from the power supplies while removing the foam blocks.

10. Position the unpacked equipment near the final location according to the site floor plan, but provide enough space to enable you to connect and route the cables.

   Note: You will remove the T9940BR3 from the pallet at a later time.

■ Confirm Receipt of Cables

Make sure the required cables are available. Table 2-3 lists the LC Fibre Channel (FC) cables that connect the T9940BR3 to FC switches or host bus adaptors (HBAs). Figure 2-2 shows the connector.

Note: If you are replacing a T9940A FC drive with a T9940B FC drive and are not connecting to a 2 Gb switch, use an adapter kit to allow a cable with an SC connector to attach to the LC connector on the T9940BR3.

The part number of the adapter kit is 312105301.

Table 2-3. LC Fibre Channel Cable Part Numbers

Connector Type	Length		Part Number	
	Meters	**Feet**	**Plenum[1]**	**Riser[2]**
LC to LC	10	32.8	10800224	10800221
LC to LC	50	164	10800225	10800222
LC to LC	100	328.1	10800226	10800223
LC to SC	10	32.8	10800234	10800231
LC to SC	50	164	10800235	10800232
LC to SC	100	328.1	10800236	10800233

Notes:

1. Plenum cables are designed for installation in air ducts. Plenum materials meet standards for flammability (produce little smoke).

2. Riser cables can be used in computer rooms. Riser cable materials are not classified according to flammability or toxic gas emissions.

Figure 2-2. Fibre Channel LC Cable Connector
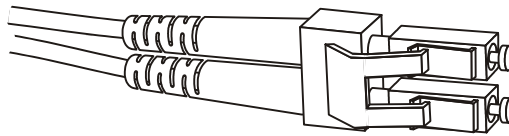
T102075

■ Rack

The following instructions are specific to the StorageTek model number RACK001. If you are using a different rack, make sure it does not have a front door. The instructions may not apply exactly to a rack other than the RACK001.

Note: Install the RACK001 stabilizer before you insert a tray.

Rack Safety and Precautions

WARNING:
POSSIBLE PERSONAL INJURY:

- **The T9940BR3 weighs 36.7 kg (81 lb) with tray slides. USE MORE THAN ONE PERSON TO INSTALL A T9940BR3 IN OR REMOVE A T9940BR3 FROM THE RACK.**

- **When you slide a tray out of the rack, you shift the rack's center of gravity. ENSURE THE RACK IS STABLE ENOUGH TO WITHSTAND THIS SHIFT.**

Observe the following safety precautions when you install a T9940BR3 in the StorageTek RACK001:

- Do *not* allow rack elements to interfere with the tape drive's ventilation. The rack's internal ambient temperature should not exceed the recommended operating temperature range of the T9940BR3.

- Ensure that the combination of the T9940BR3 with other equipment in the rack does not create an overcurrent condition in the power source. The combination of equipment in the rack must not exceed the rating plate amperage of the power distribution strip and/or the rated amperage of the facility's branch circuit.

- Ensure that all equipment in the rack has a reliable earth ground, whether the equipment is connected directly to the branch circuit or to a power distribution strip.

    Note: The T9940BR3 relies on the ground pin of the power cord for an earth ground.

Rack Installation Overview

CAUTION:
EQUIPMENT DAMAGE. The RACK001 is only intended for T9x40 trays. OBTAIN APPROVAL FROM StorageTek AND APPROPRIATE SAFETY AGENCIES BEFORE PLUGGING OTHER EQUIPMENT INTO THE RACK POWER STRIP.

Figure 2-3. Equipment Rack

T102113
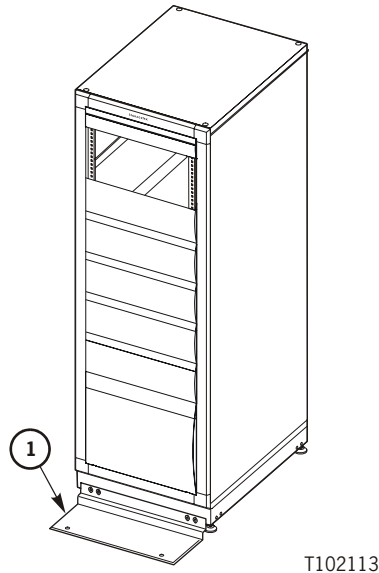
1. Stabilizer plate

The rack ships to the customer site with the following items installed:

- A single 2 EIU (88.5 mm/3.48 in.) filler at the top of the rack.

- Five 4 EIU (177 mm/6.97 in.) fillers in drive tray locations.

- A single 9 EIU (398 mm/15.7 in.) filler at the bottom of the rack.

- Fan tray at the rear of the rack.

- Power distribution strip at the rear of the rack.

To install T9940BR3 trays, you must remove the appropriate filler plates.

CAUTION:
EQUIPMENT DAMAGE. Do not attempt to move the rack once drives are installed. REMOVE ALL T9940BR3 TRAYS AND THE STABILIZER PLATE BEFORE RELOCATING THE RACK.

Tools Required

1/2 in. open-end wrench

3/4 in. open-end wrench

Assorted Torx screw drivers

Bubble level

Install Rack Stabilizer Plate

Follow these instructions to install the stabilizer plate on the rack.

1. Use a 3/4 in. wrench to lower the rack leveling pads (see the following figure). While adjusting the pads, use a bubble level to make sure the rack is plum and level.

2. Attach the stabilizer plate to the front of the cabinet finger-tight with four bolts.

3. Use a 1/2 in. wrench to tighten the bolts.

Note: The stabilizer must remain connected to the rack. You should only remove it when relocating the rack.
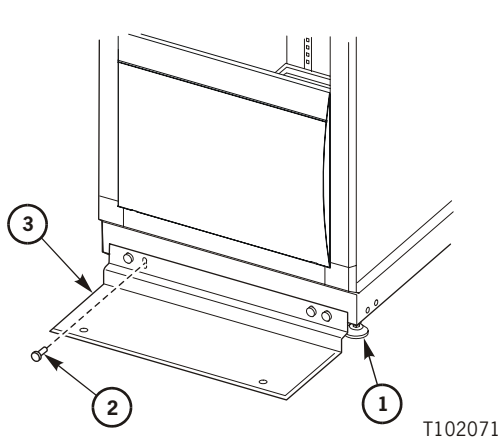
1. Leveling pad (4X)
2. Bolt (4X)
3. Stabilizer plate

T102071

Open the Rear Door

Follow these instructions to open the door at the rear of the rack.

---

1. Lift the lock shield (see the following figure).

   Note: If locked, use the key to unlock the door.

2. Push on the key cylinder. The door handle pops out.

3. Grasp the door handle, turn it 1/4 turn counterclockwise to unlatch the door, and pull on the handle to open the door.

1. Lock shield
2. Key cylinder
3. Door handle

T102086
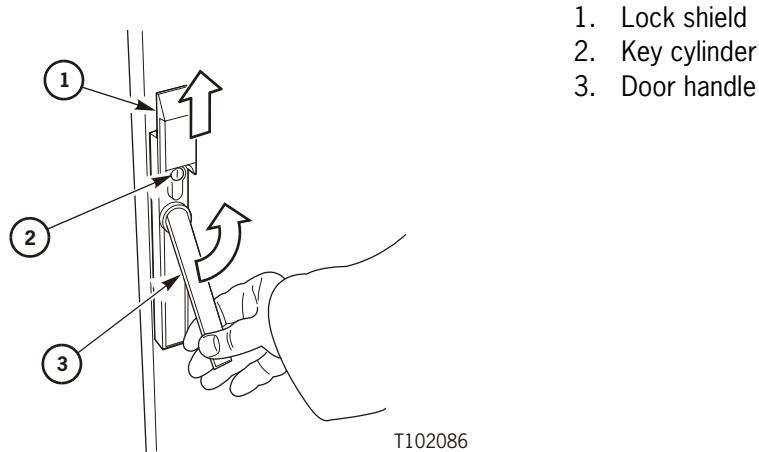
Install an Optional Power Strip

Follow these instructions to add a second power strip to the rack.

---

1. Unpack the power strip.

2. Go to the back of the rack and open the door.

3. Install captive nuts into cutouts 12 and 14 above the existing power strip. Make sure to install captive nuts on both vertical frame members.

   Note: Place the bottom edge of the captive nut into the cutout, use a tool to push down on the upper edge of the nut, push the nut into the opening, and remove the tool.

4. Position the second power strip, and secure it with four screws.

Install Captive Nuts and Nut Plates

Drive trays are installed from the top of the equipment rack (Figure 2-3 on page 2-8). Captive nuts are used to secure the tray to the rack while nut plates are used to secure the slide-rail assemblies to the rack.

Follow these instructions to install the drive tray captive nuts and nut plates in the vertical frame members of the rack:

1. Determine which filler plates to remove.

   Note: The T9940BR3 requires the space of 1.5 filler plates.

   The following list assumes that you will only use T9940BR3 trays in the rack:

   - To install one drive, remove the highest filler plate.

   - To install two drives, remove the top two filler plates.

   - To install three drives, remove the top four filler plates.

   - To install four drives, remove all five filler plates.

2. Remove the decorative cover from the filler plate.

3. Remove the screws from the filler plate and remove the plate.

4. Determine where to locate captive nuts by using the applicable instruction.

Notes:

1. You will identify which cutouts should contain captive nuts by counting down from a reference point.

2. Notches appear in the vertical frame member after every three cutouts. You can use these notches as a shortcut when counting holes.

   - For the first drive tray, locate cutouts 3 and 14 of each vertical frame member by counting down from the bottom edge of the 2EIU filler plate, and determine if a captive nut is installed in each hole. Mark these cutouts so you don't forget their location.

   - For the second through fourth drive trays, you will count down from either the bottom edge of the drive tray or the notch below the slide rail. Captive nuts will need to be present in cutouts 3 and 14 below the reference point.

   Note: It is easier to locate the reference point after the slide rails and a T9940BR3 are installed. Therefore, you will be instructed to return to this procedure after a drive is installed.

5. Make sure each determined location has captive nuts installed. If required, insert captive nuts as follows:

   a. Place the bottom edge of the nut into the cutout, use a tool to push down on the upper edge of the nut, push the nut into the opening, and remove the tool.

   b. Repeat Step a. for the opposite rail.

1. Captive nut
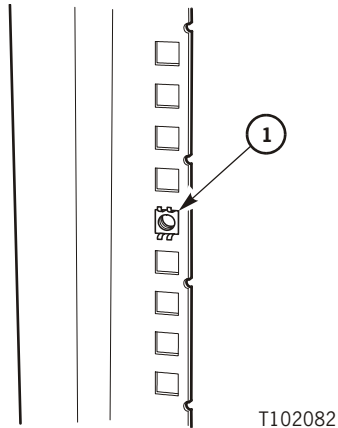
T102082

6. Attach nut plates (see the following figure) loosely for the tray slide rails by following these instructions:

   Note: You will insert the tray slide bracket between the nut plate and the vertical frame member in a later step.

   a. At the front of the cabinet, hold a nut plate near cutouts 16 and 17 (counting down from the reference point) and thread both screws into the nut plate. Repeat this for the other vertical frame member.

   b. At the rear of the cabinet, hold a nut plate near cutouts 16 and 17 (counting down from the reference point) and thread both screws into the nut plate. Repeat this for the other vertical frame member.

1. Nut plate
2. Screw (2X)
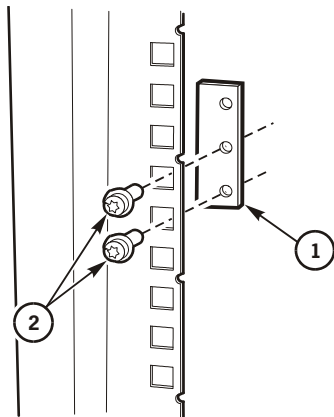
T102081

Install Slide Rails

Follow these instructions to install the slide rails on the rack:
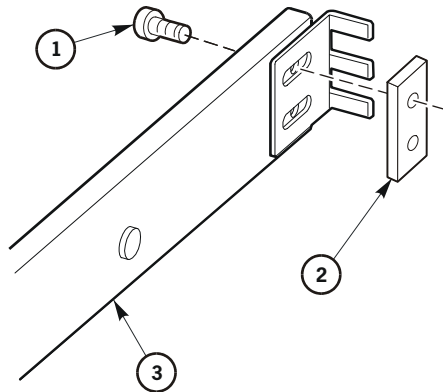
1. Attach the slide bracket loosely to the rear of the slide-rail assembly (see the following figure) using two screws and a nut plate.

    Note: Do not fully tighten the screws, you must adjust the slide bracket to fit the slide rail between the vertical frame members.

    1. Slide bracket adjustment screws (2X)
    2. Nut plate
    3. Slide rail

    T102072

2. Insert the slide-rail assembly between the vertical frame member and the nut plate at the front of the cabinet.

3. Adjust the mounting bracket at the rear of the slide-rail assembly until it seats between the nut plate and the vertical frame member.

4. Use a T-25 driver to tighten the 10-32 screws only enough to prevent the slide-rail assembly from falling.

    1. Slide rail
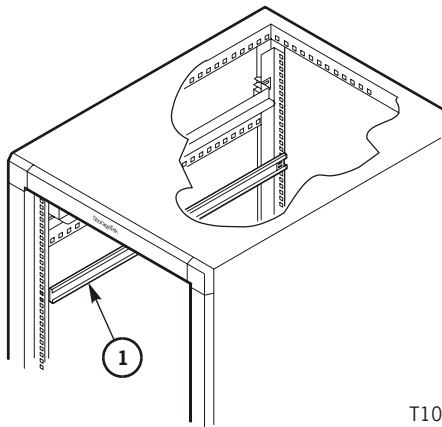
    T102073

5. Extend the slide rail out the front of the cabinet (see the following figure).

6. Position the slide rail so the center section clears the vertical frame member.

7. Tighten the nut plate screws.

8. Tighten the slide bracket screws at the rear of the slide assembly.

9. Repeat Step 1 through Step 8 for the other slide assembly.
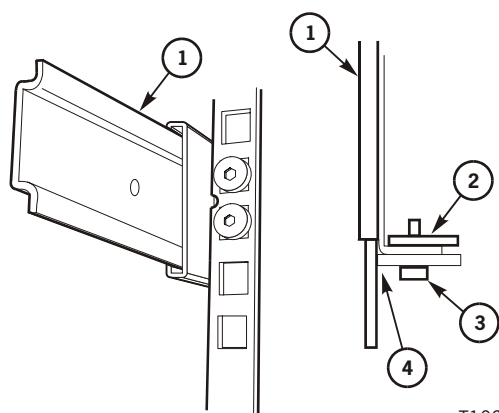
1. Slide
2. Nut plate
3. Screw (2X)
4. Slide clearance

T102074

■ T9940 Tray

Note: Make sure the following procedures have been completed before starting this procedure:

- "Install Rack Stabilizer Plate" on page 2-9
- "Install Captive Nuts and Nut Plates" on page 2-11
- "Install Slide Rails" on page 2-13.

Follow these instructions to install the tray:

1. Remove the inner portion (drive-tray rail) of the slide-rail assembly.

WARNING:
PERSONAL INJURY. The T9940BR3 weighs 36.7 kg (81 lb). USE TWO PEOPLE TO LIFT THE TRAY.

2. Remove the T9940BR3 from the pallet.

3. Install a rail on each side of the tray with five screws (see the following figure).

Notes:

1. The rails mount on the bottom edge of the tray.

2. The spring latch faces away from the drive and toward the back of the tray. The spring latch must fit into the hole of the slide rail.

1. Spring latch
2. Drive tray rails (2X)
3. Screws (5X)
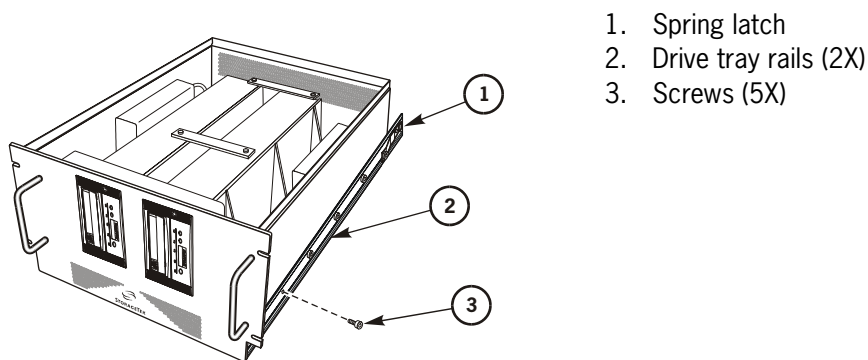
T102078

WARNING:
HEAVY OBJECT. A tray weighs 36.7 kg (81 lb). USE TWO PEOPLE TO INSERT THE DRIVE TRAY INTO THE SLIDE-RAIL ASSEMBLY.

4. Insert the tray rails into the slide-rail assemblies of the rack.

5. Push the tray into the rack until the spring latches engage.

6. Unlock the T9940 head by sliding the latch away from the center of the drive.

    Note: Because of the limited space between the drives, you might need to use a tool with a hooked end to reach the latch (see the following figure).

7. Repeat Step 6 for the second drive.

8. Set the power switch of each power supply to the ON (|) position.

1. Tool
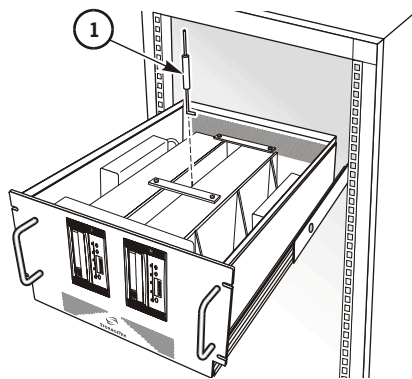
T102077

9. Install the top cover on the drive tray with eight screws.

10. Press on the spring latches and push the tray fully into the rack.

1. Spring latch
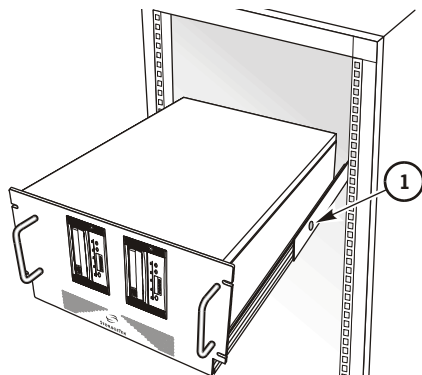
T102079

11. Secure the tray to the rack using four 10-32 screws. These screws mate with the captive nuts installed in previous steps.

1. Drive tray mounting screws (4X)
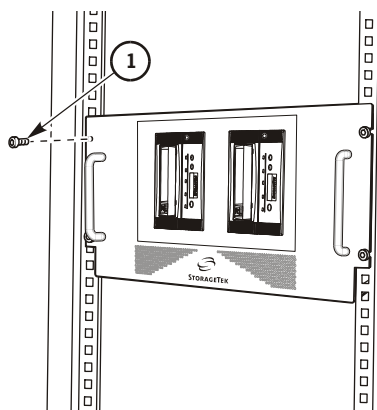
T102080

12. Attach the female end of the power cord to the drive tray (see the following figure).

1. Power cord
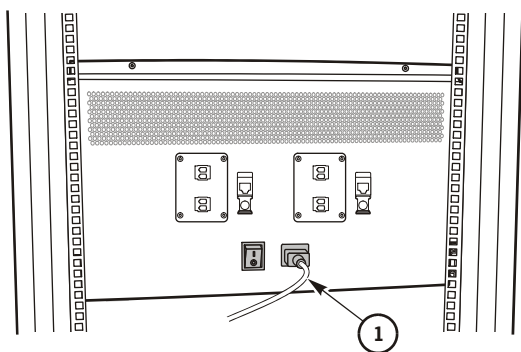
T102066

13. Attach the male end of the power cord to an outlet on a power strip in the base of the rack (see the following figure).

14. Return to Step 4 of "Install Captive Nuts and Nut Plates" on page 2-11 if you want to install another tray.

1. Drive tray power cord
2. Fan tray power cord

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■ Install Fibre Channel Cables

CAUTION:
CABLE DAMAGE. Fiber-optic cables are easily damaged. FOLLOW THE GUIDELINES LISTED IN "Fiber-Optic Cable Handling" on page xxiv TO PREVENT CABLE DAMAGE.

1. Mark each Fibre Channel (FC) cable with the device address and port.

   Note: The drive has two ports (A and B).

2. Route the cable(s) from near the switch to the drive tray.

   Note: Do not attach either end of the cable(s) at this time.

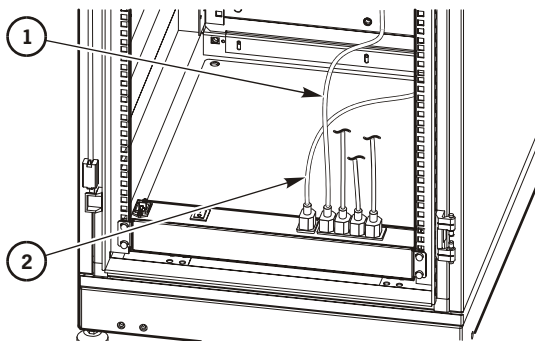3. Route the FC cable(s) for the drive tray through the floor tile cutout, then through the cable cutout in the floor of the rack, and to the rear of the tray.

4. Remove the rubber port plug from the selected drive port.

5. Allow enough slack in the cable(s) to bend and connect to the drive port(s).

6. Remove the cable connector covers and clean the cable ends with wipes.

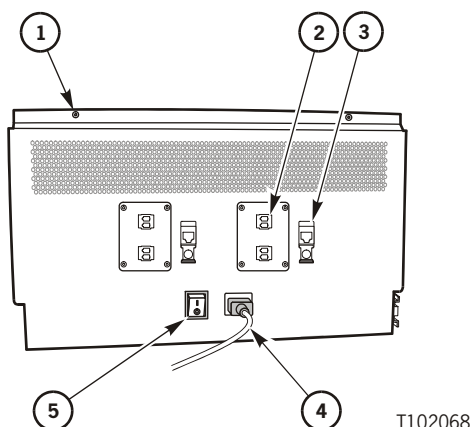**CAUTION:**
EQUIPMENT DAMAGE. DO NOT FORCE A FIBER-OPTIC PLUG INTO A CONNECTOR.

7. Connect the FC cable to the desired port on the rear of the tray.

Notes:

   1. The connector is keyed to prevent improper connection.

   2. Port A is the top connector (see the figure below).

1. Cover Screw
2. Fibre Channel ports
3. Maintenance port
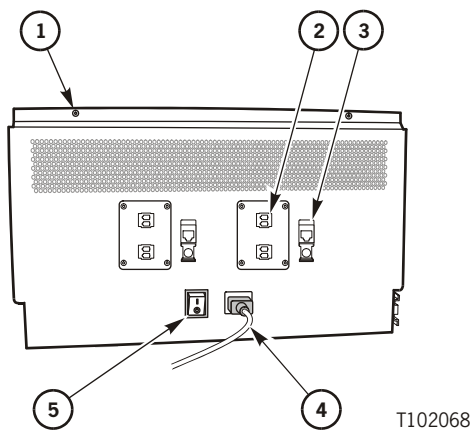4. Tray power cord
5. Power switch

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8. Insert the cable into the cable brackets along the side of the rack.

9. Repeat Step 3 through Step 8 if you will be using both ports of the drive.

10. Repeat Step 3 through Step 9 for the second drive in the tray.

11. Repeat Step 3 through Step 11 for each additional T9940BR3 in the rack.

■ Connect TCP/IP Cable to Maintenance Port

A TCP/IP cable can either be permanently connected between the maintenance port on the drive and a maintenance switch or connected between the maintenance port and a PC when needed.

Use the instructions below to permanently connect the TCP/IP cable(s):

1. Route the TCP/IP cable from the maintenance switch to the equipment rack.

2. Connect the TCP/IP cable to a port on the maintenance switch.

3. Label the TCP/IP cable for the maintenance port on the drive with its position number in the rack and drive tray. Label cables for all drives to be installed.

4. Route the cable for the installed drive tray through the cutout in the floor tile and the cable cutout in the floor of the rack.

5. Provide enough cable length to reach the maintenance port on the drive tray.

6. Connect the cable to the maintenance port (see the figure below) on the rear panel of the drive tray.

7. Insert the cable into the cable guides along the side of the rack.

1. Cover Screw
2. Fibre Channel ports
3. Maintenance port
4. Tray power cord
5. Power switch

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8. Repeat Step 2 through Step 7 for the second drive in the tray and for all remaining drive trays.

■ Power-on the Rack

Use the instructions below to apply power to the rack and trays:

1. Attach the female end of the external power cord to the connector on the left side of the power strip (see the figure below).

2. Route the power cord through the floor of the rack, and attach the male end of the power cord to a power source.

   Note: To comply with safety agency standards, the socket shall be installed near the equipment and shall be easily accessible.

3. Repeat Step 1 and Step 2 if there is a second power strip in the rack.

1. Equipment rack power cord

T102069
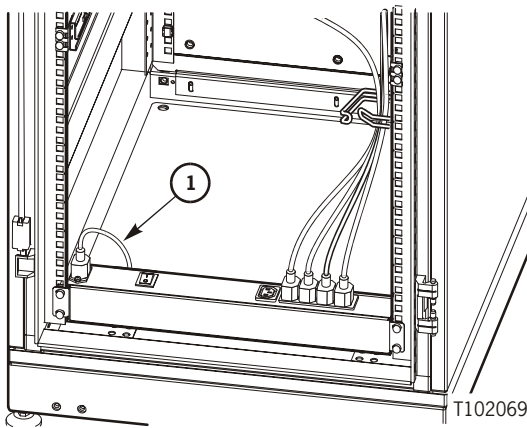
4. Locate the power switch on the power strip.

5. Place the power switch to the ON position.

6. Place the power switch of each installed drive tray to the ON position.

7. Verify that the drives operate.

Notes:

1. You should feel air flowing from the drive fan.

2. If `CHK 5A01` displays, the read/write head of the drive is locked. See for instructions to unlock the head.

■ Configure the Drive

Each drive ships from the plant with default configuration values loaded. You can check these values by navigating the online menus. If you want to change any values, you must use the appropriate offline menus.

1. Follow Chapter 3, "Menu System" to configure the drive using the offline change configuration and change TCP submenus.

2. Return to this page after the drive is configured.

■ Manually Load Tape Cartridges

You should test each installed drive to make sure it loads and unloads a tape cartridge.

If the drive cannot load or unload a tape cartridge, resolve the problem before continuing on to the next section.

■ Finish the Installation

1. Inspect the rack to make sure you did not leave any tools or parts inside it.

2. Close the door of the rack.

3. Place the power switch of each installed drive tray to the OFF position.

4. Connect the free end of the drive port FC cable(s) to an open port on the switch.

   Note: Remove the cable connector covers and clean the cable ends with wipes before connecting the cable.

5. Place the power switch of each installed drive tray to the ON position.

6. Run a test job from the host to the T9940BR3.

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Menu System

This chapter describes the T9940B Tape Drive menu system. It provides information to:

- Review drive configuration and firmware release level
- Reconfigure the drive
- Perform special operations.

This information is provided in the following order:

1. "Menu Structure Overview"

2. "Explanation of Menu Trees"

3. "View Configuration Settings"

4. "Change Configuration Settings"

   - Menu tree (Figure 3-6)
   - Menu table (Table 3-1)

5. "View/Change TCP/IP Settings"

   - Menu tree (Figure 3-7)
   - Menu table (Table 3-2)

6. "Drive Operations Menu"

   - Menu tree (Figure 3-8)
   - Menu table (Table 3-3)

The single-page menu trees show submenu sequences graphically. You can use them as a guide for options if you do not need detailed instructions. The multi-page menu tables provide more detail for less experienced users. Chapter 4, "Operation," provides step-by-step instructions for the procedures.

Note: All drives are pre-configured in manufacturing to the same settings; therefore, a drive must be configured to site specific settings upon installation or replacement.

■ Menu Structure Overview

Figure 3-1 shows an overview of the T9940B main menu system.

When you press the **Menu** switch on the Operator Panel, the first menu provides selection of Online (default) or Offline menus. Press the **Menu** switch to accept the displayed option and advance to the next menu. Press the **Select** switch to toggle the option, then press the **Menu** switch to advance to the next menu.

Figure 3-1. Main Menu System
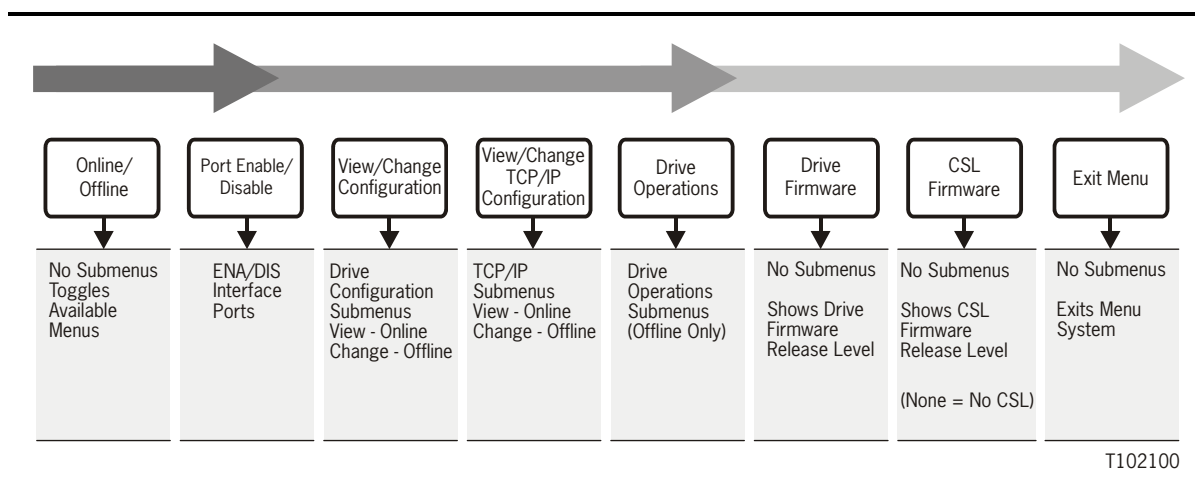
View/Change Configuration menus display drive configuration settings (view only) in Online, or allow drive configuration changes when Offline. Press the **Menu** switch to advance the display to the next main menu. Press the **Select** switch to enter submenus.

View/Change TCP Configuration menus display the drive Transmission Control Protocol /Internet Protocol (TCP/IP) configuration settings (view only) in Online, or allow TCP/IP configuration changes when Offline. Press the **Menu** switch to advances the display to the next main menu. Press the **Select** switch to enter submenus.

Drive Operations menus (Offline only) provide drive utilities. Press the **Menu** switch to advances the display to the next main menu. Press the **Select** switch to enter submenus.

The Drive Firmware Menu displays the current drive firmware release level.

The CSL Firmware Main displays **CSL None**. (Cartridge Scratch Loader configuration not available with T9840B drives.)

The Exit Menu allows you the choice to loop-back to the Online/Offline selection menu by pressing **Menu** (No), or to exit the menu system by pressing **Select** (Yes).

■ Menu Operations

Menu operations for Online and Offline are very similar. Online menus provide viewing of current settings and/or status. Offline menus allow change to various settings and/or option selections. In both menu systems, press **Menu** to advance to the next menu item, or answer "No"; or, press **Select** to toggle/increment options, or answer "Yes".

Online Menu Operation

With the online menus, you can:

- Enable/Disable the FC Ports
- View the drive configuration
- View the firmware release level

When the drive is online, the main menus shown in Figure 3-2 on page 3-4 are active. Press **Menu** (one or more times) to advance to the View Configuration Main Menu.

Notes:

1. Fibre Channel interface drives have Port Enable/Disable selections before the View Configuration main menu displays.

2. At each main menu you have two choices:

   - Press **Menu** (No) to bypass, and advance to the next main menu.
   - Press **Select** (Yes) to enter submenus.

View Configuration submenus allow you to view current drive configuration settings. See the menu tree (Figure 3-5 on page 3-8) for more information.
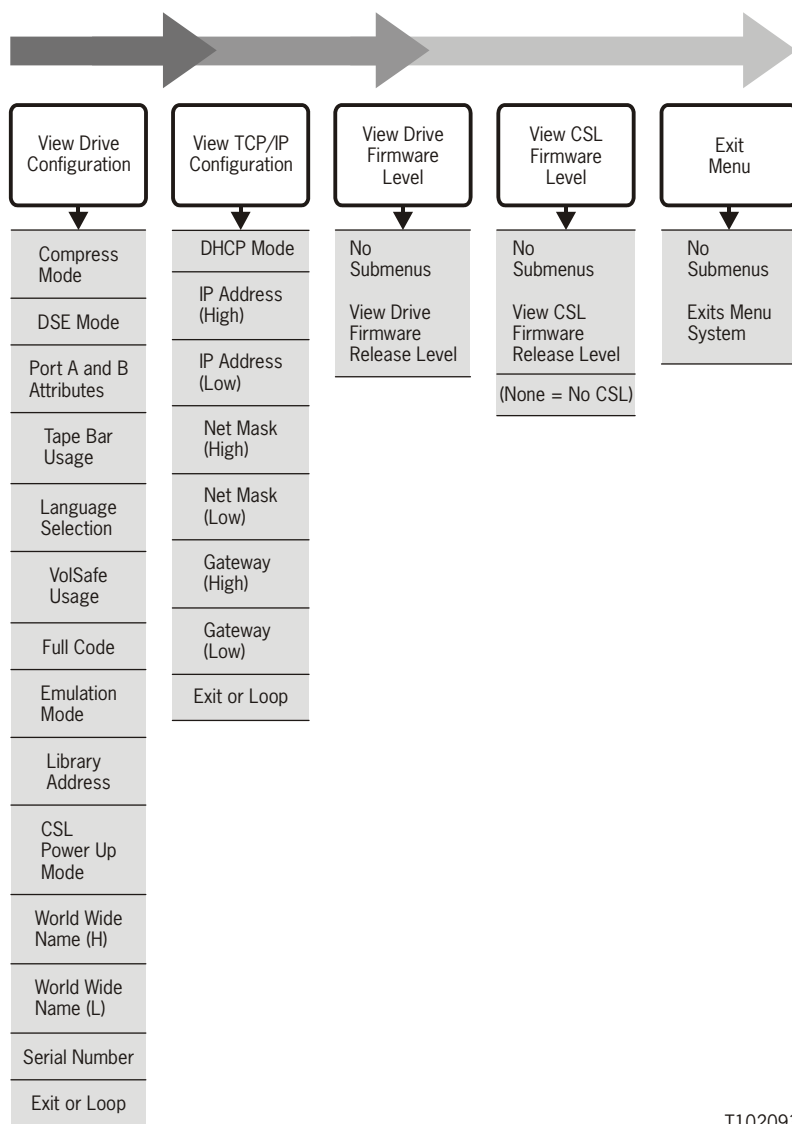
View TCP submenus allow you to view current drive TCP/IP settings. See the menu tree (Figure 3-7 on page 3-24) for additional information.

The view-only Firmware Release Menu displays the drive's firmware release level in R$x.yy.zzzc$ format, where:

- x = major revision level,
- y = minor revision level,
- z = integration number,
- and c = channel interface type (f for Fibre Channel).

The view-only CSL Firmware Release Menu displays **CSL None**. (Cartridge Scratch Loader configuration not available with T9840B drives.)

The Exit Menu allows you the choice to loop-back to the Online/Offline selection menu by pressing **Menu** (No), or to exit the menu system by pressing **Select** (Yes).

Figure 3-2. Online Menu

View Drive Configuration	View TCP/IP Configuration	View Drive Firmware Level	View CSL Firmware Level	Exit Menu
Compress Mode	DHCP Mode	No Submenus	No Submenus	No Submenus
DSE Mode	IP Address (High)	View Drive Firmware Release Level	View CSL Firmware Release Level	Exits Menu System
Port A and B Attributes	IP Address (Low)		(None = No CSL)	
Tape Bar Usage	Net Mask (High)			
Language Selection	Net Mask (Low)			
VolSafe Usage	Gateway (High)			
Full Code	Gateway (Low)			
Emulation Mode	Exit or Loop			
Library Address				
CSL Power Up Mode				
World Wide Name (H)				
World Wide Name (L)				
Serial Number				
Exit or Loop				

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Offline Menu Operation

When the drive is Offline, the main menus shown on Figure 3-3 on page 3-6 are active. Press **Menu** (one or more times) to advance to the Change Configuration Main Menu.

Notes:

1. Fibre Channel interface drives have Port Enable/Disable selections before the Change Configuration main menu displays.

2. At each main menu you have two choices:

    -   Press **Menu** (No) to bypass, and advance to the next main menu.
    -   Press **Select** (Yes) to enter submenus.

Change configuration submenus allow you to change drive configuration settings. See the menu tree (Figure 3-6 on page 3-11) for additional information.
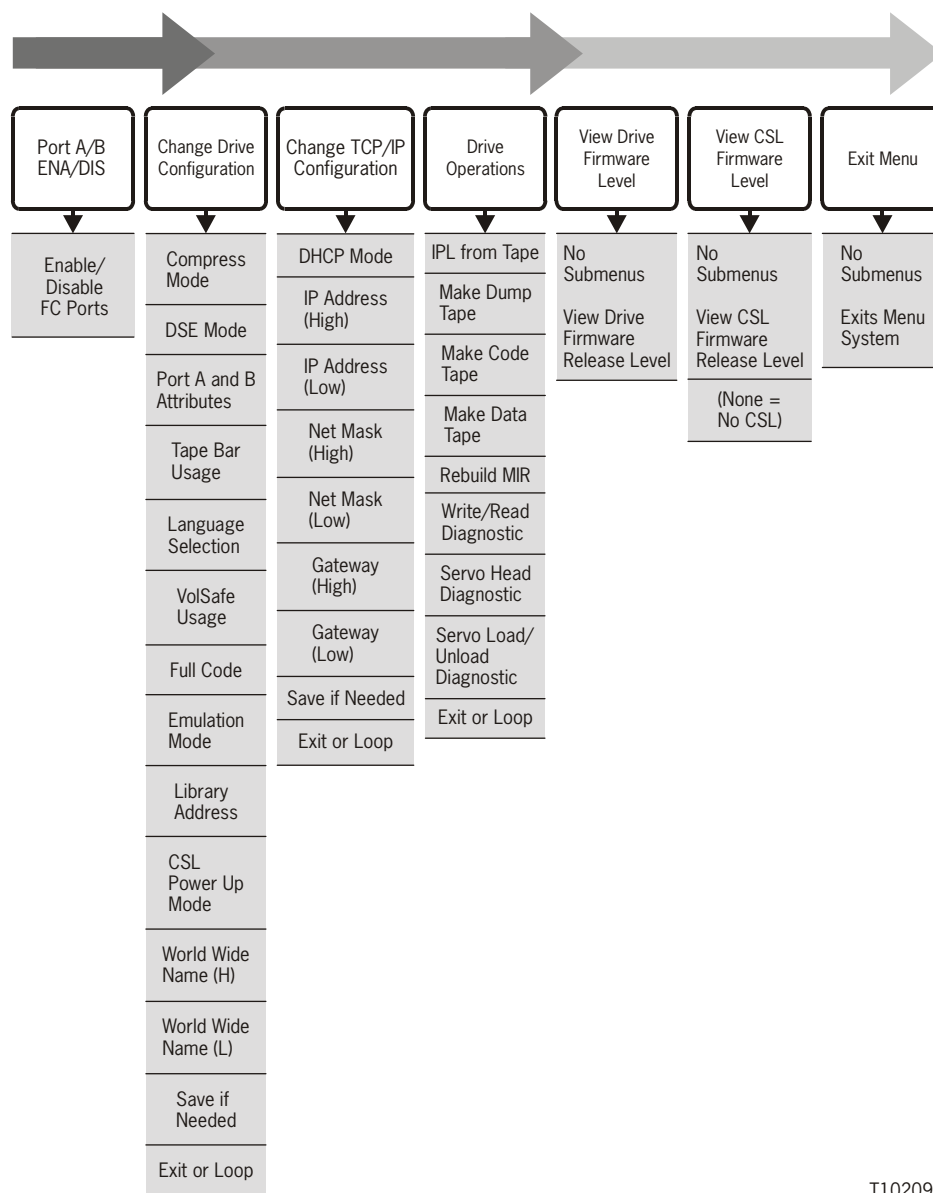
The change TCP submenus allows you to change drive TCP/IP configuration settings. See the menu tree (Figure 3-7 on page 3-24) for additional information.

The drive operation submenus allow you to perform several drive/cartridge related utilities. See the menu tree (Figure 3-8 on page 3-29) for additional information.

The view-only Firmware Level and CSL Firmware Level main menus function the same as they did in Online Main Menu Operation.

The Exit Menu allows you the choice to loop-back to the Online/Offline selection menu by pressing **Menu** (No), or to exit the menu system by pressing **Select** (Yes).

Note: If you exit the menu system with the drive "Offline", the Operator Panel alternately flashes "Offline" (if a tape cartridge has been loaded at least once) as a reminder that drive status is still Offline. This reminder flashes until the drive placed back "Online", or powered-off.

Figure 3-3. Offline Menus

Port A/B ENA/DIS	Change Drive Configuration	Change TCP/IP Configuration	Drive Operations	View Drive Firmware Level	View CSL Firmware Level	Exit Menu
Enable/ Disable FC Ports	Compress Mode	DHCP Mode	IPL from Tape	No Submenus	No Submenus	No Submenus
	DSE Mode	IP Address (High)	Make Dump Tape	View Drive Firmware Release Level	View CSL Firmware Release Level	Exits Menu System
	Port A and B Attributes	IP Address (Low)	Make Code Tape		(None = No CSL)	
	Tape Bar Usage	Net Mask (High)	Make Data Tape			
	Language Selection	Net Mask (Low)	Rebuild MIR			
	VolSafe Usage	Gateway (High)	Write/Read Diagnostic			
	Full Code	Gateway (Low)	Servo Head Diagnostic			
	Emulation Mode	Save if Needed	Servo Load/ Unload Diagnostic			
	Library Address	Exit or Loop	Exit or Loop			
	CSL Power Up Mode					
	World Wide Name (H)					
	World Wide Name (L)					
	Save if Needed					
	Exit or Loop					

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■ Explanation of Menu Trees

Figure 3-5 through Figure 3-8, later in this chapter provide graphic operational sequences for the menu operations:

- Figure 3-5 "Menu Tree—View Fibre Channel Configuration" on page 3-8
- Figure 3-6 "Menu Tree—Change Fibre Channel Configuration" on page 3-11
- Figure 3-7 "Menu Tree—View/Change TCP/IP Configuration" on page 3-24
- Figure 3-8 "Menu Tree—Drive Operations" on page 3-29.

Use the legend shown in Figure 3-4 as an aid to navigate the Menu Trees shown in this chapter. There are only two Operator Panel switches used for the menu system: **Menu** and **Select**. The black-bordered boxes show menu displays.

Figure 3-4. Menu Tree Legend
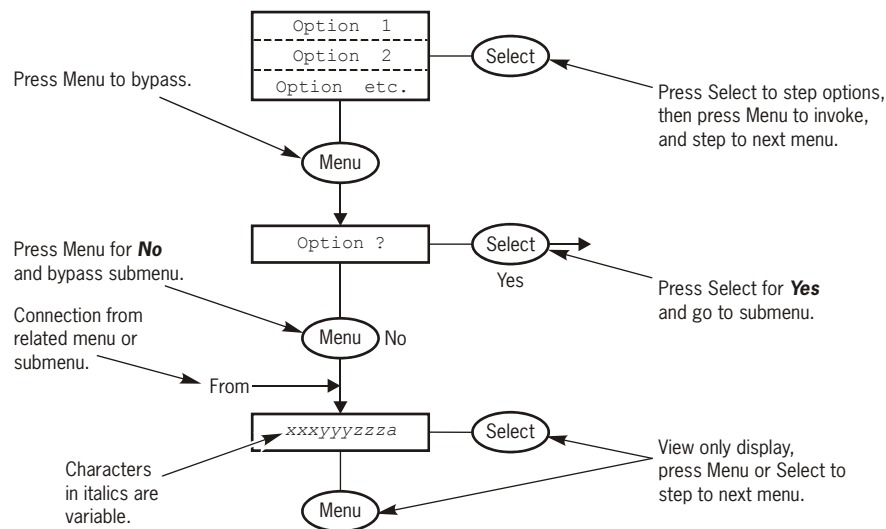

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```

Press **Menu** to advance the menu display along the flow direction, to set a menu option after selection, or to answer ***No*** to a menu choice question. Press **Select** to toggle/increment menu options, or to answer ***Yes*** to a menu choice question. When there is not an option, selection, or choice presented, such as during view-only menus, pressing **Select** has same result as pressing **Menu**.

To enter variable characters or digits, press **Select** to start the change mode. (The left-most variable character/digit begins to flash.) Each additional press of the **Select** switch increments the value one step. When the desired value displays, press **Menu** to set the value and advance flash to the next variable character/digit. When the last variable character/digit has been set, press **Menu** to accept the displayed entry and advance to the next menu, or press **Select** to restart the change mode.
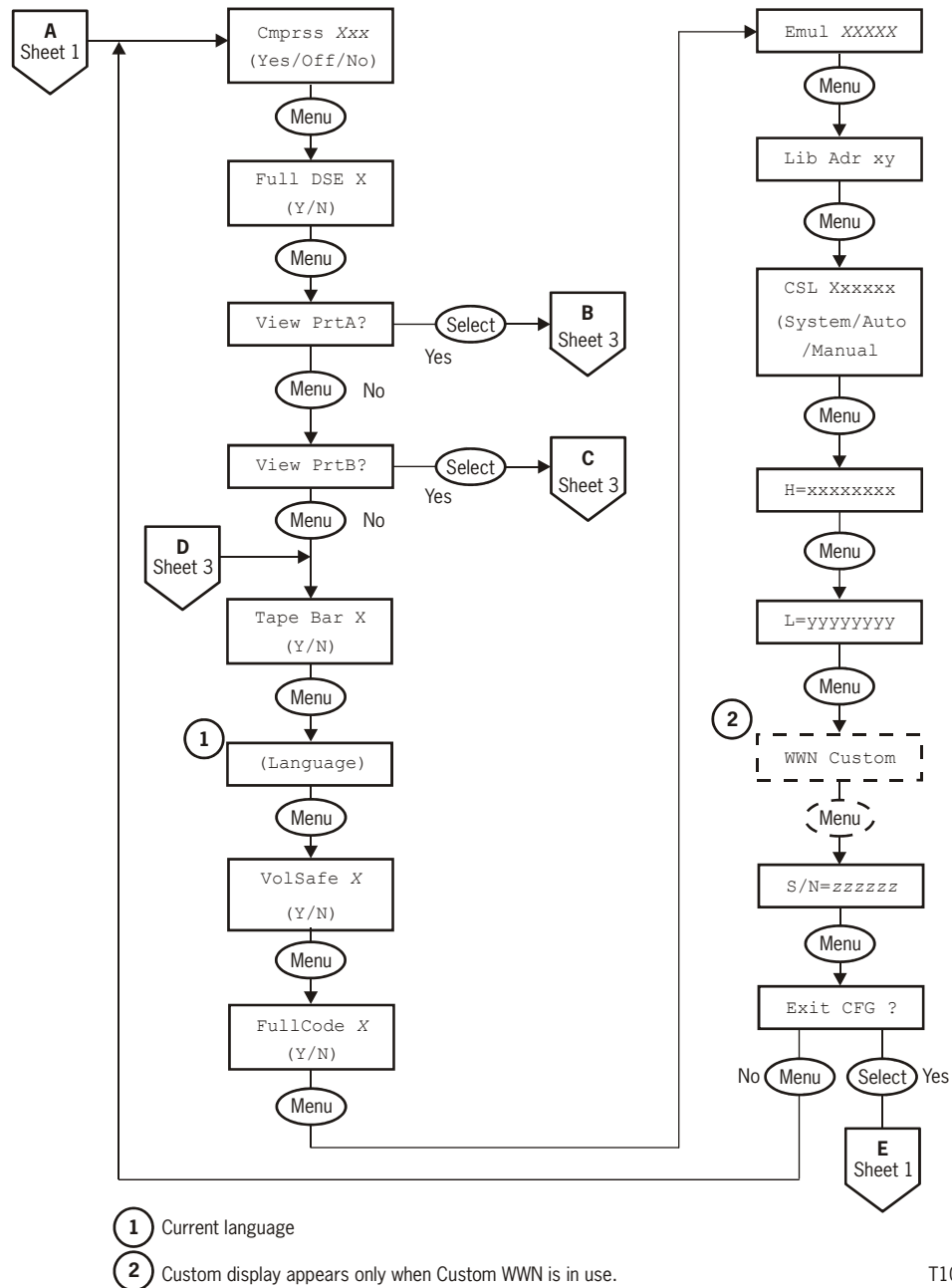
■ View Configuration Settings

Figure 3-5 is a menu tree for viewing drive configuration settings.

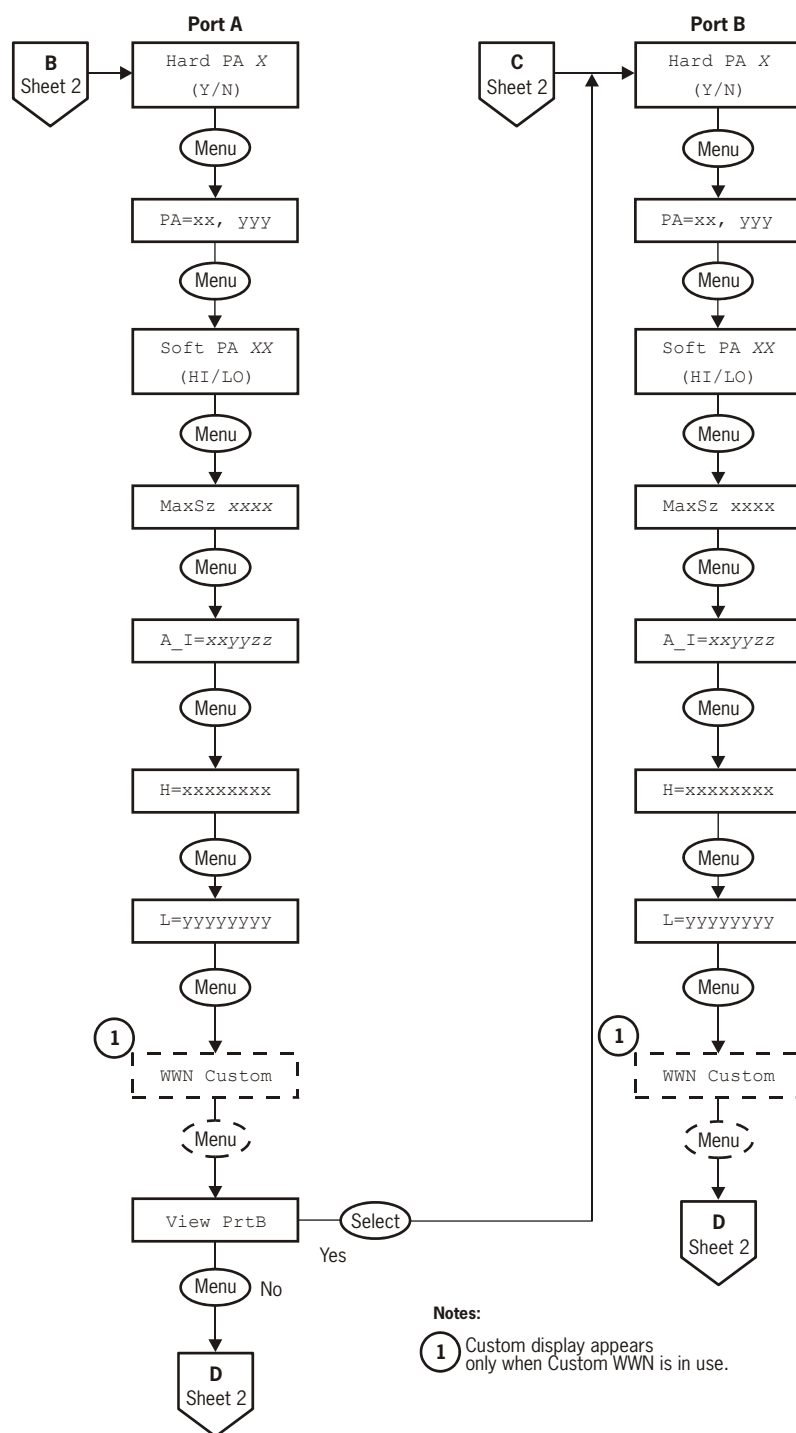**Figure 3-5. Menu Tree—View Fibre Channel Configuration (Sheet 1 of 3)**
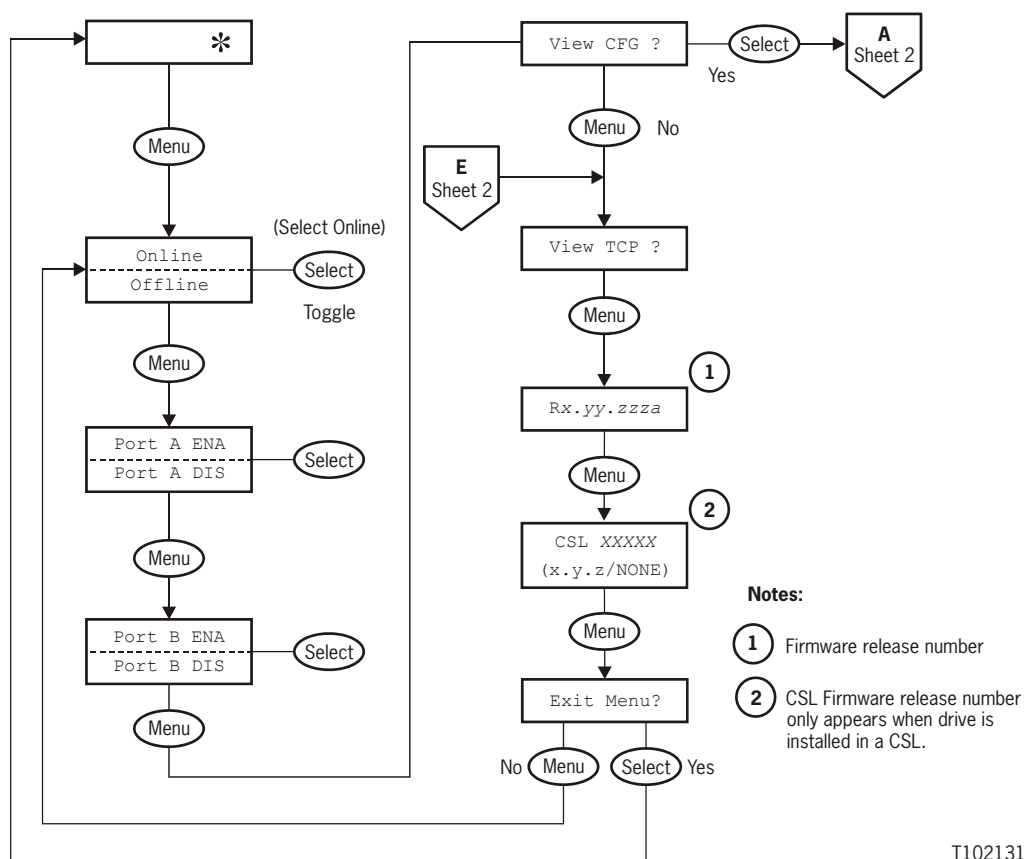
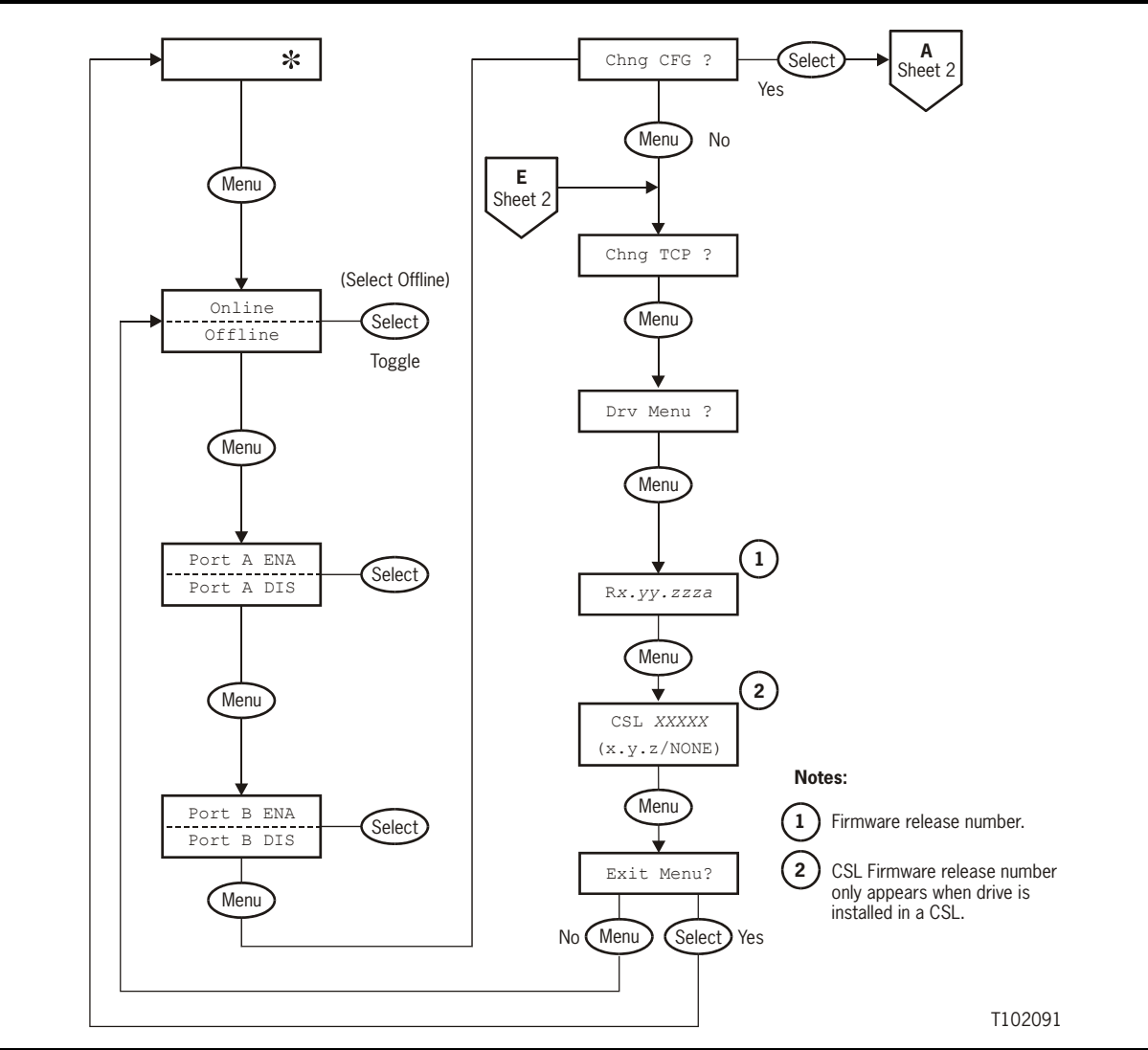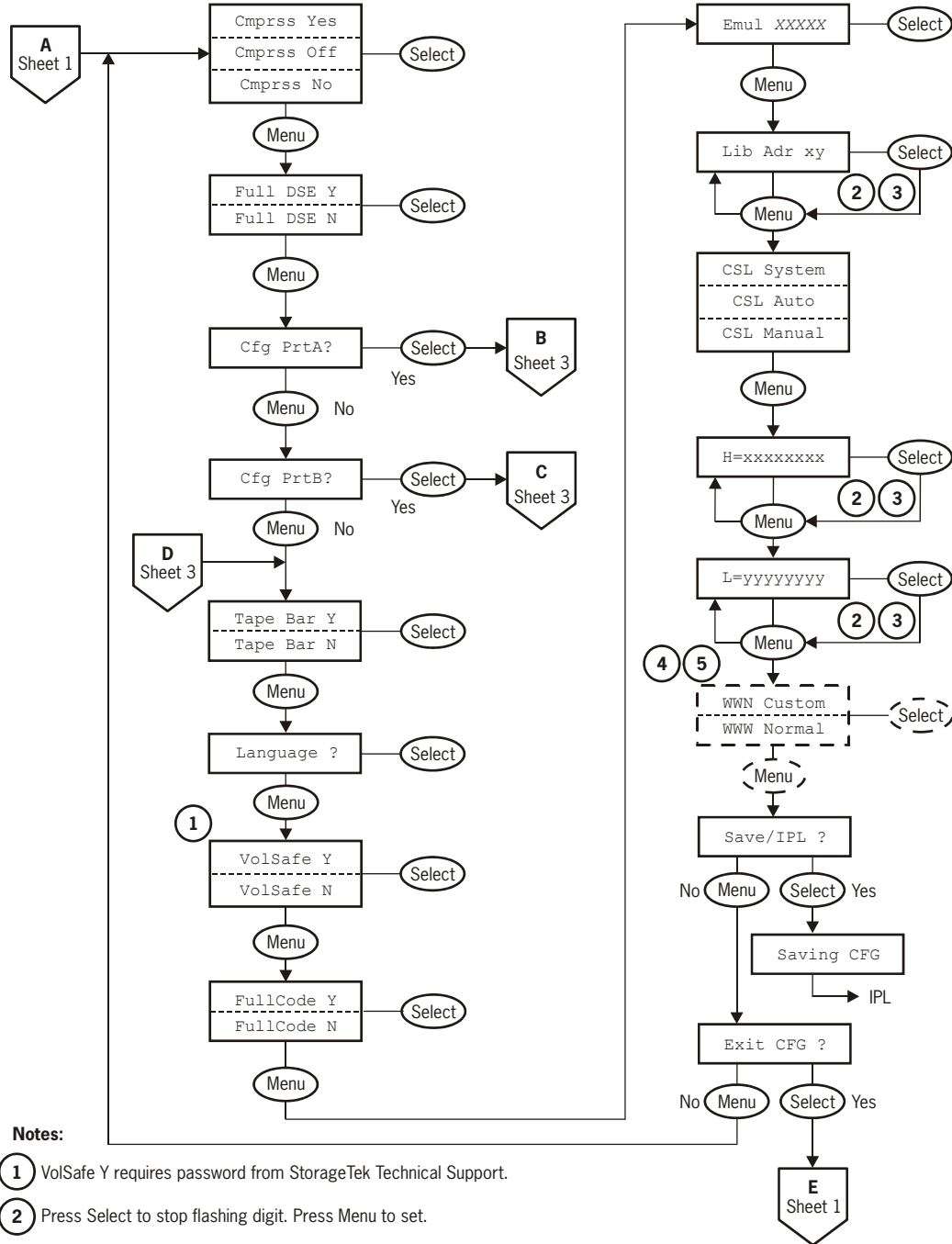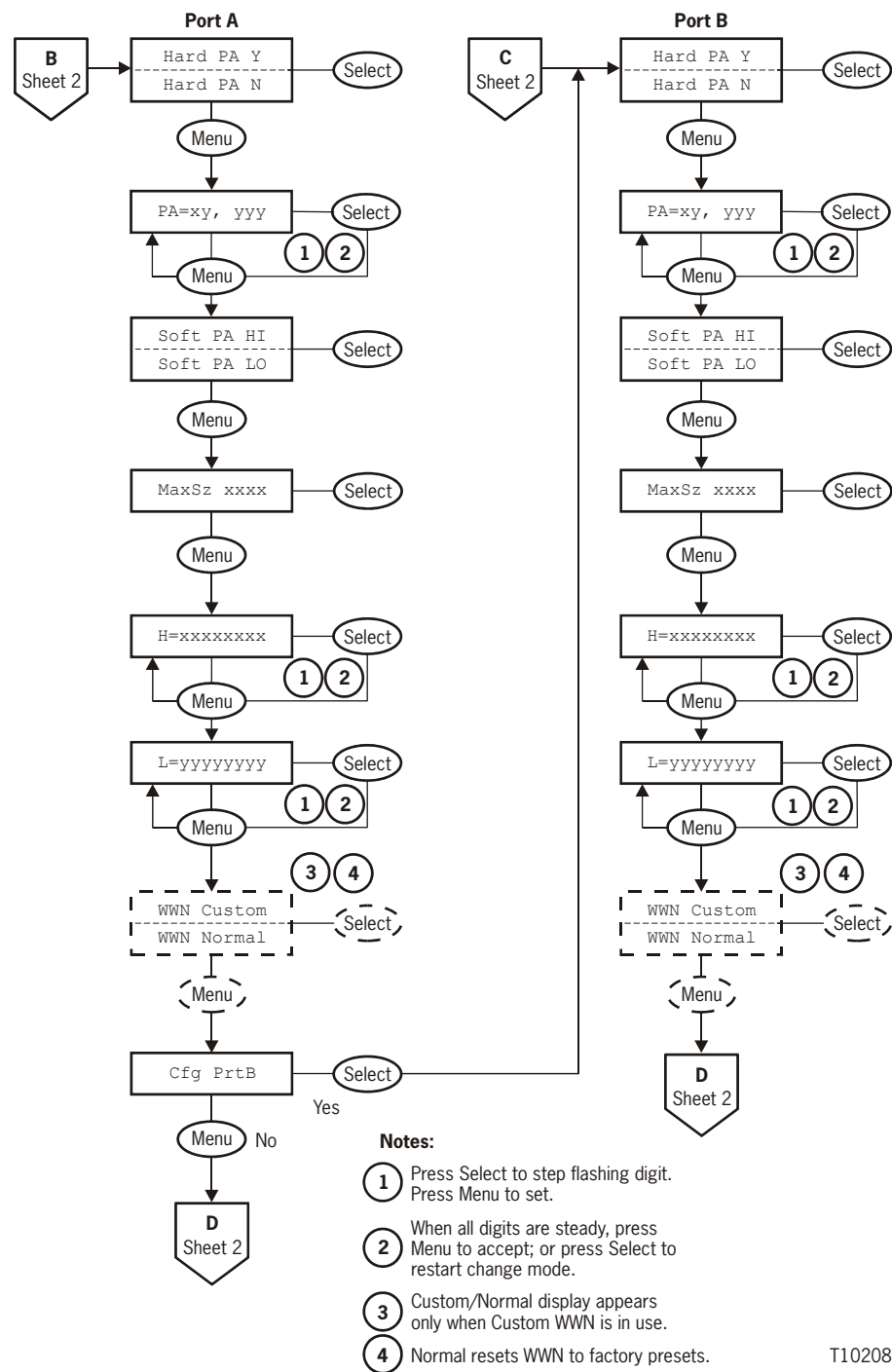**Figure 3-5. Menu Tree—View Fibre Channel Configuration (Sheet 2 of 3)**

1 Current language

2 Custom display appears only when Custom WWN is in use.

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Figure 3-5. Menu Tree—View Fibre Channel Configuration (Sheet 3 of 3)

■ Change Configuration Settings

Figure 3-6 is a menu tree for changing drive configuration settings.

Figure 3-6. Menu Tree—Change Fibre Channel Configuration (Sheet 1 of 3)

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Figure 3-6. Menu Tree—Change Fibre Channel Configuration (Sheet 2 of 3)

Notes:

(1) VolSafe Y requires password from StorageTek Technical Support.

(2) Press Select to stop flashing digit. Press Menu to set.

(3) When all digits are steady, press Menu to accept; or press Select
To restart change mode.

(4) Custom/Normal display appears only when Custom WWN is in use.

(5) Normal resets WWN to factory presets.

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Figure 3-6. Menu Tree—Change Fibre Channel Configuration (Sheet 3 of 3)

Notes:

1. Press Select to step flashing digit. Press Menu to set.

2. When all digits are steady, press Menu to accept; or press Select to restart change mode.

3. Custom/Normal display appears only when Custom WWN is in use.

4. Normal resets WWN to factory presets.

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Table 3-1 provides details for changing drive configuration settings when the drive is offline.

Table 3-1. Menu Table—Fibre Channel Configuration

Options	Notes	Procedure
Online/Offline Main Menu		
Online/ Offline	Defaults to Online at power-on/ IPL. **Offline** must be selected to change configuration settings. **OffLn Pend** may display while waiting for a system response or diagnostics completion.	1. If required, press **Menu** repeatedly until **Online** or **Offline** displays. 2. If **Online**, press **Select** to toggle option to **Offline**. 3. Press **Menu** to advance to the Port A Enable/Disable menu.
Port A Enable/Disable Menu		
Port A ENA **Port A DIS**	Defaults to enabled (ENA) at power-on/IPL. Port A enabled. (Normal for single port configuration.) Port A disabled (DIS). **DIS Pend** or **ENA Pend** may display while waiting for system response.	1. Press **Menu** to bypass, **or** 2. Press **Select** to toggle option; then, press **Menu** to set option and advance to the Port B Enable/Disable menu.
Note: Manufacturing ships all drives with the **Port A ENA** option selected.		
Port B Enable/Disable Menu		
 Port B ENA **Port B DIS**	Defaults to ENA at power-on/IPL. Port B enabled. Port B disabled. (Normal for single port configuration.) **DIS Pend** or **ENA Pend** may display while waiting for system response.	1. Press **Menu** to bypass, **or** 2. Press **Select** to toggle option; then, press **Menu** to set option, and advance to the Change Configuration Main Menu.
Note: Manufacturing ships all drives with the **Port B ENA** option selected.		
Change Configuration Main Menu		
Chng CFG ?	If bypassed, the display advances to the Change TCP/IP Configuration Main Menu. This is the entry point to the Configuration submenus.	1. Press **Menu** (No) to bypass, **or** 2. Press **Select** (Yes) to enter the Configuration submenus.

Table 3-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Compress Mode Submenu		
	Defaults to last saved selection.	1. Press Menu to bypass, **or**
`Cmprss Yes`	When **Yes** is selected, data is compressed by default. Host can request no data compression.	2. Press Select until the desired option displays; then, press Menu to set option and advance to next submenu.
`Cmprss Off`	When **Off** is selected, data is not compressed, and host request has no effect.	
`Cmprss No`	When **No** is selected, data is not compressed by default. Host can request data compression.	
Note: Manufacturing ships all drives with the **Cmprss Yes** option selected.		
Data Security Erase Mode Submenu		
	Defaults to last saved selection.	1. Press Menu to bypass, **or**
`Full DSE Y`	**Full DSE Y** writes a random binary pattern on the media, over-writing existing data, from the point of an "Erase" command, to the End of Tape.	2. Press Select to toggle option; then, press Menu to set option and advance to next submenu.
`Full DSE N`	**Full DSE N** writes data on the media that indicates valid data does not exist beyond the point of an "Erase" command.	
Note: Manufacturing ships all drives with the **Full DSE N** option selected.		
Port A Attributes Submenu		
`Cfg PrtA ?`	View or change Port A attributes as defined in the following Port A/B Attributes Submenus.	1. Press Menu (No) to bypass, **or** 2. Press Select (Yes) to enter the Port A/B Attributes submenus.
Port A/B Hard Physical Addressing Submenu		
	Defaults to last saved selection.	1. Press Menu to bypass, **or**
`Hard PA N`	**PA N** uses a new physical address each time.	2. Press Select to toggle option; then, press Menu to set option and advance to next submenu.
`Hard PA Y`	**PA Y** uses same assigned physical address each time.	
Note: Manufacturing ships all drives with **Hard PA N** option selected.		

Table 3-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Port A/B Hard Physical Address Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass; **or**
PA=xx,ddd	**xx** is the hex physical address. **ddd** is the decimal index into the ALPA table (valid indexes are **000–125**.	2. Press **Select** to start change mode:
		a. Press **Select** to increment digit until desired value displays, then press **Menu** to set.
	StorageTek Engineering recommends that Port A addresses be even numbers and Port B addresses be odd numbers	b. Repeat step a for each digit.
	As you manually change the decimal index digits (**ddd**), the hex physical address (**xx**) automatically changes.	3. Press **Menu** to advance to the next submenu; or, press **Select** to restart change mode.
	Pressing **Select** when all digits are steady starts the change mode. The left-most **d** digit begins flashing and toggle between **0–1** (only valid values) with each press of **Select**. Pressing **Menu** sets the digit at the displayed value and advances flashing to the next digit. Each press of **Select** increments the flashing digit up one value (**0–9** valid). Pressing **Menu** sets the digit at the displayed value, and advances flashing to the last digit. When the last digit is set, pressing **Menu** advances menu to next submenu. Pressing **Select** restarts the change mode with left-most digit.	
Port A/B Soft Physical Addressing Submenu		
Note: Skip this menu if Hard Physical Addressing is being used.		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
Soft PA LO	Searches for a soft loop ID in descending order (**125** to **0**)	2. Press **Select** to toggle option; then, press **Menu** to set option and advance to the next submenu.
Soft PA HI	Searches for a soft loop ID in ascending order (**0 to 125**)	

Table 3-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Port A/B Maximum Data Size Submenu		
`MaxSz 2112`	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
`MaxSz 2048`	Selects frame size.	2. Press **Select** until desired option displays; then, press **Menu** to set option and advance to the next submenu.
`MaxSz 1280`		
`MaxSz 1024`		
`MaxSz  768`		

Note: Manufacturing ships all drives with the `MaxSz 2112` option selected.

Port A/B World-Wide Name Submenu		

Note: You can create a "Custom" WWN as required for special circumstances.

When Custom WWNs are to be used, Port A, Port B, and Drive Node WWNs should *all* be changed to designated Custom WWNs to meet special circumstances.

Make sure a Custom WWN is unique, and registered in Host interface software. Unregistered or duplicate WWNs will cause Host interface anomalies.

Options	Notes	Procedure
	Defaults to last saved selection.	1. Press **Menu** to bypass; **or**
`H=`*xxxxxxxx*	`H=`*xxxxxxxx,* together with `L=`*yyyyyyyy,* comprise the unique 64-bit WWN that identifies this specific port.	2. Press **Select** to start change mode:
`L=`*yyyyyyyy*		a. Press **Select** to increment digit until desired value displays, then press **Menu** to set.
	Pressing **Select** when all digits are steady starts the change mode. The left-most hexadecimal digit begins flashing and increments up one value with each additional press of **Select**.	b. Repeat step a for each digit.
		3. Press **Menu** to advance to the next submenu; or, press **Select** to restart change mode.
	Pressing **Menu** sets the flashing digit at displayed value (**0-F**), and advances flashing to the next digit. When the last digit is set, a second press of **Menu** advances menu to next submenu. Pressing **Select** restarts the left-most digit flashing.	

Note: Manufacturing generates a "Normal" WWN and stores it in the drive EEPROM.

Table 3-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Port A/B Custom/Normal WWN Submenu		
Note: This submenu only displays when a Custom WWN is in use, or is being created.		

`WWN Custom`
 	
`WWN Normal`
	`WWN Custom` initially displays whenever a Custom WWN is in use, or is being created.
	
	`WWN Normal` selection recalls the stored Normal WWN from the drive EEPROM.
		1. Press **Menu** to bypass; **or**,
		
		2. Press **Select** to toggle option.
		
		3. Press **Menu** (while `WWN Normal` is displayed) to recall the stored Normal WWN, and advance to the next submenu.

Port B Attributes Submenu		
`Cfg PrtB ?`	View or change Port B attributes as defined in the preceding Port A/B Attributes Submenus, starting on page 3-15.	1. Press **Menu** (No) to bypass, **or** 2. Press **Select** (Yes) to enter the Port A/B Attributes submenus.
Tape Bar Submenu		
`Tape Bar Y`	Selects the barcharts that show how much tape is written and how much tape has been read.	1. Press **Menu** to bypass, **or** 2. Press **Select** to toggle option; then, press **Menu** to set option and advance to the next submenu.
`Tape Bar N`	Deselects the barcharts. See "Tape Bar" on page 1-5 for additional information.	
Note: Manufacturing ships all drives with the `Tape Bar N` option selected		
Language Selection Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
`Language ?`	Selects display language: **English**, **Espanol**, **Francais**, **Italiano**, or **Deutscher**.	2. Press **Select** until desired option displays; then, press **Menu** to set option and advance to the next submenu.
Note: Manufacturing ships all drives with the `English` option selected		

Table 3-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
VolSafe Selection Submenu		
Note: T9940B firmware release 1.32.423, or higher, required to support VolSafe.		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
VolSafe Y	When **VolSafe Y** is selected, a password (Contact StorageTek Technical Support) must also be entered before VolSafe is enabled.	2. Press **Select** to toggle option; then, press **Menu** to set.
		3. If applicable, press **Select** to start password entry. The left-most character begins flashing.
VolSafe N	When **VolSafe N** is selected, VolSafe is disabled.	4. Press **Select** to increment until desired character displays, then press **Menu** to set.
		5. Repeat step 4 for each character.
		6. Press **Menu** to advance to the next submenu; **or**, press **Select** to restart.
Note: Manufacturing ships all drives with the **VolSafe N** option selected.		
Full Code Load Submenu		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
FullCode Y	When **FullCode Y** is selected, all available firmware images are downloaded to the EEPROM. This enables the drive to be used to create a code tape which then could be used to update other drives.	2. Press **Select** to toggle option; then, press **Menu** to set option and advance to the next submenu.
FullCode N	When **FullCode N** is selected, only the specific firmware image for the drive is downloaded to EEPROM. This option allows more EEPROM space for dumps and event logs, but disables the drive from creating code tapes.	
Note: Manufacturing ships all drives with only the drive specific firmware image loaded in the EEPROM, and the drive configuration set with **FullCode N**.		
CHK A738 displays if you try to make a code tape from a drive with only one firmware image loaded.		
To enable a drive to create valid code tapes, select **FullCode Y**, and load the desired firmware release level from a valid source.		

Table 3-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Emulation Mode Submenu		
Emul XXXXX	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
	Emul STD is Native.	2. Press **Select** until desired option displays; then, press **Menu** to set and advance to the next submenu.
	Emul 3590 is 3590B (AS400).	
	Emul SD-3	
	Emul F2483	
	Emul 3490E is 3490E11 (AS400).	
	Emul 7	
	Emul STD s	
	Emul 3590s	
	Emul 10	
	Emul 12	
	Emul 13	
	Emul 14	
	Emul 9840	
	Emul 9940A	
	CAUTION: **DECREASED CAPACITY.** `Emul STD s` **and** `Emul 3590s` **selections use a portion of tape length for recording. DO NOT USE these selections unless instructed to do so by StorageTek Engineering.**	
Note:	Manufacturing ships all drives with the **Emul STD** option selected STD identifies the drive to the host relative to actual (Native) model.	
	Numbered (single/double digit) emulation modes are special test modes for engineering development, and not intended for use in normal operational configurations. Do not use these selections unless instructed by StorageTek Engineering.	

Table 3-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Library Address Submenu		
Note: Library Address is not applicable with T9940BR3 configuration. Changing the setting, or leaving at preset has no impact.		
Lib Adr xy	Defaults to last saved selection.	1. Press **Menu** to bypass; **or**

	Pressing **Select** when both characters are steady starts the change mode. The **x** character begins flashing and increments up one value with each additional press of **Select**.	2. Press **Select** to start change mode:
		
		  a. Press **Select** to increment digit until desired value displays, then press **Menu** to set.
		
		  b. Repeat step a for **y** character.

	Pressing **Menu** sets flashing character at displayed value (**0-F**), and advances to the **y** character.	3. Press **Menu** to advance to the next submenu; or, press **Select** to restart change mode.
Note: Manufacturing ships all drives with **Lib Adr FF** selected.		
CSL Power On Mode Submenu		
Note: CSL Power On Mode is not applicable with T9940BR3 configuration. Changing the setting, or leaving at preset has no impact.		
	Defaults to last saved selection.	1. Press **Menu** to bypass, **or**
	Selects the default operation of the CSL, if attached, when powering on:	2. Press **Select** until desired option displays; then, press **Menu** to set option and advance to next submenu.
CSL System	• CSL System allows the host to control the CSL.	
CSL Auto	• CSL Auto allows the CSL to operate automatically.	
CSL Manual	• CSL Manual allows manual operations only.	
Note: Manufacturing ships all T9940 drives with **CSL System** option selected.		

Table 3-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Drive Node World-Wide Name Submenu		

Note: You can create a "Custom" WWN as required for special circumstances.

When Custom WWNs are to be used, Port A, Port B, and Drive Node WWNs should *all* be changed to designated Custom WWNs to meet special circumstances.

Make sure a Custom WWN is unique, and registered in Host interface software. Unregistered or duplicate WWNs cause Host interface anomalies.

Options	Notes	Procedure
	Defaults to last saved selection.	1. Press **Menu** to bypass; **or**

H=xxxxxxxx
 	
 L=yyyyyyyy
	H=xxxxxxxx, together with **L=yyyyyyyy,** comprise the unique 64-bit WWN that identifies this specific drive.
	
	Pressing **Select** when all digits are steady starts the change mode. The left-most hexadecimal digit begins flashing and increments up one value with each additional press of **Select**.
	
	Pressing **Menu** sets the flashing digit at the displayed value (**0-F**), and advances flashing to the next digit. When the last digit is set, a second press of **Menu** advances menu to next submenu. Pressing **Select** restarts the left-most digit flashing.
		2. Press **Select** to start change mode:
		
		  a. Press **Select** to increment digit until desired value displays, then press **Menu** to set.
		
		  b. Repeat step a for each digit.
		
		3. Press **Menu** to advance to the next submenu; or, press **Select** to restart change mode.

Drive Node Custom/Normal WWN Submenu		

Note: This submenu only displays when a Custom WWN is in use, or is being created.

Options	Notes	Procedure
WWN Custom	**WWN Custom** initially displays whenever a Custom WWN is in use, or is being created.	1. Press **Menu** to bypass; **or**, 2. Press **Select** to toggle option.
WWN Normal	**WWN Normal** selection recalls the stored Normal WWN from the drive EEPROM.	3. Press **Menu** (while **WWN Normal** is displayed) to recall the stored Normal WWN, and advance to the next submenu.

Table 3-1. Menu Table—Fibre Channel Configuration (Continued)

Options	Notes	Procedure
Save Configuration Submenu		
`Save/IPL ?`	This submenu displays only if changes were made to the drive configuration settings.	1. Press **Menu** (No) to cancel changes, **or**
	Saving CFG displays for 2 seconds after you press **Select**.	2. Press **Select** (Yes) to save changes and initiate an IPL.
	After saving the configuration changes, the drive automatically initiates an IPL.	
	Save Fails displays for RAM problems. See "Operator-panel Display Messages" on page 5-4 for instructions.	
Exit Configuration Submenu		
`Exit CFG ?`	This submenu allows you to repeat the change configuration submenus, or to exit.	1. Press **Menu** (No) to loop back to the Compress Mode Submenu, **or**
		2. Press **Select** (Yes) to exit, and advance to the Change TCP/IP Configuration Main Menu.

■ View/Change TCP/IP Settings

Figure 3-7 is a menu tree to view/change the TCP/IP settings of the drive. Table 3-2 on page 3-25, provides details for changing the settings.

Figure 3-7. Menu Tree—View/Change TCP/IP Configuration

```
                              ✳                      ④    DHCP Y      Select
                                                          DHCP N      Toggle
                            Menu
                                                          Menu
                          Online       Select
                          Offline      Toggle            IPhaaa.bbb   Select
                                                                      ⑤ ⑥
                            Menu                          Menu
          ②          1
                          View TCP ?    Select           IPlccc.ddd   Select
                          Chng TCP ?    Yes                          ⑤ ⑥
                                                          Menu
                          Menu   No
                                                          NMhaaa.bbb  Select
                          Drv Menu ?   Offline Only                  ⑤ ⑥
                                                          Menu
                            Menu
          ③                                              NMlccc.ddd   Select
                          Rx.yy.zzza                                 ⑤ ⑥
                                                          Menu
                            Menu
                                                          GWhaaa.bbb  Select
                          CSL XXXXX                                  ⑤ ⑥
                          (x.y.z/NONE)                    Menu

                            Menu                          GWlccc.ddd   Select
                                                                     ⑤ ⑥
                          Exit Menu?                      Menu

              No  Menu   Select  Yes                     Save/IPL ?

                                                    No  Menu   Select  Yes

                                                          Saving TCP
Notes:
 1.  See interface Menu Tree.                                          IPL
 2.  View TCP (Online), Change TCP (Offline).
 3.  Firmware release level.                              Exit TCP ?
 4.  Static IP, NM, or GW can be set only with "DHCP N".
 5.  Press Select to increment flashing digit.      No  Menu   Select  Yes
     Press Menu to set, and move to next digit.
 6.  When all variable digits are steady, press Menu to advance
     to next submenu, or press Select to start change mode.
                                                                 T102089
```

Table 3-2. Menu Table—Change TCP/IP Configuration

Options	Notes	Procedure
Change TCP/IP Configuration Main Menu		
`Chng TCP ?`	If bypassed, the display advances to the Drive Operations Main Menu.	1. Press Menu (No) to bypass; **or**,
	This is the entry point for the TCP/IP submenus.	2. Press Select (Yes) to enter submenus.
DHCP Submenu		
`DHCP Y/N`	Defaults to the last saved.	1. Press Menu to bypass; **or**,
	With **DHCP Y** selected, the DHCP assigns dynamic TCP/IP.	2. Press Select to toggle (Offline only), then, press Menu to continue.
	With **DHCP N** selected, the DHCP is disabled. Static TCP/IP settings are used and set.	

Notes:

1. Static IP, Net Mask, and Gateway are viewed/set only with `DHCP N` selected.

2. Static IP, Net Mask, and Gateway **CANNOT** be viewed/set with `DHCP Y` selected.

3. Manufacturing ships all drives with `DHCP N` option selected.

Options	Notes	Procedure
IP Address Hi Submenu		
`IPhaaa.bbb`	Defaults to last saved,	1. Press Menu to bypass; **or**
	Pressing Select when all digits are steady, starts the change mode. The left-most digit begins flashing, and increments up one value with each additional press of Select.	2. Press Select to start change mode: a. Press Select to increment digit until desired value displays, then press Menu to set. b. Repeat step a for each digit.
	Pressing Menu sets digit at flashing value (**0-2** for the left-most digit of each trio or **0-9** for the other two digits), and advances to the next digit.	3. Press Menu to accept and advance to next submenu; **or**, press Select to restart change mode.
	Valid entries are **000-255** for each digit trio. If an entry greater than **255** is attempted in either trio, all digits flash when last digit is set.	4. If all digits flash, press either Select or Menu to clear; then, press Select to restart change mode.

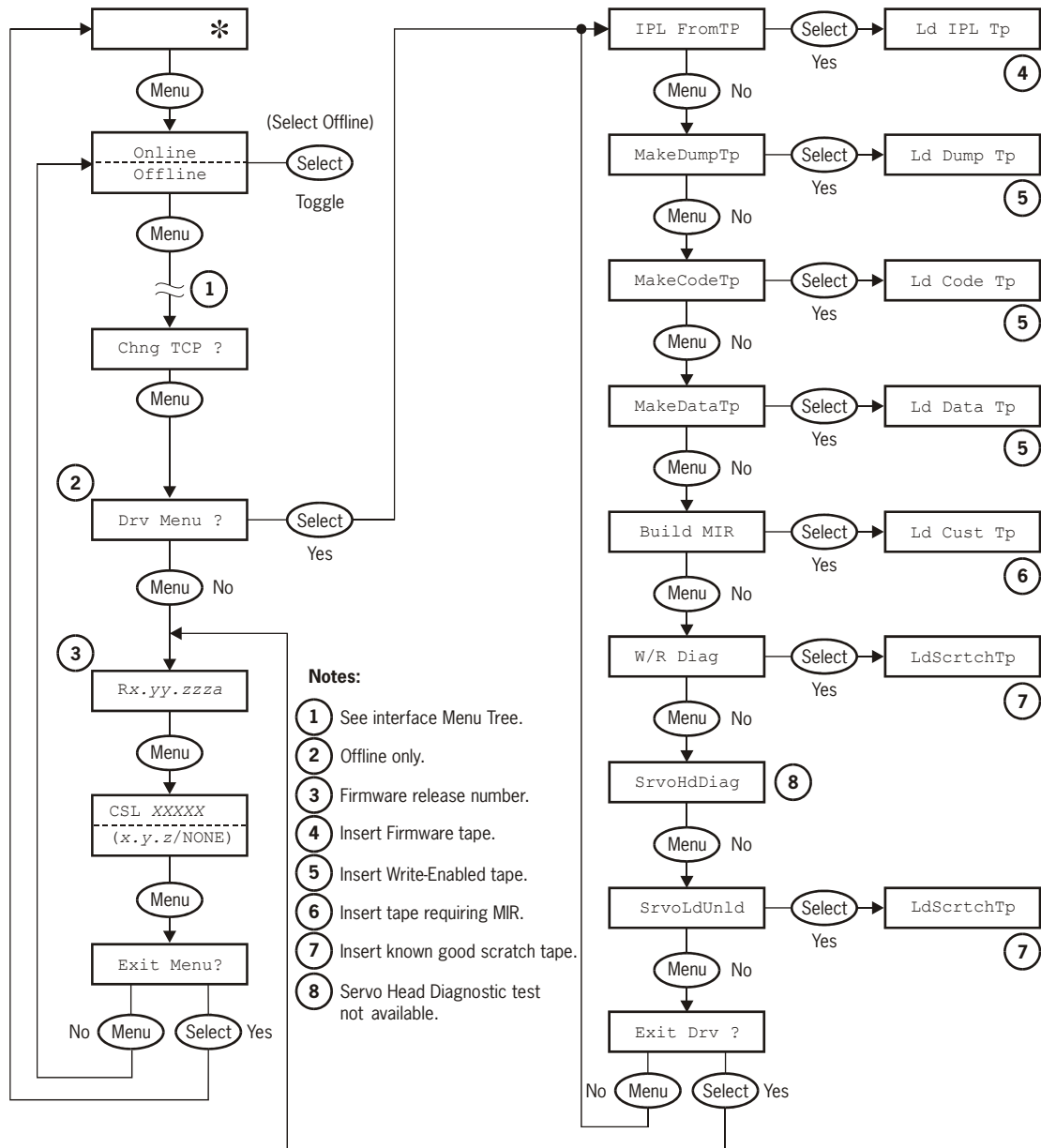Note: Manufacturing ships all drives with static IP Address Hi set to **010.000**.

Table 3-2. Menu Table—Change TCP/IP Configuration (Continued)

Options	Notes	Procedure
IP Address Lo Submenu		
`IPlccc.ddd`	Defaults to last saved,	1. Press **Menu** to bypass; **or**
	Pressing **Select** when all digits are steady, starts the change mode. The left-most digit begins flashing and increments up one value with each additional press of **Select**.	2. Press **Select** to start change mode: a. Press **Select** to increment digit until desired value displays, then press **Menu** to set. b. Repeat step a for each digit.
	Pressing **Menu** sets digit at flashing value (**0-2** for the left-most digit of each trio or **0-9** for the other two digits), and advances to the next digit.	3. Press **Menu** to accept and advance to next submenu; **or**, press **Select** to restart change mode.
	Valid entries are **000-255** for each digit trio. If an entry greater than **255** is attempted in either trio, all digits flash when last digit is set.	4. If all digits flash, press either **Select** or **Menu** to clear; then press **Select** to restart change mode.

Note: Manufacturing ships all drives with static IP Address Lo set to **000.001**.

Options	Notes	Procedure
Net Mask Hi Submenu		
`NMhaaa.bbb`	Defaults to last saved,	1. Press **Menu** to bypass; **or**
	Pressing **Select** when all digits are steady, starts the change mode. The left-most digit begins flashing and increments up one value with each additional press of **Select**.	2. Press **Select** to start change mode: a. Press **Select** to increment digit until desired value displays, then press **Menu** to set. b. Repeat step a for each digit.
	Pressing **Menu** sets digit at flashing value (**0-2** for the left-most digit of each trio or **0-9** for the other two digits), and advances to the next digit.	3. Press **Menu** to accept and advance to next submenu; **or**, press **Select** to restart change mode.
	Valid entries are **000-255**, for each digit trio. If an entry greater than **255** is attempted in either trio, all digits flash when last digit is set.	4. If all digits flash, press either **Select** or **Menu** to clear; then press **Select** to restart change mode.

Note: Manufacturing ships all drives with static Net Mask Hi set to **255.255**.

Table 3-2. Menu Table—Change TCP/IP Configuration (Continued)

Options	Notes	Procedure
Net Mask Lo Submenu		
`NMlccc.ddd`	Defaults to last saved,	1. Press Menu to bypass; **or**
	Pressing Select when all digits are steady, starts the change mode. The left-most digit begins flashing and increments up one value with each additional press of Select.	2. Press Select to start change mode: a. Press Select to increment digit until desired value displays, then press Menu to set. b. Repeat step a for each digit.
	Pressing Menu sets digit at flashing value (**0-2** for the left-most digit of each trio or **0-9** for the other two digits), and advances to the next digit.	3. Press Menu to accept and advance to next submenu; **or**, press Select to restart change mode.
	Valid entries are **000-255** for each digit trio. If an entry greater than **255** is attempted in either trio, all digits flash when the sixth digit is set.	4. If all digits flash, press either Select or Menu to clear; then press Select to restart change mode.

Note: Manufacturing ships all drives with static Net Mask Lo set to **255.000**.

Options	Notes	Procedure
Gateway Hi Submenu		
`GWhaaa.bbb`	Defaults to last saved,	1. Press Menu to bypass; **or**
	Pressing Select when all digits are steady, starts the change mode. The left-most digit begins flashing and increments up one value with each additional press of Select.	2. Press Select to start change mode: a. Press Select to increment digit until desired value displays, then press Menu to set. b. Repeat step a for each digit.
	Pressing Menu sets digit at flashing value (**0-2** for the left-most digit of each trio or **0-9** for the other two digits), and advances to the next digit.	3. Press Menu to accept and advance to next submenu; **or**, press Select to restart change mode.
	Valid entries are **000-255** for each digit trio. If an entry greater than **255** is attempted in either trio, all digits flash when last digit is set.	4. If all digits flash, press either Select or Menu to clear; then press Select to restart change mode.

Note: Manufacturing ships all drives with static Gateway Hi set to **255.255**.

Table 3-2. Menu Table—Change TCP/IP Configuration (Continued)

Options	Notes	Procedure
Gateway Lo Submenu		
GWlccc.ddd	Defaults to last saved,	1. Press **Menu** to bypass; **or**
	Pressing **Select** when all digits are steady, starts the change mode. The left-most digit begins flashing and increments up one value with each additional press of **Select**.	2. Press **Select** to start change mode: a. Press **Select** to increment digit until desired value displays, then press **Menu** to set. b. Repeat step a for each digit.
	Pressing **Menu** sets digit at flashing value (**0-2** for the left-most digit of each trio or **0-9** for the other two digits), and advances to the next digit.	3. Press **Menu** to accept and advance to next submenu; **or**, press **Select** to restart change mode.
	Valid entries are **000-255**, for each digit trio. If an entry greater than **255** is attempted in either trio, all digits flash when last digit is set.	4. If all digits flash, press either **Select** or **Menu** to clear; then press **Select** to restart change mode.

Note: Manufacturing ships all drives with static Gateway Lo set to **255.255**.

Options	Notes	Procedure
Save TCP/IP Submenu		
Save/IPL ?	This submenu is present only if the DHCP selection, or static TCP/IP settings were changed.	1. Press **Menu** (No) to cancel changes; **or**,
	Saving TCP displays for 2 seconds after you press **Select**.	2. Press **Select** (Yes) to save changes.
	After saving the TCP/IP configuration changes, the drive automatically initiates an IPL.	
	Save Fails displays for RAM problems. See "Operator-panel Display Messages" on page 5-4 for instructions.	

Options	Notes	Procedure
Exit TCP/IP Submenu		
Exit TCP ?	This submenu allows you to repeat the TCP/IP submenus, or to exit TCP/IP.	1. Press **Menu** (No) to loop back to the DHCP Submenu; **or**,
		2. Press **Select** (Yes) to exit and advance to the Drive Operations Main Menu.

■ Drive Operations Menu

Figure 3-8 provides a menu tree for drive operations. This menu is only available when the drive is Offline.

Figure 3-8. Menu Tree—Drive Operations

Notes:

1. See interface Menu Tree.
2. Offline only.
3. Firmware release number.
4. Insert Firmware tape.
5. Insert Write-Enabled tape.
6. Insert tape requiring MIR.
7. Insert known good scratch tape.
8. Servo Head Diagnostic test not available.

T102_096

Table 3-3 provides the drive menus and displays used to:

- Update drive firmware
- Format a dump tape
- Copy firmware to tape
- Reformat tape cartridges
- Build an MIR
- Perform drive diagnostics.

Table 3-3. Menu Table—Drive Operations

Options	Notes	Procedure
Drive Operation Main Menu		
Drv Menu ?	This is the entry point to the Drive Operations submenus.	1. Press **Menu** to bypass the Drive Operations submenus and advance to the Exit Main Menu, **or**
		2. Press **Select** to enter the Drive Operations submenus.
Code Update Submenu		
IPL FromTP	IPL From Tape, updates the drive firmware from a code tape inserted in the drive.	1. Make sure Full Code option is properly set. If required, exit Drive Operations Menu and go to "Change Configuration Main Menu" on page 3-14 to verify/change Full Code option.
	If **FullCode Y** is selected in the drive configuration, all available firmware images are downloaded to the EEPROM.	2. Press **Menu** to bypass, **or**
	If **FullCode N** is selected, only the specific drive firmware image (Fibre Channel) is downloaded to the EEPROM.	3. Press **Select** to activate.
	See "Full Code Load Submenu" on page 3-19.	4. When **Ld IPL Tp** displays, insert the code tape (write-protected tape cartridge that contains the desired firmware release level image).
	If a normal data tape cartridge is present in the drive when this function is activated, it ejects.	
	When the update is done, the drive ejects the code tape and initiates an IPL.	
	If the Code Update fails and **CHK xxxx** displays, try a different code tape. If problem persists, see Table 5-3 on page 5-4.	

Table 3-3. Menu Table—Drive Operations (Continued)

Options	Notes	Procedure
Dump Tape Submenu		
MakeDumpTp	Make Dump Tape specially formats and identifies a tape cartridge as a "dump tape"; but, it does not collect dump logs. Tape cartridges used to collect dump logs must first be formatted this way to accept dump logs. A normal tape cartridge, present in the drive when this function is activated, ejects. If Make Dump Tape fails and **CHK xxxx** displays, try a different tape cartridge. If problem persists, see Table 5-3 on page 5-4.	1. Press **Menu** to bypass, **or** 2. Press **Select** to activate. 3. When **Ld Dump Tp** displays, insert a write-enabled tape cartridge. 4. When the dump tape ejects, insert another write-enabled tape cartridge or press **Menu** to advance to the next submenu.
Create Code Tape Submenu		
Note: Only drives that have all firmware images loaded into the EEPROM can make valid code tapes.		
MakeCodeTp	Make Code Tape, copies all firmware images from the drive EEPROM to a tape cartridge. This "code tape" may then be used to update firmware in other drives using the Code Update submenu. A normal tape cartridge, present in the drive when this function is activated, ejects. **CHK A738** displays if you try to make a code tape form a drive that only has one firmware image loaded. If Make Code Tape fails and **CHK xxxx** displays, try a different tape cartridge. If problem persists, see Table 5-3 on page 5-4.	1. Make sure drive is properly prepared to create code tapes. If required, exit Drive Operations Menu and go to "Prepare Drive" on page B-2. 2. Press **Menu** to bypass, **or** 3. Press **Select** to activate. 4. When **Ld Code Tp** displays, insert write-enabled tape cartridge. 5. When the code tape ejects, insert another write-enabled tape cartridge or press **Menu** to advance to the next submenu. 6. Write-protect the new code tape.

Table 3-3. Menu Table—Drive Operations (Continued)

Options	Notes	Procedure
Reclaim Tape Submenu		
MakeDataTp	Make Data Tape, reformats data tape cartridges, except VolSafe, so they can be reused as normal "data tapes". This is sometimes referred to as "reclaiming." A tape cartridge, present in the drive when this function is activated, ejects. Information about old data on tape being formatted is erased. If Make Data Tape fails and **CHK xxxx** displays, try a different tape cartridge. If problem persists, see Table 5-3 on page 5-4.	1. Press **Menu** to bypass, **or** 2. Press **Select** to activate. 3. When **Ld Data Tp** displays, insert write-enabled tape cartridge. 4. When the reformatted data tape ejects, insert another write-enabled tape cartridge or press **Menu** to advance to the next submenu.
Build Media Information Region (MIR)		
Build MIR	The T9940B tape drive uses information recorded at the beginning of tape of a tape cartridge, in an area known as the Media Information Region (MIR), to access and manage data files while the tape cartridge is loaded in the drive. Make sure the drive is unloaded before you activate Build MIR. **Rebuild MIR** flashes on the operator panel while the MIR is rebuilding. The T9940B MIR rebuild takes approximately two hours (120 minutes) for a full tape. If Build MIR fails, **CHK xxxx** displays, try a different tape drive. If problem persists, see Table 5-3 on page 5-4.	1. Press **Menu** to bypass, **or** 2. Press **Select** to activate. 3. When **Ld Cust Tp** displays, insert a write-enabled tape cartridge that requires the MIR to be rebuilt. 4. When the MIR is rebuilt, and the tape cartridge ejects, insert another write-enabled tape cartridge or press **Menu** to advance to the next submenu.

Table 3-3. Menu Table—Drive Operations (Continued)

Options	Notes	Procedure
	Note: The Write/Read Diagnostics is not currently functional with the T9940B Tape Drive. **Not Available** displays whenever you attempt to initiate it. StorageTek will notify you when the Write/Read Diagnostic is functional in a future firmware release level.	

Write/ Read Diagnostic Submenu

Options	Notes	Procedure
W/R Diag	Write/Read Diagnostics test the drive write/read function by writing/reading data to/from a "scratch tape" (formatted for data, and has a tape mark is present). A tape cartridge, if present, ejects when this option is selected. Make sure a known good, scratch tape is available. The diagnostic routine is designed and intended to check drive functions, NOT tape media. A faulty tape cartridge causes unexpected/misleading errors. A write-protected W/R Diag scratch tape allows only the read portion of the test to perform (Read Interchange). **CHK A74C** displays if a tape cartridge containing normal data is inserted. **"WrtRd Diag"** displays during the routine. If **CHK xxxx** displays, see FSC Dictionary for information.	1. Press **Menu** to bypass, **or** 2. Press **Select** to activate. 3. When **LdScrtchTp** displays, insert known good, write-enabled scratch tape, **or** 4. Insert a write-protected W/R Diag (written by a different drive) scratch tape to perform a Read Interchange test. 5. If a diagnostic error FSC displays, press **Unload** to clear. 6. When the scratch tape ejects, press **Menu** to advance to the Exit Drive submenu; or, reinsert a scratch tape to repeat. 7. Write-protect the cartridge if it is to be used for a Read Interchange test on a different drive.

Servo Head Diagnostic Submenu

Options	Notes	Procedure
SrvoHdDiag	Servo Head Diagnostics is not available on any drive model or firmware release. **Not Available** displays on an attempt to start the test.	1. Press **Menu** to bypass.

Table 3-3. Menu Table—Drive Operations (Continued)

Options	Notes	Procedure
Servo Load/ Unload Diagnostic Submenu		
SrvoLdUnld	Servo Load/ Unload Diagnostics test the drive servo load/unload function. A tape cartridge, if present, ejects when this option is selected. Make sure a scratch tape is available. Tape cartridge loading is required for the diagnostic, but the tape media is not used. **TestSrvLdU** displays during the routine of ten load/unload cycles. (approximately 5 minutes for the T9940B) If **CHK xxxx** displays, see FSC Dictionary for information.	1. Press **Menu** to bypass, **or** 2. Press **Select** to activate. 3. When **LdScrtchTp** displays, insert known good "scratch tape". 4. If a diagnostic error FSC displays, press **Unload** to clear. 5. When the scratch tape ejects, press **Menu** to advance to the Exit Drive submenu; or, reinsert scratch tape to repeat.
Exit Drive Submenu		
Exit Drv ?	This submenu allows you to repeat the drive submenus, or exit Drive Operations.	1. Press **Menu** (No) to loop back to the Code Update Submenu, **or** 2. Press **Select** (Yes) to exit Drive Operations and advance to the Exit Main Menu.
Exit Main Menu		
Exit Menu?	This menu allows you to stay in the menu system to return the drive to Online, or to exit the menu system.	1. Press **Menu** (No) to go to the Online/Offline menu, **or** 2. Press **Select** (Yes) to exit the menu system.

Note: If you exit the menu system with the drive Offline, the display flashes **Offline** every few seconds as a reminder that drive is still Offline (if a tape cartridge has been loaded at least once).

Operation

<div style="text-align:right">4</div>

This chapter provides T9940B Tape Drive operational tasks. Drive operation are tasks that are perform by using only the operator panel switches and indicators. See "Operator Panel" on page 1-2 for information about the operator panel, and/or Chapter 3, "Menu System," for information about menu displays.

Cartridge tasks, beginning on page 4-9, are operations that specifically include use of the T9940 tape cartridge.

■ Drive Operation Tasks

Typical drive operation tasks include the following:

- Power-on/Power-off
- Online/Offline
- View Firmware Release Level
- View Drive Configuration
- View TCP/IP Configuration
- Change Drive Configuration
- Change TCP/IP Configuration
- Exit the Menu System
- Manual IPL
- Forced Dump

Power-on/Power-off

To apply power to the T9940BR3 rack-mount tray:

1. Make sure the rack-mount tray is connected to an AC power source.

2. Set the power switch on the back of the rack-mount tray to ON (|).

   Both drives begin performing an initial program load (IPL).

   - The *power* indicator flashes.
   - The display shows various messages indicating that the IPL is proceeding. These messages require no action on your part.

   When the drive successfully completes the IPL:

   - The *power* indicator is lit steadily.
   - The display shows a steady " ∗ " (asterisk).
   - The drive is now in an online state.

To remove power from the T9940BR3 rack-mount tray:

1. Make sure the drive is not selected from the host.

2. Make sure a tape cartridge is not loaded in the drive.

3. Set the power switch on the back of the rack-mount tray to OFF (O).

Online/Offline

By default, the drive is in the online state following a successful IPL.
To change the drive state to offline:

1. Cease all I/O activity from the host.

2. Press **Menu**.

    The display shows `Online`, indicating the current state of the drive.

3. Press **Select** to place the drive offline.

    The display shows `Offline`, indicating a successful transition.

4. Press **Menu** until the display shows `Exit Menu?`.

5. Press **Menu** to repeat Online/Offline selection, or press **Select** to exit.

    Note: If a tape cartridge has been loaded at least once, and `Exit Menu? (Yes)` is selected, the display shows `Offline`, alternating with the normal message, as a reminder that the drive is in the offline state.

    If a tape cartridge has NOT been loaded at least once, and `Exit Menu? (Yes)` is selected, the display shows a steady " ✱ " (asterisk), and there is not a reminder that the drive is still in the offline state.

To change the drive state back to online:

1. Press **Menu**.

    The display shows `Offline`, indicating the offline state of the drive.

2. Press **Select** to place the drive online.

    The display shows `Online`, indicating a successful transition.

3. Press **Menu** until the display shows `Exit Menu?`.

4. Press **Select** to exit the menu system.

    Note: No additional action required to bring drive back online to the host.

View Firmware Release Level

You can view the current firmware release level, loaded in the EEPROM, in either the online or offline states. To view the firmware release level:

1. Press **Menu** to enter the menu system.

2. Press **Menu** until the display shows a number in the following format:

   R*x.yy.zzzc*, where:

   > *x* is the major revision level
   > *yy* is the minor revision level
   > *zzz* is the integration number
   > *c* is the channel type, (f is Fibre Channel)

3. Press **Menu** until the display shows Exit Menu?.

4. Press **Menu** to go to the Online/Offline selection, or
   press **Select** to exit the menu system.

View Drive Configuration

You can view, but not change drive configuration settings when the drive is in the online state. To view current drive configuration settings:

1. Press **Menu** to enter the menu system.

   a. If the display shows Online, go to step 2.

   b. If the display shows Offline, press **Select** to place the drive online.

2. Press **Menu** until the display shows View CFG ?.

3. Press **Select** to enter the view configuration submenus.

   - The display shows the first configuration setting.
   - See Figure 3-5 on page 3-8 for a graphical "Menu Tree" of view configuration submenus.

4. Press either **Menu** or **Select,** to step through the configuration settings.

5. Press **Menu** to repeat the view configuration submenus, or
   press **Select** to exit when the display shows Exit CFG ?.

6. Press **Menu** until the display shows Exit Menu?.

7. Press **Menu** to go to the Online/Offline selection menu, or
   press **Select** to exit the menu system.

View TCP/IP Configuration

You can view, but not change, drive TCP/IP configuration settings when the drive is in the online state. To view current TCP/IP configuration settings:

1. Press **Menu** to enter the menu system.

   a. If the display shows `Online`, go to step 2.

   b. If the display shows `Offline`, press **Select** to place the drive online.

2. Press **Menu** until the display shows `View TCP ?`.

3. Press **Select** to enter the view TCP/IP configuration submenus.

   - The display shows the first configuration setting.
   - See Figure 3-7 on page 3-24 for a graphical "Menu Tree" of current TCP/IP configuration settings.

4. Press either **Menu** or **Select,** to step through settings.

5. Press **Select** to exit when the display shows `Exit TCP ?`, or press **Menu** to repeat the view TCP/IP submenus.

6. Press **Menu** until the display shows `Exit Menu?`.

7. Press **Menu** to go to the Online/Offline selection menu, or press **Select** to exit the menu system.

Change Drive Configuration

You can change drive configuration settings only when the drive is offline. Once changes are made, the drive automatically initiates an IPL, and returns to the online state. To change current drive configuration settings:

1. Press **Menu** to enter the menu system.

   a. If the display shows `Offline`, go to step 2.

   b. If the display shows `Online`, press **Select** to place the drive offline.

2. Press **Menu** until the display shows `Chng CFG ?`.

3. Press **Select** to enter configuration submenus.

   - The display shows the first configuration setting.
   - See Figure 3-6 on page 3-11 for a graphical "Menu Tree" of change configuration options.

4. Press **Menu** to step through the change configuration submenus.

5. Press **Select** to step through available options, then press **Menu** to set a displayed option of choice.

   - See Table 3-1 on page 3-14 for a tabular guide of change options.

Once all configuration submenus have been explored, `Save/IPL ?` displays if any settings were changed:

6. Press **Select** to save changes and initiate an IPL, or press **Menu** to cancel changes and repeat the change configuration submenus.

Once all settings have explored, without change, `Exit CFG ?` displays:

7. Press **Select** to exit, or press **Menu** to repeat the change configuration submenus.

8. Press **Menu** until the display shows `Exit Menu?`.

9. Press **Menu** to go to the Online/Offline selection menu, or press **Select** to exit the menu system.

Change TCP/IP Configuration

Drive TCP/IP configuration changes can be made only when the drive is offline. Once changes are made, the drive automatically initiates an IPL, and returns to the online state. To change TCP/IP configuration settings:

1. Press **Menu** to enter the menu system.

   a. If the display shows `Offline`, go to step 2.

   b. If the display shows `Online`, press **Select** to place the drive offline.

2. Press **Menu** until the display shows `Chng TCP ?`.

3. Press **Select** to enter change submenus.

   • The display shows the first configuration setting.
   • See Figure 3-7 on page 3-24 for a graphical "Menu Tree" of change configuration options.

4. Press **Menu** to step through the configuration settings.

5. Press **Select** to step through the setting options, then press **Menu** to invoke a displayed option.

   Note: See Table 3-2 on page 3-25 for a tabular guide of change options.

Once all configuration settings have been explored, `Save/IPL ?` displays if any settings were changed:

6. Press **Select** to save changes and initiate an IPL, or press **Menu** to cancel changes and repeat the change TCP submenus.

Once all settings have been explored, without change, `Exit CFG ?` displays:

7. Press **Select** to exit, or press **Menu** to repeat the change TCP submenus.

8. Press **Menu** until the display shows `Exit Menu?`.

9. Press **Select** to exit the menu system, or press **Menu** to repeat the Online/Offline selection.

Exit the Menu System

To exit the menu system:

1. Press **Menu** repeatedly until the display shows `Exit Menu?`.

2. Press **Select**.

   Note: The display will show one of the following:

   " **∗** " (asterisk) - The drive is online (tape cartridge not loaded).

   `READY A` (Volsafe) - A T9940B drive is online with VolSafe enabled, and loaded with a VolSafe tape cartridge. The drive can read existing data, but can only append new data to the tape.

   `READY F` (file-protected) - The drive is online, and a loaded tape cartridge write-protect switch is in the locked (protected) position. The drive can read the data, but cannot write nor append data.

   `READY L` (low-density data) - The drive is online, loaded with a write-enabled (unprotected) tape cartridge that contains low-density data written by a T9940A drive. The drive can read the data, but cannot append data.

   `READY U` (file-unprotected) - The drive is online, loaded with a write-enabled (unprotected) tape cartridge with data density format that matches the drive model. (T9940B - high). The drive can read, write, and/or append data.

   `Offline`, alternating with any of the above messages - The drive is in the offline state.

Manual IPL

Pressing the **IPL** switch initiates an IPL of the drive and reloads drive firmware into drive memory from the EEPROM (same process that occurs at power-on).

To initiate an IPL on a drive that is already powered on:

1. Make sure a tape cartridge is not loaded in the drive.

2. Press **IPL**.

   - The *power* indicator flashes.
   - The display shows various messages indicating that the IPL is proceeding. These messages require no action on your part.

When the drive successfully completes an IPL:

- The *power* indicator is lit steadily.
- The display shows a steady " **∗** " (asterisk).
- The drive is now in the online state.

Forced Dump

This operation works the same as an IPL, but also forces a data dump of the present state of the drive.

Forcing a dump resets the drive and writes the dump to the EEPROM. The EEPROM can accumulate at least two (2) dump logs, depending on drive, compression, size of dump data, and Full Code Y/N configuration setting. Dump logs remain in the EEPROM until it is full. If there is not enough space in the EEPROM for an additional dump, memory blocks are overwritten (beginning with oldest) until newest dump log is saved. If any portion of a memory block is overwritten, the entire related dump log is no longer accessible. Previous dump logs that are still complete, remain in the EEPROM.

Notes:

- A forced dump is usually done by Engineering request to identify drive status at any time during drive operation.

- Failure Analysis use dump logs to diagnose drive malfunctions.

- Download uncollected dump logs from the EEPROM before performing a forced dump.

To force a dump to the EEPROM, from the operator panel:

1. Hold in the Menu and Unload switches for three seconds (or until CHK FFFF displays) to dump present drive status from memory to EEPROM.

Notes:

- Dump saving to the EEPROM begins when CHK FFFF displays and the **power** indicator begins to flash.

- When the dump is saved, the **service** indicator flashes.

- The drive automatically performs an IPL and returns to Online.

- The display will alternate between "*" (asterisk) and FFFF:Dmp*yy* (*yy*= total number of all uncollected dump logs) until any normal drive activity is started.

2. If a dump tape is desired, see "Dump Logs to Tape" on page 4-14 to collect (download) the EEPROM dump logs to tape.

   Note: The EEPROM dump logs may also be collected to file. See "Dump Logs to File" on page 4-14.

3. When done, return the drive to online, or replace as necessary.

Clean the Drive

After a predetermined length of tape has passed the R/W head, or a predetermined number of errors have been logged, the amber *clean* indicator lights. It is time to clean the drive.

CAUTION:
EQUIPMENT DAMAGE. DO NOT WET-CLEAN (CHEMICAL-CLEAN) THE DRIVE. DO NOT CLEAN THE DRIVE UNLESS THE *clean* INDICATOR LIGHTS.

To clean the drive:

1. Unload any data tape cartridge in the drive.

2. Insert a cleaning cartridge in the drive.

   - Cleaning cartridge has "W" Media ID label, see .
   - The green *activity* indicator flashes.
   - When the *activity* and *clean* indicators turn off, cleaning is complete and the cleaning cartridge ejects.

   Note: If the drive immediately ejects the cleaning cartridge and the display shows `Exp ClCart`, the cleaning cartridge is used up. Discard the worn cleaning cartridge and insert a new cleaning cartridge. The cleaning cartridge can be used about 100 times before you must discard it.

   If the display shows `CHK xxxx`, where `xxxx` is the FSC, a cleaning cartridge failure occurred. Try the procedure again with a different cleaning cartridge. If the problem persists, contact authorized service personnel.

3. Remove the ejected cleaning cartridge from the drive.

■ Cartridge Tasks

The following cartridge tasks involve manual handling of a tape cartridge.

- Write-protect/Write-enable
- Load a Tape Cartridge
- Unload a Tape Cartridge
- Reformat a Tape Cartridge
- Format a Dump Tape
- Collect Dump Logs
- Identify Defective Tape Cartridges
- Media Management Criteria
- Build MIR
- Tape Cartridge Care

Write-protect/Write-enable

To write-protect or write-enable a tape cartridge, move the write-protect switch (Figure 4-1) on the cartridge case to the desired setting.

The write-protect switch is on the leading edge of the T9940 cartridge case (the edge that enters the drive first). A pointer on the switch points to padlock symbols on the case that indicate the following status:

Locked: Write-protected. Data can only be read from the tape cartridge.

Unlocked: Write-enabled (unprotected). Data can be read from, and written to the tape cartridge.

Figure 4-1. T9940 Tape Cartridge Write-Protect Switch
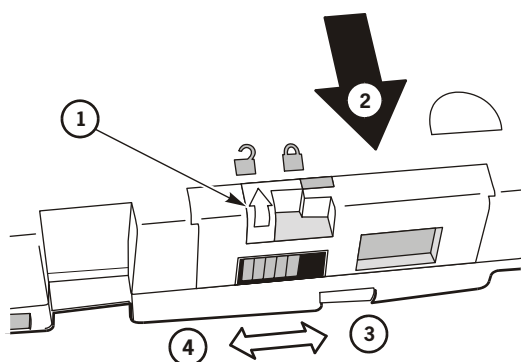
T102117

1. Write-protect switch
2. Insert direction arrow
3. Locked (write-protected)
4. Unlocked (write-enabled)

Load a Tape Cartridge

To load a T9940 tape cartridge, manually insert the cartridge into the drive loading slot in the direction shown in Figure 4-2.

Observe the following messages on the display:

READY A (Volsafe) - A T9940B drive is online with VolSafe enabled, and loaded with a VolSafe tape cartridge. The drive can read existing data, but can only append new data to the tape.

READY F (file-protected) - The drive is online, and the tape cartridge write-protect switch is in the locked position. The drive can read data files, but cannot write nor append data files.

Note: Write-protect switch position detection overrides data density format identification. Therefore, a loaded tape cartridge data density is unknown. If the data is low-density format (T9940A), a read attempt will still succeed on a T9940B drive.

READY L (low-density data) - The drive is online, loaded with a write-enabled (unprotected) tape cartridge that contains low-density data written by a T9940A drive. The drive can read the low-density data files, but cannot append the data.

READY U (file-unprotected) - The drive is online, loaded with a write-enabled (unprotected) tape cartridge, and the data density format matches the drive model. (T9940B - high). The drive can read, write, and/or append data files.

Load *xxxx* – The attempted cartridge load was unsuccessful; *xxxx* is the FSC. See Table 5-3 on page 5-4 to resolve this condition.

Figure 4-2. T9940 Tape Cartridge Loading
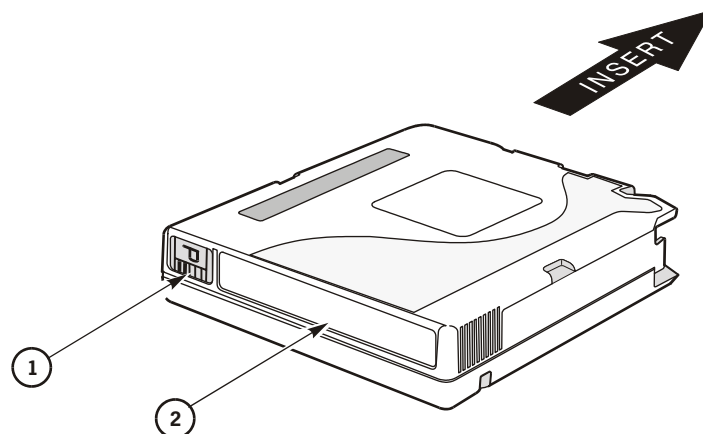
T102127

1. Media ID Label
2. VOLSER Label

Unload a Tape Cartridge

Pressing the **Unload** switch causes a loaded tape cartridge to rewind and eject.

Pressing the **Unload** switch once during a write operation causes the drive to try to write the remaining data before the tape cartridge unloads. An operator panel display of `UnWr xxxx` (unwritten data, where `xxxx` is the FSC) means that some data is not yet written to the tape. Pressing **Unload** a second time causes the unwritten data to be lost. Before you press **Unload** again, see `UnWr xxxx` in Table 5-3 on page 5-4.

To unload a tape cartridge:

1. Make sure the drive is not selected from the host.

CAUTION:
DATA LOSS. DO NOT PRESS THE Unload SWITCH TWICE DURING A WRITE OPERATION.

2. Press the **Unload** switch once.

    Note: One of the following conditions occurs:

    - The tape cartridge rewinds and ejects from the drive.
      Remove the tape cartridge from the drive.

    - If the **Unload** switch is pressed *during* a write operation, the drive attempts to write the remaining data before it unloads. A error message `UnWr xxxx` (Unwritten Data) means that the write attempt failed and some data remains unwritten to tape. DO NOT press the **Unload** switch a second time. See"UnWr xxxx Indication" on page 5-11 for instructions.

    - The tape cartridge rewinds but fails to eject. The display shows `Load xxxx`, where `xxxx` is the FSC.
      The tape cartridge is jammed and the drive requires service to resolve the problem. See "Tape Malfunctions" on page 6-22.

Reformat a Tape Cartridge

A standard or geophysical data tape cartridge can be reformatted for new data recording using the offline drive operations menu. Once a tape cartridge is reformatted (reclaimed), old data is no longer accessible because the reformatting and new data recording overwrites the media information region (MIR) and writes a "tape mark" at the beginning of the tape. This signifies that the tape cartridge is effectively blank. See "Data Security Erase Mode Submenu" on page 3-15 for information about completely erasing data on a tape cartridge.

Note: A T9940B VolSafe data tape cartridge cannot be reformatted.

The change configuration menu (Chng CFG ?) is for qualified service personnel only. The drive operations menu (Drv Menu ?) is the only offline menu operators may use.

To reformat a standard or geophysical data tape cartridge:

1. Press **Menu** to access the menu system.

    a. If the display shows Offline, go to step 2.

    b. If the display shows Online, press **Select** to place the drive offline.

2. Press **Menu** until the display shows Drv Menu ?.

3. Press **Select**.

4. Press **Menu** until the display shows MakeDataTp.

5. Press **Select**.

    • The display shows Ld Data Tp.

6. Load a write-enabled data tape cartridge in the drive loading slot.

    • The drive reformats and ejects the tape cartridge.

7. Remove the tape cartridge.

    Note: To reformat another tape, repeat steps 6 and 7.

8. Press **Menu** until the display shows Exit Drv ?.

9. Press **Select** to exit, or press **Menu** to repeat the drive operations submenus.

10. Press **Menu** until the display shows Exit Menu?.

11. Press **Select** to exit the menu system, or press **Menu** to repeat the Online/ Offline selection.

Format a Dump Tape

Use the following procedure to format a tape cartridge with a special format and identifier (dump tape) to collect dump logs from the EEPROM).

1. Make sure the drive does not have I/O to/from the host.

2. Press the **Menu** switch, then press **Select** for `Offline`.

3. Press the **Menu** switch until you reach the Drive Operations menu. `Drv Menu?` displays.

4. Press the **Select** switch to enter Drive Operation submenus.

5. Press the **Menu** switch once. The `MakeDumpTp` submenu displays.

6. Press the **Select** switch to start.

    Note: Any tape cartridge in the drive ejects.

7. Load a write-enabled tape cartridge in the drive when `Ld Dump Tp` displays.

    Notes:

    - Formatting starts automatically.

    - The green *activity* indicator flashes during the process.

    - The process erases previous data and gives the tape cartridge a special dump tape ID.

    - If `CHK xxxx` displays, an error has occurred, and drive could not format the tape cartridge as a dump tape.

        - Make sure the tape cartridge is write-enabled.
        - Try a different tape cartridge.
        - Try a different drive.

    - When formatting is complete, the "dump tape" ejects.

8. Remove the tape cartridge.

    Note: To format another dump tape, repeat Steps 7 and 8.

9. Exit the Drive Operations menu.

10. Return the drive to `Online`.

11. Exit the Menu system.

    Note: A steady " * " (asterisk) should display after exiting.

12. Inform the operator that the drive is ready.

Collect Dump Logs

Whenever an error occurs that creates dump data, the red *service* and green *activity* indicators on the operator panel flash, to indicate new data is being saved (dumped) to the EEPROM. Once the dump is saved, the indicators stop flashing. The display now alternates between a steady " * ", and *xxxx*:Dmp*yy*, to indicate that a new uncollected dump log is present, and is available to collect (download) to tape or file. The *xxxx* is the 4-character FSC that caused the last dump (FFFF indicates the last dump was forced).

Dump Logs to Tape

Use the following procedure to collect dump logs from the EEPROM to a specially formatted, write-enabled tape cartridge (dump tape). If required, see "Format a Dump Tape" on page 4-13.

The dump to tape operation does not overwrite dump logs already on the dump tape. New dump logs append to dump logs already on the dump tape.

1. Make sure the drive does not have I/O to/from the host.

2. Load a dump tape in the drive.

   Notes:

   - Data is automatically written to the tape from the drive's EEPROM.

   - When the process is done, the dump tape ejects.

   - If CHK *xxxx* displays, an error has occurred, and the drive was unable to write a dump log to tape.

     - Make sure tape cartridge is formatted as a dump tape.
     - Try a different dump tape.

3. Remove the dump tape.

4. Make sure the drive is Online. If required, see "Online/Offline" on page 4-2.

5. Inform the operator that the drive is ready.

Dump Logs to File

You can download dump logs, present in the EEPROM, through the rack-mount tray rear panel Maintenance Ports as electronic files, using the StorageTek Diagnostic System (STDS) tool. In STDS, use "98/9940 Support" to connect, and establish communication with the drive. Then use the "Get Log" drop-down menu to download dump logs to a PC local drive folder. Transfer these electronic files to interested parties by any mutually compatible means.

The Host software application could also download dump logs from the EEPROM, and save as electronic files. See application documentation.

Identify Defective Tape Cartridges

A defective tape cartridge fails with some or most drive operations. Use the following steps to confirm a suspected tape is defective:

1. Try the tape cartridge in another drive. If it fails in the second drive, the tape cartridge is probably defective.

2. Try a known good tape cartridge in both drives. If both drives operate with the known good tape cartridge, the original tape cartridge is confirmed defective, but not necessarily unrecoverable.

3. Reformat the suspect tape cartridge.
   (See "Reformat a Tape Cartridge" on page 4-12.)

   Note: If the reformat succeeds, the tape cartridge can be reused. If the reformat fails, the tape cartridge is unrecoverable and it must be discarded.

CAUTION:
TAPE DAMAGE. Servo tracks are written on the tape media at the factory. When these tracks are mistakenly erased as by degaussing, the tape cartridge must be discarded. DO NOT DEGAUSS T9940 tape cartridges.

A degaussed tape cartridge fails in all operations, including reformat, because the tape servo tracks are lost, and can not be recovered. The tape cartridge must be discarded.

Media Management Criteria

Tape cartridges may experience errors. However, the error recovery capabilities of the T9940B Tape Drive are much more robust than previous technologies. Consequently, errors should be reduced as compared to older drives.

The following data is for recommendation purposes only.

Problem: Tape Cartridge permanent errors and/or tape cartridge performance degrades to an unacceptable level.

Solution: Work with the operator to identify and replace defective tape cartridges. The criteria for replacing tape cartridges are:

◗ One permanent write error.

◗ Informational FSC 367A displayed (11,000 mounts). Recommend that the tape cartridge be migrated out.

◗ Informational FSC 367B displayed (792 full tape passes equivalent). Recommend that the tape cartridge be migrated out.

◗ Temporary write errors based on performance degradation threshold. Average impact is roughly 20 seconds per temporary error.

Example: 20 seconds times n=performance degradation threshold.

◗ Transient and correctable errors are not valid for the T9940B Tape Drive.

◗ Replace tape cartridges only for errors on write commands. Read errors are not criteria for replacing tape cartridges. Investigate all read errors to determine the cause of the error, such as problems during the creation of the data tape.

Build MIR

The media information region (MIR) is an area at the beginning of the tape media that contains metadata—information about data on the tape media that helps the drive access and manage it. If an error occurs, the MIR can be rebuilt (restored) by a utility that sequentially reads the entire tape media.

To build an MIR:

1. Press **Menu** to access the menu system.

   a. If the display shows `Offline`, go to step 2.

   b. If the display shows `Online`, press **Select** to place the drive offline.

2. Press **Menu** until the display shows `Drv Menu ?`.

3. Press **Select**.

4. Press **Menu** until the display shows `Build MIR`.

5. Press **Select**.

   • The display shows `Ld Cust Tp`.

6. Load a write-enabled data tape cartridge, requiring the MIR to be rebuilt, in the drive loading slot.

   Note: While the drive builds the MIR, the display shows `ReBldg MIR` and the green *activity* indicators flashes. When the rebuild MIR is complete (could be up to 120 minutes for a full data tape, written in T9940B high-density format), the drive ejects the tape cartridge, and the display shows `Ld Cust Tp`.

7. Remove the tape cartridge.

   Note: To build the MIR on another tape cartridge, repeat steps 6 and 7.

8. Press **Menu** until the display shows `Exit Drv ?`.

9. Press **Select** to exit, or press **Menu** to repeat the drive operations menu.

10. Press **Menu** until the display shows `Exit Menu?`.

11. Press **Select** to exit the menu system, or press **Menu** to repeat the Online/ Offline selection.

Tape Cartridge Care

T9940 tape cartridges require care to ensure proper operation and longevity.

Handling

CAUTION:
TAPE CARTRIDGE DAMAGE OR DATA LOSS. HANDLE TAPE CARTRIDGES PROPERLY.

Follow these guidelines to properly handle tape cartridges:

- Do not open a tape cartridge or touch the tape.
- Do not carry tape cartridges loosely in a container.
- Do not expose the tape media or cartridge to direct sunlight or moisture.
- Do not expose a tape cartridge to magnetic fields.
- Maintain clean operating, working, and storage environment.

Cleaning

Wipe all dust, dirt, and moisture from the cartridge case with a lint-free cloth.

Storing

Always store tape cartridges in an environment with the specified range of temperature and humidity found in "Tape Cartridges" on page A-5. When storing tape cartridges, follow these recommendations:

- Do not take tape cartridges out of their protective wrapping until they are needed. Use the tear string, not a sharp instrument, to remove wrapping.

- Store tape cartridges in a dirt-free environment that, if possible, duplicates the conditions of the data processing center.

- Before using tape cartridges that have been in storage, acclimate them to the operating environment for at least 24 hours.

Inspecting

CAUTION:
EQUIPMENT DAMAGE. DO NOT LOAD DAMAGED TAPE CARTRIDGES.

Before loading a tape cartridge into a drive, look for the following problems:

- A cracked or broken cartridge case
- A dirty cartridge case
- A missing or broken leader block
- A damaged write-protect switch
- Liquid in the cartridge case
- A loose label
- Any other obvious damage

Figure 4-3. T9940 Tape Cartridge Inspection

REAR VIEW

BOTTOM VIEW

FRONT VIEW

T102099
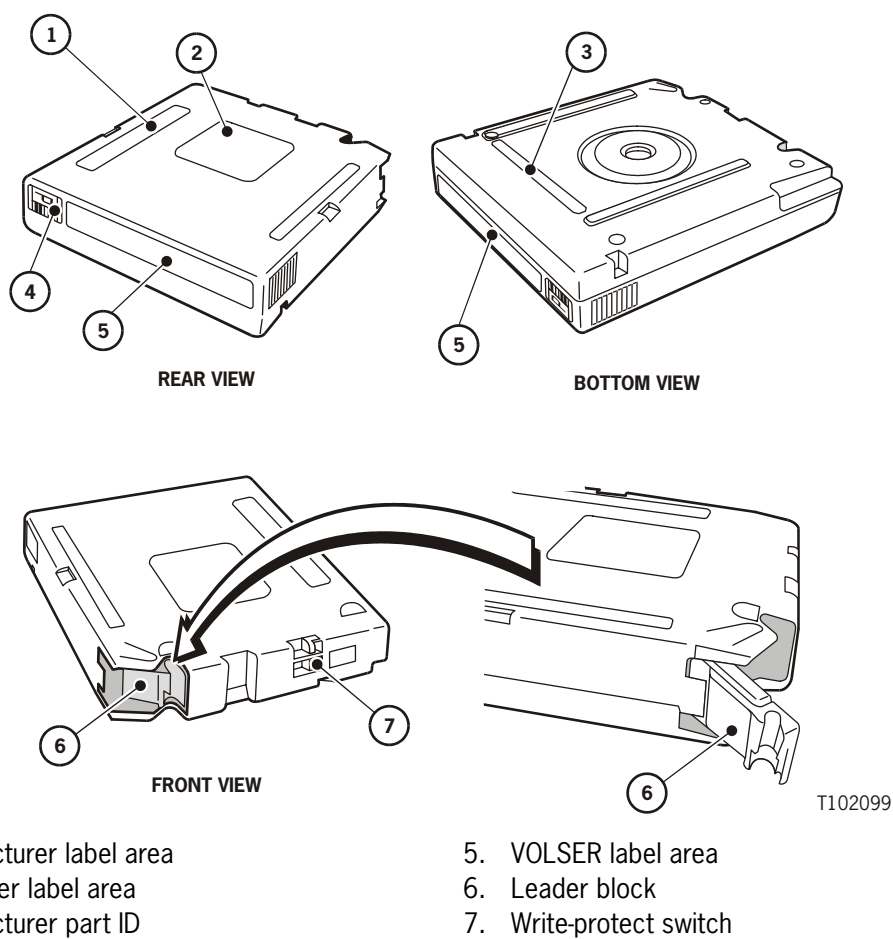
1. Manufacturer label area
2. Customer label area
3. Manufacturer part ID
4. Media ID
5. VOLSER label area
6. Leader block
7. Write-protect switch

Shipping

CAUTION:
TAPE CARTRIDGE DAMAGE. SHIP TAPE CARTRIDGES PROPERLY.

If you must ship T9940 tape cartridges, especially if they are for remote system backup, remote database duplication, or disaster recovery, follow these guidelines:

- Save the original factory packaging. Use it, or the equivalent, to package tape cartridges.

- Wrap the tape cartridges in plastic to block moisture and contamination from entering the tape cartridges.

- Pack the tape cartridges on edge, with the leader block pointing up. If tape cartridges are packed flat, shipping vibration causes the clutches in the tape cartridges to disengage and slip.

- Pad the tape cartridges on all sides.

- Fill voids in the packaging with foam padding equivalent to the original padding, if you are using factory packaging to ship fewer tape cartridges than the packaging originally held, or if you are using other packaging.

- Label the outside of the shipping carton clearly with text or accepted symbols that indicate:
  - Do not expose to magnetic fields
  - Do not expose to moisture
  - This end up
  - Fragile

Indicators and Messages

<div style="text-align: right">5</div>

This chapter summarizes the T9940B Tape Drive operator-panel indicator lights and display messages. Where applicable, this chapter recommends action for error recovery.

■ Indicators

Table 5-1 shows the front-panel indicators with their meaning and recommended action.

Table 5-1. Operator-panel Indicators

Indicator				Meaning	Recommended Action
power	*activity*	*clean*	*service*		
Off				The drive is powered off.	Power on the drive as required.
On			Off	Normal operation	None
On			On	A drive error occurred.	Perform an initial program load (IPL) on the drive. If the problem persists, contact authorized service personnel.
Flashing			Off	The drive is performing IPL.	None
Persistent flashing			Off, or flashing	The drive failed IPL and cannot exit the sequence.	Power the drive off and on again. If the problem persists, contact authorized service personnel.
On			Flashing (after dump saved)	An error occurred and dump data was saved to the drive EEPROM.	Observe the display message. See "Messages" on page 5-3 for more information about the message.

Table 5-1. Operator-panel Indicators (Continued)

Indicator				Meaning	Recommended Action
power	**activity**	**clean**	**service**		
On	On			A tape cartridge is loaded.	None
On	Flashing			The tape media is moving.	None
On	Off			Tape cartridge is not loaded.	Load tape cartridge as required.
On		Off		No cleaning is required.	None
On		On		Cleaning is required.	Clean the drive.
On	Flashing	On		Cleaning in progress.	None

■ Messages

The operator panel displays messages (ten character maximum) that provides status, information, and/or errors relevant to drive operations. Some messages are translated into the language selected by the drive configuration.

Translated Messages

Table 5-2 shows operator panel display messages that are translated when the drive configuration Language setting is set to other than English.

Table 5-2. Translated Display Messages

English	Espanol	Francais	Italiano	Deutsch
CLEANING	*LIMPIA*	*NETTOYAGE	*PULIR*	*REINIGEN*
CHK XXXX	FALLA XXXX	ERR XXXX	ERR XXXX	PRUF XXXX
ERASING	*BORRANDO*	EFFACEMENT	*CANCELLA*	*LOESCHNG*
LOAD XXXX	LOAD XXXX	LOAD XXXX	LOAD XXXX	LADEN XXXX
Loading	Cargando	Chargement	Loading	Laden
Locating	Situando	Recherche	Ricerca	Suchen
NT Ready A	NoPrep A	NPret ATG	No Prt A	N Bereit A
NT Ready F	NoPrep P	NPret PTG	No Prt P	N Bereit G
NT Ready H	NoPrep H	NPret HTG	No Prt H	N Bereit H
NT Ready L	NoPrep L	NPret LTG	No Prt L	N Bereit L
NT Ready U	NoPrep N	NPret NPTG	No Prt N	N Bereit N
Online	Conectado	Connecte	Collegato	Online
Overtemp	*Caliente*	* Chaud *	* Caldo *	* HeisB *
Processing	Procesar	Traiter	Processare	Verarbeitn
Reading	Leer	Lire	Leggere	Lesen
Ready A	Prepda A	Pret ATG	Pronto A	Bereit A
Ready F	Prepda P	Pret PTG	Pronto P	Bereit G
Ready H	Prepda H	Pret HTG	Pronto H	Bereit H
Ready L	Prepda L	Pret LTG	Pronto L	Bereit L
Ready U	Prepda N	Pret NPTG	Pronto N	Bereit N
Rewinding	Rebobina	Rebobinage	Riavvolg	Spult-R
Unloading	Descarga	Dechargemt	Scaricam	Entladung
Writing	Escritura	Ecriture	Scrittura	Schrift

Information and Error Messages

Table 5-3 provides an alphabetical list of operator panel display messages with their meaning and recommended action.

The notation "CHK *xxxx*" contains a four-character hexadecimal fault symptom code (FSC). See the FSC dictionary for information.

Table 5-3. Operator-panel Display Messages

Display	Meaning	Recommended Action
*	A steady asterisk (*) indicates that the drive completed IPL and is online, but not loaded.	Operator discretion.
* Offline	An asterisk (*) alternating with Offline indicates that the drive is offline.	Operator discretion. Place drive Online for use by the host.
ASIA DIAG	This is the normal display during an IPL.	Wait for the IPL to complete.
Bank *n* Bad	During the boot sequence, a section of memory (1, 2, 3, or 4) is found bad.	If IPL does not correct the problem, replace the drive. See "FRU Removal/Replacement" on page 6-5.
Boot Fail	The IPL failed.	Initiate IPL again. If IPL fails again, replace the drive. See "FRU Removal/Replacement" on page 6-5.
CHK A738	Drive attempted to create a code tape, but only has single firmware image in the EEPROM.	Make sure the drive has all code images loaded in the EEPROM. See "Prepare Drive" on page B-2.
CHK *xxxx*	An operational failure occurred. (*xxxx* = actual FSC that caused the failure.) Some failures will initiate a dump and IPL.	If required, wait for IPL to complete, then retry the operation. If the problem persists, replace the drive. See "FRU Removal/Replacement" on page 6-5.
CLEANING	A cleaning cartridge is in the drive and is now cleaning.	None
c*n*h*n*d*n*s*n*	The hardware revision level supported by the firmware in this drive, where: *n*=any number 0–9 *c*=controller processor level *h*=host side formatter level *d*=device side formatter level *s*=servo level.	This message occurs when the firmware level is insufficient to control the hardware level in the drive. Load/update to higher level firmware.

Table 5-3. Operator-panel Display Messages (Continued)

Display	Meaning	Recommended Action
CodeUpDate	Firmware in the drive EEPROM is being updated, the operator panel switches are locked.	No user action is necessary.
DumpAgain?	The drive detected the same FSC (CHK *xxxx*) within one minute.	See "Fix_CfgErr Error" on page 5-9.
DumpToHost	The dump or event log is being transferred to the host; operator panel switches are locked.	None
Exp ClCart	The cleaning cartridge is used up.	Replace the cleaning cartridge.
xxxx:Dmpyy	Alternates with an "*" after completion of an IPL, where *xxxx*=the FSC of last dump data saved to the EEPROM, (FFFF indicates last dump was forced) and *yy*= number of uncollected dumps in the EEPROM.	Indicates uncollected dump data in the EEPROM. Optionally move dump logs to tape or file. See "Collect Dump Logs" on page 4-14.
Fix_CfgErr	Upon IPL, the configuration checksum does not match.	Go to "Fix_CfgErr Error" on page 5-9.
INIT *xxxx*	Initialization error.	Initiate an IPL. If that fails, replace the drive. See "FRU Removal/ Replacement" on page 6-5.
IPL Pend	Displays for one second when IPL is pressed.	Wait until the IPL completes automatically.
Load CC	The common controller code is loading.	No user action is necessary.
Loading	The tape cartridge is being loaded.	No user action is necessary.
Load FIBRE	This is the normal display during a boot.	Wait for the IPL to complete.
Load *xxxx*	The load/unload operation has failed.	Try another tape cartridge. If it loads, the first tape cartridge may be defective. See "Identify Defective Tape Cartridges" on page 4-15. If second tape cartridge also fails to load, initiate an IPL. If failure persists, replace the drive. See "FRU Removal/ Replacement" on page 6-5.
Locating	The drive is doing a high speed seek.	No user action is necessary.

Table 5-3. Operator-panel Display Messages (Continued)

Display	Meaning	Recommended Action
Memory Err	The RAM failed during an IPL.	IPL again. If that fails, replace the drive. See "FRU Removal/ Replacement" on page 6-5.
NTReady A	A write-enabled VolSafe data tape cartridge is in the process of a manual unload.	None
NT Ready F	A write-protected tape cartridge is in the unload process.	Wait until the unload operation completes.
NT Ready U	A write enabled tape cartridge is in the unload process.	Wait until the unload operation completes.
Offline *	Offline alternating with an asterisk (*) indicates that the drive is offline.	Operator discretion. Place drive online.
Online	The drive is operational.	No user action is necessary.
Power Fail	The power supply has failed.	Replace the power supply. See "FRU Removal/Replacement" on page 6-5.
Reading	The drive is doing a read.	No user action is necessary.
Ready A	The loaded VolSafe data tape cartridge is write-enabled, and the drive VolSafe configuration option is enabled (Yes).	None.
Note: Firmware level 1.32.423 or higher required for VolSafe support. Load 5B15 displays with down-level firmware.		
Ready F	The loaded tape cartridge is write-protected by the write-protect switch in the locked position. Ready F also displays with a VolSafe data tape cartridge when the drive VolSafe configuration option is disabled (No).	Operator discretion.
Ready L	The loaded tape cartridge is write-enabled, and contains data written in the low-density format by a T9940A drive.	Low-density data files can be read, but not revised, or appended by the T9940B drive. Use for read-only jobs; or, intentionally over-write from BOT.
Ready U	A write-enabled tape cartridge with matching data density is loaded in the drive.	Operator discretion.
Rewinding	The drive is rewinding	No user action is necessary.

Table 5-3. Operator-panel Display Messages (Continued)

Display	Meaning	Recommended Action
Save Fails	The changed configuration cannot be saved.	Replace drive. See "FRU Removal/ Replacement" on page 6-5.
SavingDump	Dump data is being saved to the EEPROM.	Normal display. Wait for the save to complete.
Start Init	Initialization started.	No user action necessary.
Trapped	The boot is trapped in a closed loop.	If an IPL does not clear the condition, replace drive. See "FRU Removal/ Replacement" on page 6-5.
Unloading	The tape cartridge is being unloaded.	No user action is necessary.
UnWr *xxxx*	The **Unload** switch was pressed while a write was taking place.	Go to "UnWr xxxx Indication" on page 5-11.
Write Prot	Write attempt to a write-protected tape cartridge. This message also appears if a reformat operation is attempted with a VoSafe data tape cartridge.	Change the switch on tape cartridge to write-enable.
Writing	The drive is in write mode.	No user action is necessary.

T9940B Tape Malfunction Messages

When the T9940B experiences a tape malfunction, one of the FSCs listed in Table 5-4, displays on the operator panel.

Table 5-4. Tape Malfunction FSCs

FSC	Malfunction	Corrective Action
5132	Tape could not be tensioned before the load sequence. Tape may be broken near the leader block. Tape and leader block are still in the cartridge case. **Note:** The tape cartridge ejects.	Press Unload switch to eject the tape cartridge from the drive. See "Leader Block Replacement" on page 6-31.
5C62	Tape tension was lost during threading. The tape is broken near the leader block. **Note:** The tape cartridge *does not* eject.	See "Detached Leader Block Recovery" on page 6-22 to remove the tape cartridge and leader block from the drive.
5C72	Tape tension was lost during unthreading. The tape is broken near the leader block. **Note:** The tape cartridge *does not* eject.	See "Detached Leader Block Recovery" on page 6-22 to remove the tape cartridge and leader block from the drive.
(*xxxx*)	Tape tension was lost during read/write operation. The tape is broken midway in the drive, or the drive is defective. **Note:** The tape cartridge *does not* eject. Multiple FSCs may display.	See "Tape Broken Midway in Drive" on page 6-31.

Save Fails Error

The Save Fails error can occur when saving a new configuration. It means that the RAM has failed the save operation. The drive cannot work properly with defective information in the RAM. Replace the drive. See "FRU Removal/ Replacement" on page 6-5.

Fix_CfgErr Error

This error may occur during power on or IPL.

When you make configuration changes, they are first saved to RAM. The RAM copy is, in turn, stored in the EEPROM. During normal operation, the drive uses the RAM content to determine drive configuration, and the EEPROM remains idle. However, while drive power is on, the RAM periodically rewrites (refreshes) the EEPROM.

The Application Specific Interface Adaptor (ASIA) looks at the entire RAM contents, generates a checksum, and stores the checksum also in the EEPROM.

When the drive is powered on or IPL is initiated, the EEPROM contents are sent to the RAM. This data includes both the configuration data and the previously stored checksum.

The ASIA reads the RAM, generates a fresh checksum from the RAM contents, and compares this checksum to the stored checksum. If there is no match, `Fix_CfgErr` displays.

This may indicate a defective EEPROM or RAM. When this error occurs, the drive completes the IPL but remains offline.

Notes:

- This error check does not protect you from entering the wrong configuration in the first place. It only tells you that the RAM content had somehow changed since the configuration data was last entered. If you originally entered a wrong configuration and the circuits are in working order, it will not show up as an error.

- This error check does not lock drive operations. You can place the drive online without changing the drive configuration. Do so only if you determine that an unused bit in the RAM or EEPROM is bad in accordance with the following procedure.

1. Check the drive configuration against the client records.

2. If the client records and the drive configurations match, there are two possibilities:

   - An unused bit in the RAM or EEPROM has become bad.

     (The RAM and EEPROM each have 256 bytes, and not all are being used. If an unused bit turns bad AFTER the last configuration was saved, it causes a checksum error upon IPL: it will not show up as a changed configuration and will not affect the operation of the drive.)

   - There may be a problem with the ASIA interface.

3. To isolate one of the two possibilities, do the following:

   a. Re-save the configuration.

      Because the configuration is already apparently correct, re-saving the configuration generates and stores a new checksum.

      If an unused bit of the RAM has become bad, it is now included in the ASIA checksum and will not show up again as an error.

   b. Initiate an IPL for the drive.

   c. If the error is not repeated, it is an indication that an unused bit in the RAM is bad. This problem can now be disregarded. Go to Step 5.

   d. If the problem is repeated and the configuration remains correct, there may be a problem with an unused bit in the EEPROM or with the ASIA checksum circuit.

   e. If you suspect the ASIA Fibre Channel interface, run the Fibre Channel Loop Test before you replace the drive. See "Fibre Channel Loop Test" on page 6-4.

      Note: When the configuration in the RAM is correct, the drive can usually operate normally while it remains powered on, even if the EEPROM or the checksum circuit in the ASIA are damaged. You can employ the drive that way if you have to wait for replacement.

4. Reconfigure the drive and save the new configuration:

   Note: If a used area of the RAM is bad, the save operation will fail, causing a `Save Fails` error. In that case the `Fix_CfgErr` was caused by a bad RAM and the drive must be replaced. See "FRU Removal/ Replacement" on page 6-5.

      If the save operation succeeds, the EEPROM is probably bad. The new configuration is properly saved only to the RAM: the EEPROM may have corrupt data.

      When the configuration in the RAM is correct, the drive can usually operate normally while it remains powered on, even if the EEPROM is damaged. You can employ the drive that way if you have to wait for a replacement drive FRU.

5. If applicable, release the drive for operation.

6. If the EEPROM is suspect, record the problem in the site logbook.

Note: If the configuration problem repeats on the next IPL, it means that the EEPROM is damaged and the drive should be replaced. However, you can reconfigure the drive and use it until a replacement drive FRU is available.

UnWr xxxx Indication

UnWr *xxxx* means Unwritten Data. This display can occur if the **Unload** switch was pressed *during* a write operation. It indicates that the drive attempted to write the remaining data before it unloaded but the attempt failed and some data remains unwritten to tape.

CAUTION:
DATA LOSS. Pressing the Unload switch again will cause loss of this data. DO NOT PRESS the Unload switch again.

Issue the following command from the host software:

    Recover Buffer Data

DumpAgain? Indication

The DumpAgain? display alternates with a FSC CHK *xxxx* indication while the *service* light flashes. This occurs when the identical FCS CHK *xxxx* is detected within one minute of the previous occurrence. The drive becomes non-operational, requiring manual intervention.

With this condition, you may choose to save a dump but there is no requirement to do so. If you have reason to save the dump, press any control *except* the **IPL** switch. This saves the dump data to the EEPROM.

While the dump is being saved to the EEPROM, the *service* light goes out and the display alternates between SavingDmp and the CHK *xxxx* display. After saving, the drive automatically performs IPL.

Use the dump log collection procedures on to download dump logs from the EEPROM to tape or file.

If you don't want to save the dump, press the **IPL** switch. This initiates IPL for the drive without copying the dump data to EEPROM.

If the IPL is successful, continue with normal operations.

If the IPL fails, as indicated by any error message, replace the drive. See .

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Third Edition

Servicing

<div style="text-align: right">**6**</div>

This chapter contains servicing instructions such as firmware update, field replacement unit (FRU) removal/replacement, tape malfunction recovery, FRU preparation for shipment, and fiber optics cleaning.

■ Firmware Update

Update or reload the drive firmware from a micro-code electronic file, through the Host software application, or the StorageTek Diagnostic System (STDS) tool.

If neither the host nor STDS is available, but a code tape is available, use "Load/Update Firmware from Code Tape" on page 6-3.

Load/Update Firmware from STDS

This procedure uses the STDS tool to load/update drive firmware when an electronic file version of the firmware micro-code is available on a PC local drive.

1. Make sure the desired firmware release level micro-code electronic file is available on a PC local drive.

   Note: If required, go to "T9940B Firmware Electronic File" on page B-1.

2. Reset TCP/IP properties for the PC to the following static settings:

   - IP address - 10.0.0.2
   - Subnet mask - 255.255.255.0

     Note: Make note of original static settings, if used.

3. Connect the PC Ethernet port to the selected drive's Maintenance Port on the rack-mount tray rear panel.

   Note: Use a crossed Ethernet cable for direct connection to one drive; or uncrossed Ethernet cables when connecting both drives through an Ethernet switch device.

4. Make sure the drives do not have I/O to/from the host.

5. Press the **Menu** switch, then press **Select** for `Offline` on each drive.

6. Make sure each drive TCP/IP configuration settings are properly set:

   a. Set both drives to the default IP address (010.000.000.001), if direct connection is used.

    b.   Set each drive to a different IP address, if connected through an Ethernet switch device.

    c.   Set both drives to the default Net Mask (255.255.255.000).

    Note: See "Menu Table—Change TCP/IP Configuration" on page 3-25, as required, for guidance.

7.   Launch STDS application, and select "98/9940B Support" from the "Connect" drop-down menu.

    Note: Menu bar changes to 98/9940B Support. selections

8.   Select "IP Address", and make sure address is set to target drive's IP address.

9.   Select "Get ID".

    Note: The PC should now communicate with the drive and display drive information, including the loaded firmware release level.

10. Select "Start Op Panel", and make sure the drive is Offline. If required, use the STDS Operator Panel GUI to change state.

    Note: STDS Operator Panel GUI emulates the drive operator panel, and can be used in lieu of the drive's operator panel while STDS is active.

11. Select "Download Firmware" to initiate transfer of the firmware electronic file from the PC local drive folder to the drive EEPROM.

    Note: The drive front panel displays CodeUpdate activity messages during the download. When the firmware download is complete, the drive automatically performs an IPL and goes `Online`.
A steady " `*` " (asterisk) should display after IPL is complete.

12. Verify the updated firmware release level:

    a.   See "View Firmware Release Level" on page 4-3.

    b.   If required, repeat step 11.

13. Switch the crossed Ethernet cable to the second drive's Maintenance Port, if direct connection is used.

14. Repeat steps 8 through 12 for the second drive in the rack-mount tray.

15. Exit "98/9940B Support", then exit/close the STDS application.

16. Disconnect all Ethernet cables.

17. Reset the PC's TCP/IP properties to original setting.

Load/Update Firmware from Code Tape

This procedure uses a "Code Tape" (tape cartridge containing firmware images) for loading/updating firmware in a rack-mount T9940B Tape Drive when the preferred method (from file) is not possible.

1. Make sure the drive does not have I/O to/from the host.

2. Press the **Menu** switch, then press **Select** for `Offline`.

3. Press the **Menu** switch until `Drv Menu?` displays.

4. Press the **Select** switch. `IPL FromTp` menu displays.

5. Press the **Select** switch.

   Note: Any tape cartridge in the drive ejects.

6. Remove ejected tape cartridge, if present.

   CAUTION:
   FIRMWARE CORRUPTION. Interrupting the update process corrupts the contents of the drive EEPROM, and requires the drive to be replaced. DO NOT INITIATE IPL OR POWER OFF THE DRIVE while firmware update is processing.

7. When `Ld IPL Tp` displays, load a write-protected tape cartridge, containing the desired firmware level image, in the drive.

   Notes:

   - The firmware load starts automatically.

   - If `CHK xxxx` displays, an error has occurred, such as unable to read image on code tape, or the drive EEPROM is defective.

     - Try code tape in different drive.
     - Try another code tape in drive.
     - Initiate IPL, if problem persists, replace drive.
       See "FRU Removal/Replacement" on page 6-5.

   - When updating is done, the code tape ejects, and
     `Remove Tape` displays.

8. Remove the code tape cartridge from the drive.

   Note: The drive automatically performs an IPL and comes `Online`.
   A steady "*" should display after IPL is complete.

9. Repeat steps 1 through 8 for the second drive in the rack-mount tray.

■ Fibre Channel Loop Test

When you suspect Fibre Channel interface problems, you can conduct a Fibre Channel loop test to check the drive's optical ports as "alive or dead". This test isolates the interface problem to the drive, or to the interface.

Note: A known-good, Dual LC multi-mode fiber cable is required for the test.

Use the follow procedure to conduct the Fibre Channel Loop Test:

1. Take the drive offline to the host.

2. Disconnect the Fibre Channel interface cable at the drive end.

3. Remove dust protector from unused drive port.

4. Connect a known good multi-mode fiber cable between the drive Port A and Port B.

Note: The ports should see each other and then arbitrate a loop address for each port.

5. Place the drive Online and navigate to the `View Configuration` menu.

6. Press **Select** to enter the View Configuration submenus, then navigate to the View Port A submenu.

7. Press **Select** to enter View Port A submenus, then navigate to the `A_I=`*xxyyzz* submenu.

Notes:

- If the drive is operational, the current arbitrated loop address for Port A displays.

- If `Hard PA` is "Yes", the loop address equals the Hard PA.

- If `Hard PA` is "No", the loop address varies, typically: `A_I=000001` for Port A and `A_I=000002` for Port B.

- If `A_I=......` displays, the drive is defective.
  (Either Port A or Port B is not functioning properly; however, this test does not determine which port is defective.)

8. Disconnect the fiber cable loop from Port A and Port B.

9. Insert dust protector into unused drive port.

10. If the loop test failed, replace drive.

11. If the loop test was good, replace interface fiber cable.

Note: If replacing interface fiber cable does not solve the interface problem, the fault is within the host system components.

■ FRU Removal/Replacement

This section contains procedures for the removal and replacement of the rack-mount T9940B Tape Drive and power supply FRUs. Defective drive FRUs and power supply FRUs are not repaired on site. They must be sent back to StorageTek for repair.

General Recommendation

These recommendations may make the removal/replacement and shipping procedure easier for you. Follow these recommendations whenever the condition of the drive allows you to do so.

Check Configuration Before Powering Off

Before you power off a drive that requires replacement, view the drive configuration,
and document the configuration. Use the View Configuration procedures in "View Drive Configuration" on page 4-3.

Note: Use the documented information to configure the new drive.

Force a Dump Before Powering Off

Note: Collect any stored dump logs from the EEPROM before forcing a new dump. See "Collect Dump Logs" on page 4-14.

Before you power off a drive that requires replacement, force a dump on the defective drive before removing the drive. The resulting dump log provides information of the present state of the drive. Failure Analysis uses dump logs to diagnose and isolate drive malfunctions.

See "Forced Dump" on page 4-7 for instructions to complete this dump.

Unload Drive Before Powering Off

Always press the Unload switch, and let the loading mechanism go full cycle, before you power off the drive.

Stabilize Drive Head Before Shipping

Always stabilize the drive R/W head before shipping a drive FRU.
If the R/W head is not stabilized, it will be damaged during shipment.
See "Head Restraint and Packaging Procedure" on page 6-37 to stabilize the R/W head.

Required Tools

The following Torx bits are used with the T9940B FRU replacement procedures:

- T6 Torx (StorageTek PN 24100160) bit: torque to 0.23 N m (2 in. lb)
- T6 Torx Plus (StorageTek PN 24100164) bit: torque to 0.23 N m (2 in. lb)
- T8 Torx bit: torque to 0.23 N m (2 in. lb)
- T10 Torx bit: torque to 0. 68 N m (6 in. lb)
- T15 Torx bit: torque to 1.13 N m (10 in. lb)
- 7-in. T15 Torx bit: torque to 1.13 N m (10 in. lb)
- T25 Torx bit: torque to 2.26 N m (20 in. lb)

Prepare Tray for Maintenance

This procedure prepares the rack-mount tray for maintenance. Extend only one tray at a time from cabinet. Always reseat an extended tray before you extend a second tray. You may replace a power supply FRU with the tray merely in the extended position, and the unaffected drive, could remain powered/ operational. You must remove the tray from the cabinet, and place it on a suitable work surface if either drive FRU requires replacement.

1. Make sure there is not active I/O to/from host at the affected drive.

2. If applicable, unload tape cartridge.

   Note: To manually remove a T9940 tape cartridge from the drive, see .

3. Open the cabinet rear door:

   a. Lift the lock shield.

   b. If locked, unlock the door with a key.

   c. Press on the key cylinder; the door handle unlatches.

   d. Turn the door handle counterclockwise to open the door.
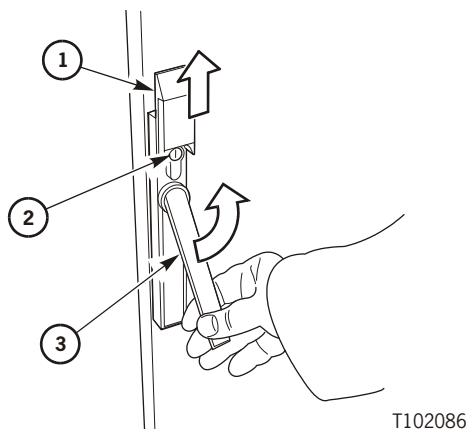
1. Lock Shield
2. Key Cylinder
3. Handle

T102086

4. Prepare a tray for extension/removal:

   a. Make sure adequate cable slack is present.

   b. Remove the two rear screws from top cover of the tray.

   Note: If preparing to extend a tray for power supply FRU replacement, skip steps c through f, and go to step 5.

   If preparing to remove a tray for drive FRU replacement, continue with step c.

   c. Set power switch to OFF (O).

   d. Disconnect power cord.

   e. Disconnect TCP/IP cables, if present, from the Maintenance Ports.

   f. Disconnect both interface cables.
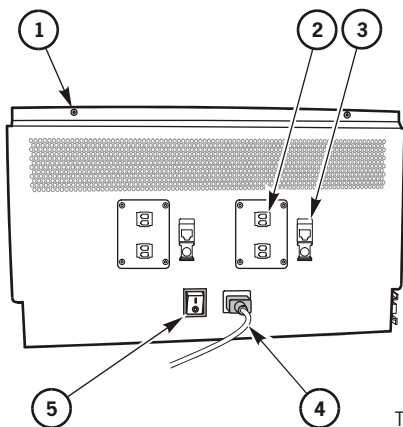
1. Cover Screw (2x)
2. FC Interface Ports (4x - 2 per drive)
3. TCP/IP Maintenance Port (2x)
4. Power Switch
5. AC Power Cord

T102068

5. Remove four mounting screws (Torx T15) that hold the tray in place.

1. Mounting screw (4x)
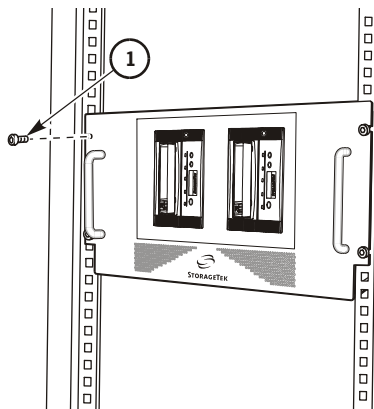
T102080

CAUTION:
CABINET INSTABILITY POTENTIAL. Extended equipment trays place weight forward of the cabinet. MAKE SURE ONLY ONE EQUIPMENT TRAY IS EXTEND AT A TIME, AND THE STABILIZER IS ATTACHED TO THE CABINET FRONT BOTTOM.

6. Pull the tray assembly out until it stops.

   Note: The tray stops when a spring latch on each slide rail pops into the stop position.

7. Remove three top cover screws (Torx T15) from each side of the tray.

8. Remove the tray top cover.

1. Cover Screw (3x, each side)
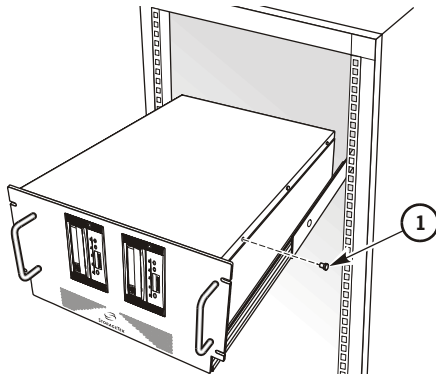
T102123

Note: You can replace either power supply FRU with the tray in the extended position. When replacing a power supply FRU, return to "Power Supply Removal," step 2 on page 6-10.

You must remove the tray from the cabinet and place it on a work surface when replacing either drive FRU. Continue with step 9 to remove tray.

WARNING:
HEAVY OBJECT. The rack-mount tray weighs over 36 kg (80 lb), and is awkward to move. Failure to maintain adequate control and support during removal could result in injury to personnel, and/or damage to equipment. OBTAIN ASSISTANCE FOR REMOVAL FROM THE RACK.

9. Remove the tray and place it on a work surface.

   Note: Press both spring latches (one on each slide rail) to release the tray.

   1. Spring latch (2x)
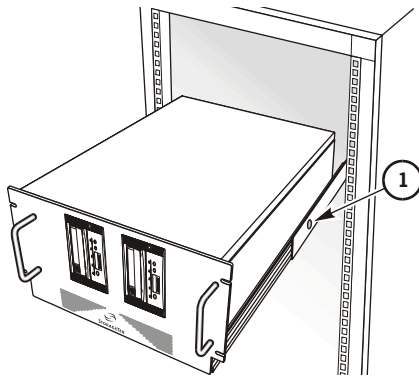
T102079

10. Return to "Drive Removal," step 2. on page 6-12.

Power Supply Removal

This procedure removes a power supply FRU from the rack-mount tray.

1. Complete the instructions in "Prepare Tray for Maintenance" on page 6-6.

2. Set the power supply power switch to OFF (O).

3. Disconnect the AC power cord from the power supply.

4. Disconnect the drive power cable (P2) from the power supply.

   Note: Press on connector latch clip to release the connector.
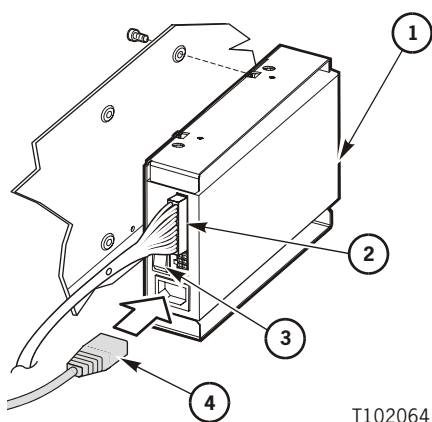
1. Power Supply
2. Drive power cable (P2)
3. Power Switch
4. AC Power Cord

T102064

CAUTION:
EQUIPMENT DAMAGE. Failure to adequately support power supply while removing screws could result in damage to the power supply and/or nearby tape drive.

5. Remove the power supply from the tray:

   a. Support the power supply with one hand.

   b. Remove all four power supply mounting screws (Torx T15) from the tray side wall.
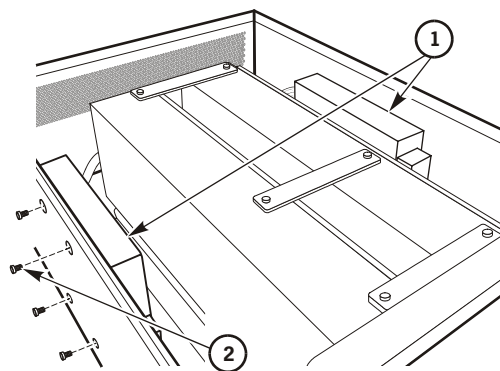
1. Power Supply (2x)
2. Mounting screws (4 per power supply)

T102118

Power Supply Replacement

This procedure installs a power supply FRU into the rack-mount tray.

1. Position the replacement power supply with the fan toward the front of tray.

2. Align and insert four mounting screws through the tray side wall.

3. Tighten all four power supply mounting screws (Torx T15).

   Note: The recommended torque for power supply mounting screws is
   1.13 Nm (10 in. lb).
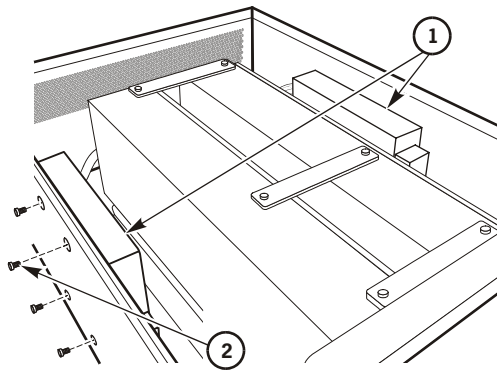
1. Power Supply (2x)
2. Mounting screws (4 per power supply)

T102118

4. Connect the drive power cable (P2) to the power supply.

   Note: Make sure the connector latch clip snaps into position to secure connector.

5. Connect the power cord to the power supply.

6. Make sure the power supply power switch is set to ON (|).

   Note: If the power switch is not on, the power supply and drive will not operate.
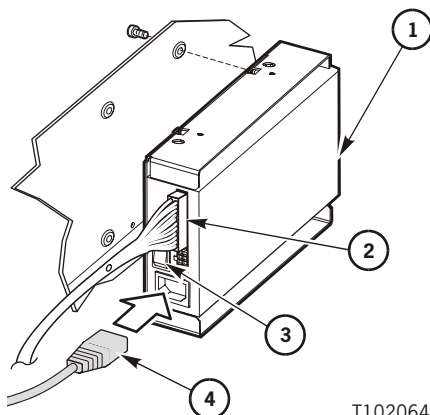
1. Power Supply
2. Drive power cable (P2)
3. Power Switch
4. AC Power Cord

T102064

7. Complete the instructions in

Drive Removal

The following procedure removes the drive FRU from the rack-mount tray.

Always force a dump on a defective drive before you turn off power to the drive. This dump provides information of the present state of the drive. Failure Analysis uses this data to diagnose drive malfunctions. See "Forced Dump" on page 4-7.

1. Complete the instructions in "Prepare Tray for Maintenance" on page 6-6.

2. Disconnect the drive power cable (P53) from each drive.

   Note: Press on connector latch clip to release the connector.

   Make sure the drive power cables on both drives are disconnected.

3. Disconnect the TCP/IP jumper cable from each drive Maintenance Port.

4. Disconnect the FC interface jumper cable from each drive.

   Note: Make sure the FC interface jumper cables on both drives are disconnected.
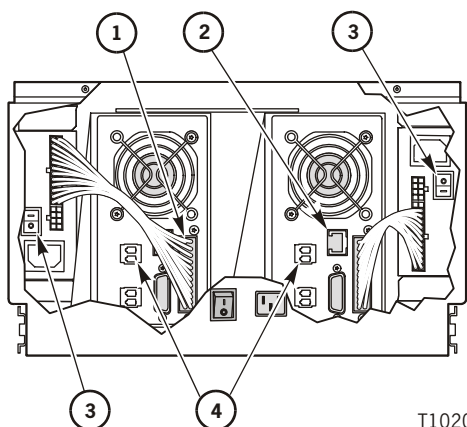
1. Drive Power Cable (P53)
2. TCP/IP Maintenance Port
3. Power Switch
4. FC Interface Ports

T102063

5. Remove the six drive carriage mounting screws (Torx T25).

   Note: A 6-inch, or longer, driver extension is required to reach carriage screws.

CAUTION:
HEAVY OBJECT. The drive carriage weighs approximately 18 kg (40 lb), and is awkward to move. Failure to adequately control and support the carriage could result in damage to the drives and/or the adjacent power supplies. OBTAIN ASSISTANCE FOR LIFTING THE DRIVE CARRIAGE OUT OF THE TRAY.

6. Lift the drive carriage out of the tray and place it on a work surface.

   Note: Straps across drives may be used to lift the drive carriage.
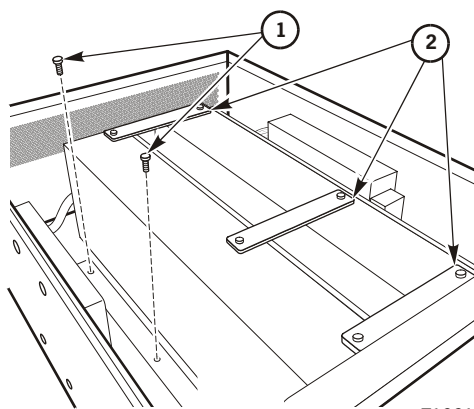
1. Carriage Mounting Screw (6x)
2. Strap

T102119

7. Remove the front foam spacer from the front of both drives.

8. Remove all six drive strap mounting screws (Torx T15), and remove all three drive straps.

9. Remove all five drive mounting screws (Torx T15) from the right carriage position.

10. Remove the drive from the right carriage position.

   Note: You can replace the drive in the right carriage position without disturbing the left carriage position. However, to remove the drive from the left carriage position, you must first remove the drive in the right carriage position.

   If the drive in the left carriage position is defective, continue with step 11.

11. Remove all five drive mounting screws (Torx T15) from the left carriage position.

12. Remove the drive from the left carriage position.
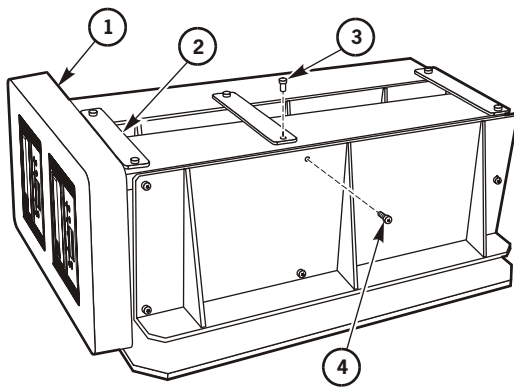
1. Foam Spacer
2. Strap (3x)
3. Strap Screw (6x)
4. Drive Screw (5x, per drive)

T102120

Drive Replacement

This procedure installs a drive FRU into the rack-mount tray.

1. Remove the upper bezel from the defective drive and install it on the replacement drive.

    Note: The bezel is held by one screw (Torx T6) on each side of the drive. Replace upper bezel (PN 312764003), if damaged.

    1. Bezel Screw (2x)

    T102121
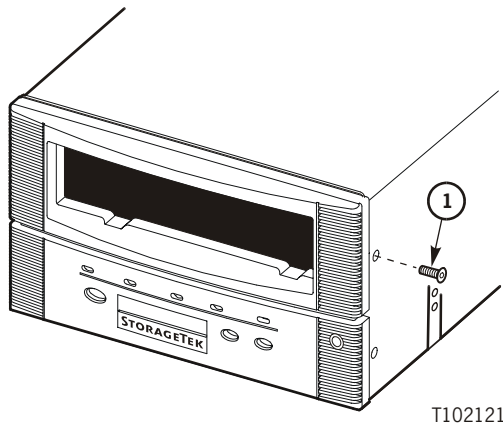
2. Unlock the replacement drive head-restraint mechanism.

    a. Locate the hole in the top cover.

    b. Use a small, common screwdriver, or other pointed tool to "unlock" the restraint.

    c. Slide the head-restraint mechanism to the "Unlock" position (toward outside of drive).

    Note: If the head restraint is not unlocked, the drive will be inoperable. (FSC: CHK 5A33)

    1. Head Restraint Access Hole
    2. Tool
    3. Unlock
    4. Lock
    5. Front of Drive

    T102122
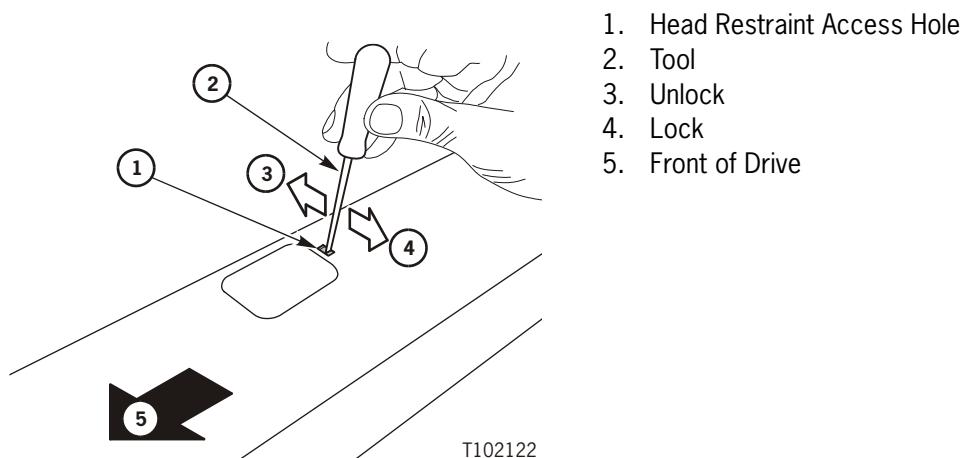
Notes: In steps 3 through 9, comply with the following installation requirements

- The drive carriage must be balanced with two installed drives. Do not install a drive carriage with only one installed drive into the rack-mount tray.

- Make sure a drive is installed in left carriage position before you install a drive into the right carriage position.

- Bias the drive toward rear of the carriage before you tighten mounting screws.

- The recommended torque for drive/strap mounting screws is 1.13 Nm (10 in. lb).

3. Place a drive into the left carriage position.

4. Install five mounting screws through the carriage wall.

5. Bias the drive toward carriage rear, and tighten all drive mounting screws (Torx T15).

6. Place a drive into the right carriage drive position.

7. Insert five mounting screws through the carriage wall.

8. Bias the drive toward carriage rear, and tighten all drive mounting screws (Torx T15).

9. Position the three drive straps, and install the six drive strap mounting screws (Torx T15).

10. Install the foam spacer over the two drive fronts.

11. Make sure the spacer is pulled flush against back of the drive bezels.
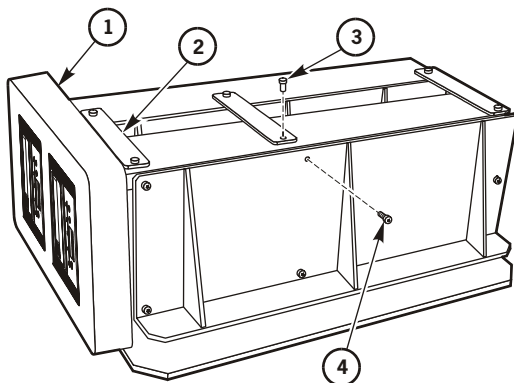
1. Foam Spacer
2. Strap (3x)
3. Strap Screw (6x)
4. Drive Screw (5x, per drive)

T102120

CAUTION:
HEAVY OBJECT. The drive carriage weighs approximately 18 kg (40 lb), and is awkward to move. Failure to adequately control and support the carriage could result in damage to the drives and/or the adjacent power supplies. OBTAIN ASSISTANCE TO LIFT AND POSITION THE DRIVE CARRIAGE INTO THE TRAY.

LOOSE CABLES. Interface jumper cables and/or drive power cables could be damaged if trapped underneath drive carriage. MAKE SURE CABLES ARE HELD CLEAR WHILE POSITIONING THE DRIVE CARRIAGE.

12. Lift and position the assembled drive carriage into the rack tray.

    Note: The straps across the drives may be used to lift the drive carriage.

13. Insert six carriage mounting screws (Torx T25)through the carriage floor.

    Note: A 6-inch, or longer, driver extension required to reach the carriage screws.

14. Torque all six drive carriage mounting screws to 2.26 Nm (20 in. lb).
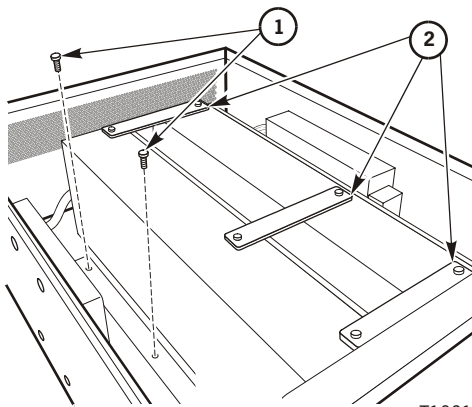
1. Carriage Mounting Screw (6x)
2. Strap

T102119

15. Connect the FC interface jumper cable to each drive.

    Note: Fibre Channel drive FRU ship with protective covers. Make sure cover is removed before inserting the interface connector.

    Make sure replacement drive fiber optic ports are clean.
    See "Fiber Optic Ports" on page 6-39 for cleaning procedures.

16. Connect the TCP/IP jumper cable to the each drive Maintenance Port.

17. Connect the drive power cable (P53) to each drive.

    Note: Make sure the connector latch clip snaps into position to secure connection on both drives.

18. Make sure the power switch on each power supply is set to ON (|).

    Note: If the power switch is not on, the power supply and drive will not operate

1. Drive Power (P53)
2. TCP/IP Maintenance Port
3. Power Switch
4. FC Interface Ports

T102063
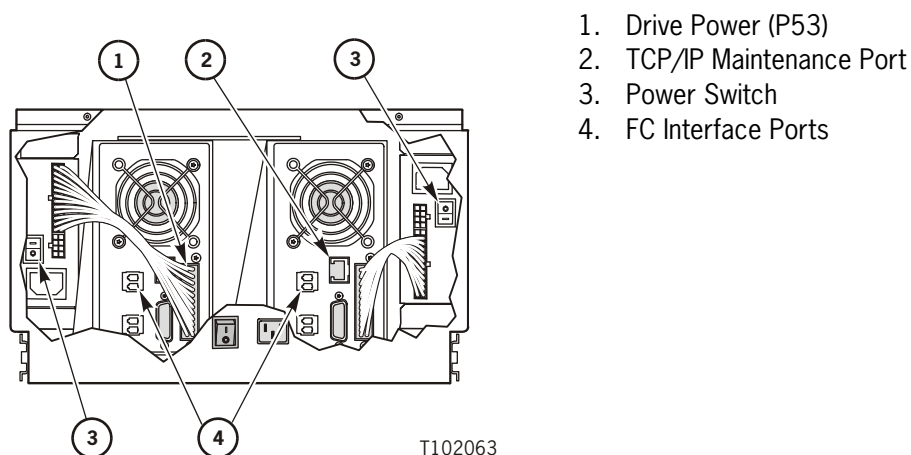
19. Complete the instructions in "Reseat Tray in Rack and Verification" on page 6-19.

Reseat Tray in Rack and Verification

This procedure reinserts rack-mount tray (if removed), replaces tray top cover, reseats tray into rack cabinet, and verifies drive operation.

WARNING:
HEAVY OBJECT. The rack-mount tray weighs over 36 kg (80 lb), and is awkward to move. Failure to maintain adequate control and support during insertion could result in injury to personnel, and/or damage to equipment. OBTAIN ASSISTANCE FOR INSERTING THE TRAY RAILS INTO THE RACK SLIDES.

Note: If the rack-mount tray was not removed from the cabinet, go to step 2.

1. Insert the rack-mount tray rails into the rack cabinet slides and push the tray in until both spring latches catch.

1. Spring Latch
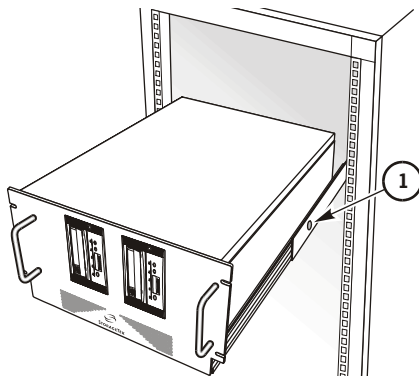
T102079

2. Position the tray top cover and secure with three screws (Torx T15) on each side.

1. Cover Screw (3x, each side)
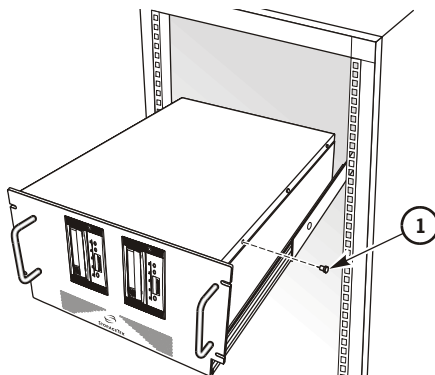
T102123

3. Press on the spring latches (one on each rail) and push the tray fully into the cabinet.

1. Spring Latch (2x)
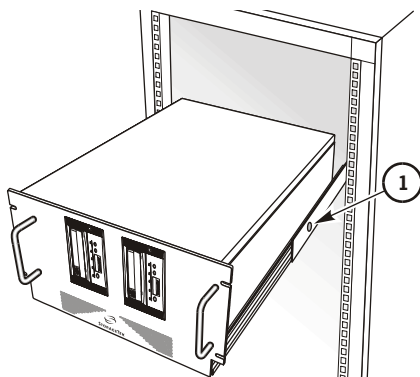
T102079

4. Secure the tray with four drive tray mounting screws (Torx T15).

1. Mounting Screw (4x)
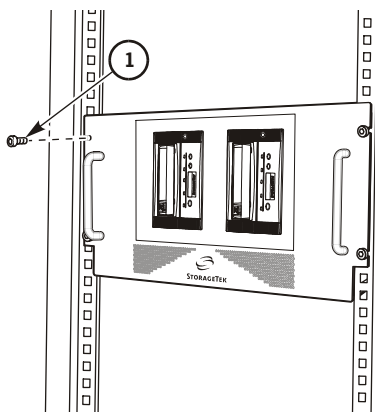
T102080

5. Insert and tighten the remaining two top cover screws (Torx T15) at the back of the tray.

6. Reconnect the power cord to the tray.
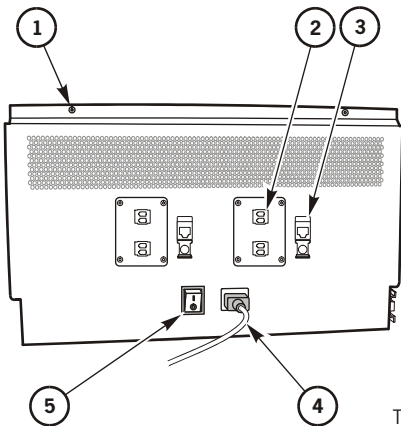
1. Cover Screw (2x)
2. FC Interface Ports (4x - 2 per drive)
3. TCP/IP Maintenance Port (2x)
4. Power Switch
5. AC Power Cord

T102068

7. Set the power switch to ON (|), and make sure both drives perform IPL without errors.

Notes:

- A steady asterisk (*) displayed on the operator panel indicates an error-free IPL.

- If CHK 5A33 displays, the R/W head-restraint system is locked.
  See step 2 of "Drive Replacement", on page 6-15.

- If CHK 4966, 4AF4, or 5540 displays, the drive power cable is reversed. Make sure P2 is connected to the power supply and P53 is connected to the drive.

8. Check/change the drive configuration. See Chapter 5, "Indicators and Messages."

Notes:

- If the drive was not replaced, the configuration of the drive should not have changed.

- If the drive was replaced, the replacement drive must be configured to previously recorded settings.

9. Set the power switch to OFF (O), and reconnect the interface cables to the rear panel.

10. Connect the TCP/IP cables, if present, to the rear panel.

11. Set the power switch to ON (|), and make sure both drives perform IPL without errors.

    Note: A steady asterisk (*) on the operator display indicates completed IPL error free.

12. Close and latch the cabinet rear door.

13. Inform the operator that the drives are available.

14. Go to "Prepare Defective T9940B FRU for Shipment" on page 6-32.

■ Tape Malfunctions

In the event that a tape malfunction occurs during thread/unthread operation, a detached leader block is likely to still be inside the thread/unthread path. When this occurs, the operator panel displays CHK 5C62 or CHK 5C72. The tape cartridge and detached leader block must be manually extracted from the drive, repaired for a one-time data transfer use, and then returned to StorageTek.

Detached Leader Block Recovery

Use the following procedure to rewind the small amount of tape that might still be in the thread path, extract the leader block, and eject the tape cartridge from the drive.

Prepare Drive

This procedure prepares the drive for leader block recovery.

1. Remove the drive from the rack-mount tray. See "Drive Removal" on page 6-12.

2. Place the drive upright on an ESD qualified work surface.

> **CAUTION:**
> **ESD DAMAGE. The drive's electronic circuits are vulnerable to ESD damage with top cover removed. OBSERVE THE GUIDELINES listed in "Electrostatic Discharge (ESD) Damage Prevention" on page xxi.**

3. Remove sixteen screws (T6 Torx Plus bit) that secure the top cover.

   Note: Two screws are on the top of the drive (back area).
   Seven screws are on each side of the drive (14 screws)
   Rearmost right side screw is under the warranty sticker.

4. Lift off the top cover.
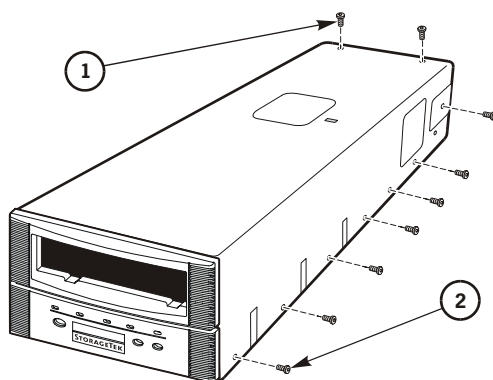
1. Cover screw (2x, top)
2. Cover screw (7x, each side)

T102067

CAUTION:
POTENTIAL HEAD DAMAGE. T9940B tape carriage movement, with the wrap ring out of position, could cause the wrap ring to contact and damage the R/W head.
MAKE SURE BOTH HEAD-PROTECT PINS ARE PROPERLY IN PLACE before any repositioning of a T9940B tape carriage.

5. Insert two head-protect pins into the holes on each side of the R/W head area.
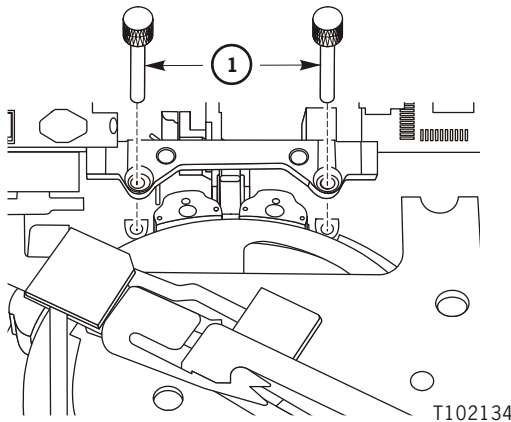
1. Head Protect Pin (2x)
   Note: Two head-protect pins (PN 3144124) are contained in Field Bill 102916.

T102134

6. Determine current position of the tape carriage.

   Note: If the tape carriage is in the read/write position (close to R/W head, as shown), it must be moved out of the read/write position before you can wind tape back into the cartridge.

   If the tape carriage is not in the read/write position, skip step 7.

7. Turn both black plastic tape carriage cam gears towards the front of drive into a detent position, approximately 10 mm (0.375 in.).

   Note: This action moves the tape carriage away from the head to allow you to wind the tape into the cartridge, in the following steps.

1. Left Cam Gear
2. Right Cam Gear

T102102
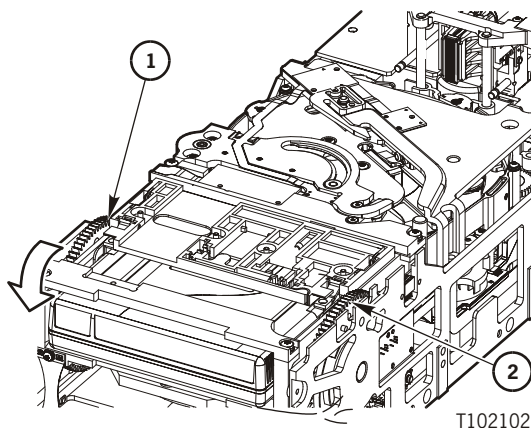
Extract Leader Block and Eject Tape Cartridge

This procedure extracts a detached leader block from the thread path, and ejects the tape cartridge from the loader mechanism.

CAUTION:
EQUIPMENT DAMAGE. Exposed flex cables are vulnerable to damage. AVOID TOUCHING THE FLEX CABLES WHEN YOU HANDLE THE DRIVE.

Note: If any amount of tape remains in the thread path, it must be rewound into the cartridge. Perform steps 1 through 4 to make sure all tape is in the cartridge.

1. Carefully reposition the drive on the work surface, with the file reel motor access hole extended just beyond the edge of the work surface.

2. Insert a T25 Torx Tip driver (or 5/32 Allen wrench/driver) into the file reel motor shaft.

1. Tape Cartridge
2. Driver/wrench
3. Machine Reel

T102104
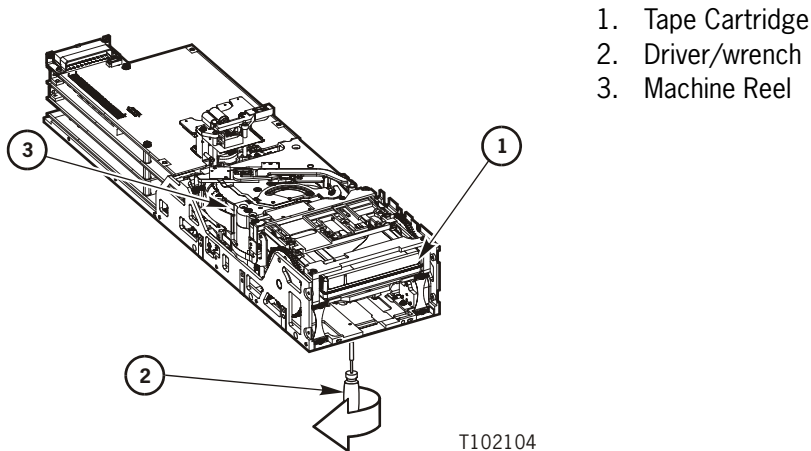
3. Slowly turn the driver/wrench clockwise, as viewed from above, to rewind the tape back into the cartridge.

   Note: The detached leader block remains in the thread path.

4. Remove the driver/wrench from the file reel motor shaft.

CAUTION:
BEARING DAMAGE. Skin contaminants cause corrosion. DO NOT TOUCH
THE "D" BEARING SURFACES WHEN YOU MOVE THE WRAP RING.

5. Rotate the wrap ring until the head/cleaner notch is aligned with the R/W head.

   Note: This alignment ensures a clear path for the detached leader block.
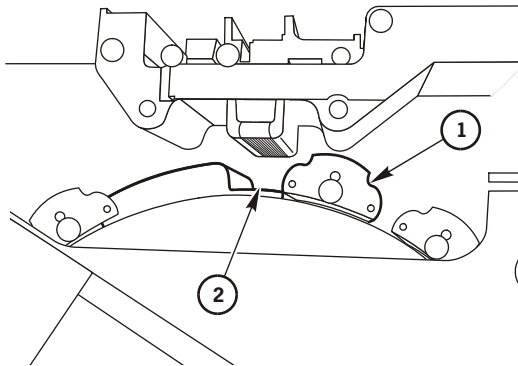
   1. "D" Bearing
   2. Head Cleaner Notch

T102105

6. Rotate the machine reel to align the thread arm slot with the machine reel cam path.

   Note: This alignment allows for extraction of the detached leader block.
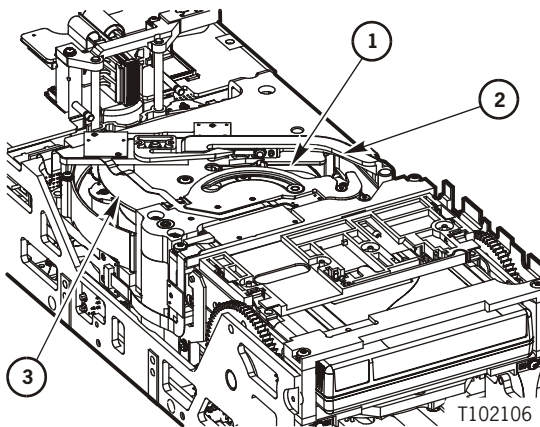
   1. Thread Arm Shaft
   2. Take-up Reel Cam Path
   3. Machine Reel

T102106

7. Locate the detached leader block in the thread path.
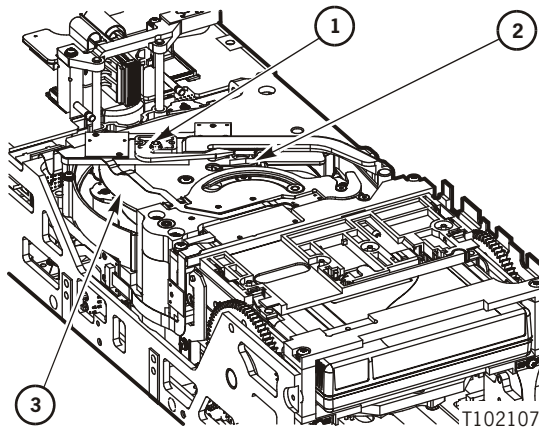
1. Thread Arm
2. Detached leader Block
3. Machine Reel

T102107

8. Insert a 5/64 Allen wrench/driver into the thread arm motor shaft.
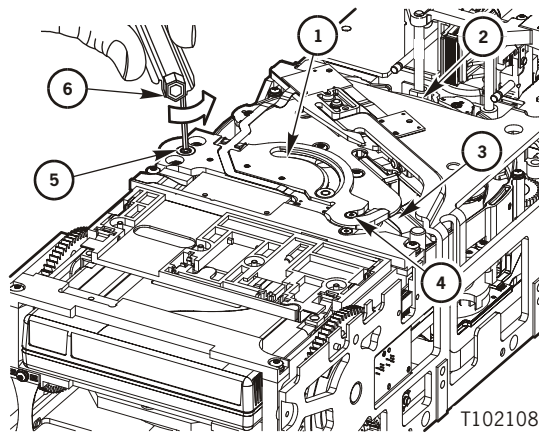
1. Threader Base
2. Machine Reel
3. Thread Arm Slot
4. Thread Arm
5. Thread Arm Motor Shaft
6. Allen Wrench

T102108

9. Turn the Allen wrench counterclockwise to move leader block toward to the cartridge.

   Note: As the leader block approaches the cartridge, use a pointed tool, such as a guarded scribe, to keep the leader block parallel to the side of the drive.

10. Continue to turn the motor until the thread arm is at the end of the thread path and the leader block snaps into the cartridge.

CAUTION:
BEARING DAMAGE. Skin contaminants cause corrosion. DO NOT TOUCH
THE "D" BEARING SURFACES WHEN YOU MOVE THE WRAP RING.

11. Move the wrap ring a small amount clockwise until head/cleaner notch is just past the R/W head. Avoid rotating the machine reel with the wrap ring.

    Note: This makes sure the wrap ring "D" bearings and the machine reel do not interfere with threader base movement during the next step.

1. Read/Write Head
2. Head Cleaner Notch
3. "D" Bearing
4. Wrap Ring

T102109
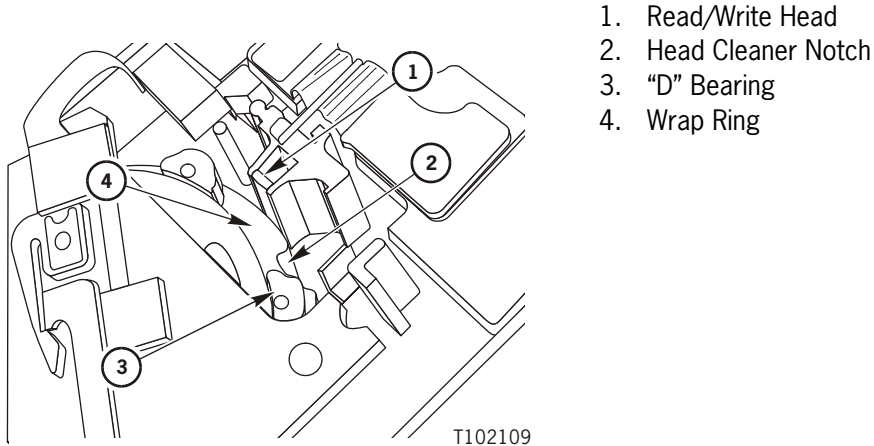
12. Turn both black plastic tape carriage cam gears simultaneously towards front of drive until the tape cartridge ejects.

    Note: The threader base lowers during this action. If the threader base is impeded by the "D" bearings or the machine reel, repeat step 11 to clear the interfering "D" bearing.

13. Remove the tape cartridge from the drive.

1. Left Cam Gear
2. Right Cam Gear

T102102
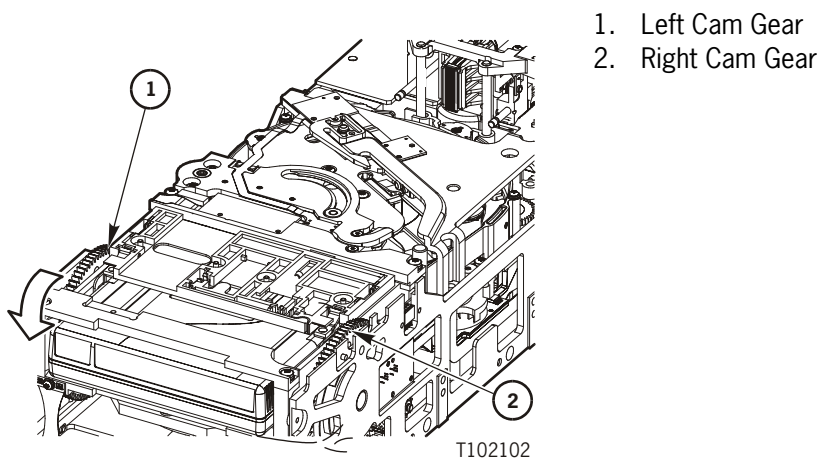
Reassemble Drive

This procedure reassembles the drive for reinstallation or shipment.

CAUTION:
ESD DAMAGE. Circuit components near the wrap ring end stop are vulnerable to ESD damage. AVOID TOUCHING CIRCUIT COMPONENTS WHILE YOU POSITION THE WRAP RING END STOP.

1. Make sure the wrap ring end stop, near the large flex cable, is in the fully counterclockwise position by carefully pushing the outer rim toward the drive rear.

    Note: The wrap ring end stop could have been nudged out of position during leader block and tape cartridge extraction. If the wrap ring end stop is out of position, the drive will not initialize properly.
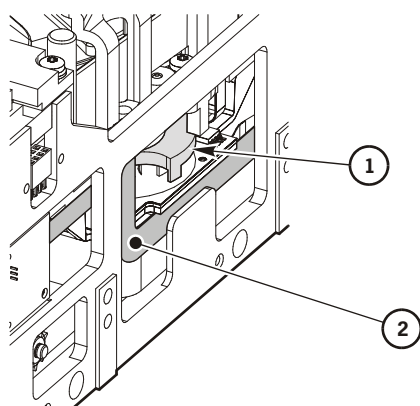
1. Wrap Ring End Stop
2. Large Flex Cable

T102110

2. Turn both black plastic cam gears towards the rear of the drive into a detent position after the threader base raises.

    Note: The first action of the cam gear raises the threader base. The detent position comes shortly after the threader base has risen.
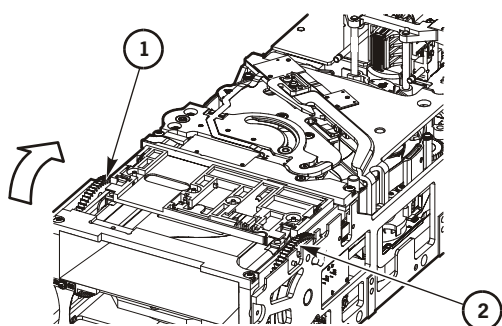
1. Left Cam Gear
2. Right Cam Gear

T102125

3. Rotate the wrap ring fully counterclockwise until it stops.

   Note: It will take more than 360 degrees counterclockwise rotation; and, there will be some resistance as the wrap ring nears the end on rotation.

4. Move the left and right cam gears toward the rear of the drive all the way until they stop.

   Note: The lock pin slot will straddle the head-protect (lock) pin as the tape carriage completes movement toward the rear of the drive.

1. Read/Write Head
2. "D" Bearing
3. Wrap Ring

T102101
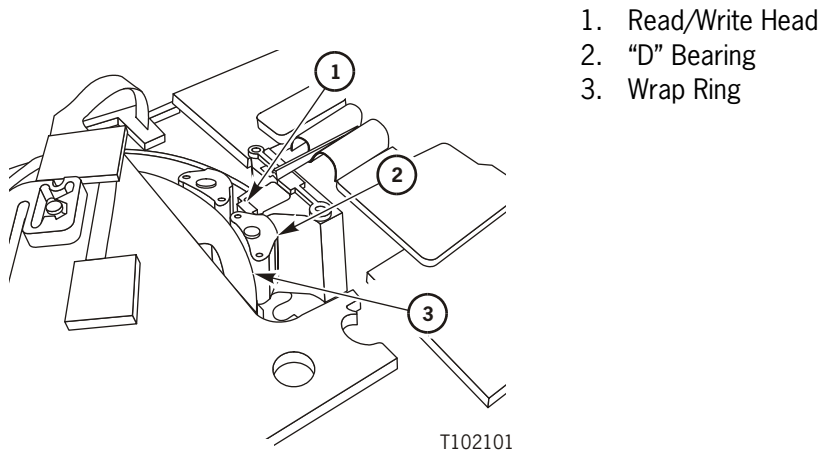
5. Remove both head-protect pins from each side of the R/W head area.

   Note: The T9940B drive top cover cannot be installed with head-protect pins in place. Make sure both pins are removed before you attempt to install a T9940B.top cover.
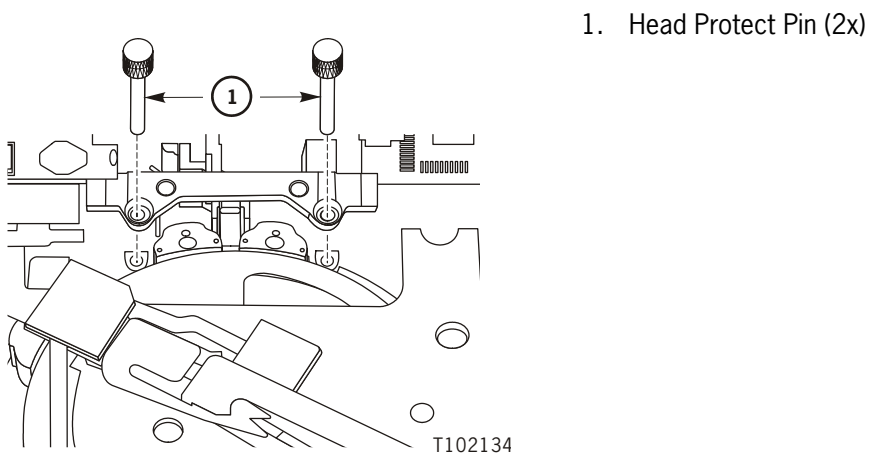
1. Head Protect Pin (2x)

T102134

CAUTION:
EXPOSED FLEX CABLES. Two large flex cables on both sides of the drive, and one small flex cable by the drive carriage (right side) could be snagged/damaged by the top cover. MAKE SURE ALL FLEX CABLES ARE SEATED WITHIN THE DRIVE.
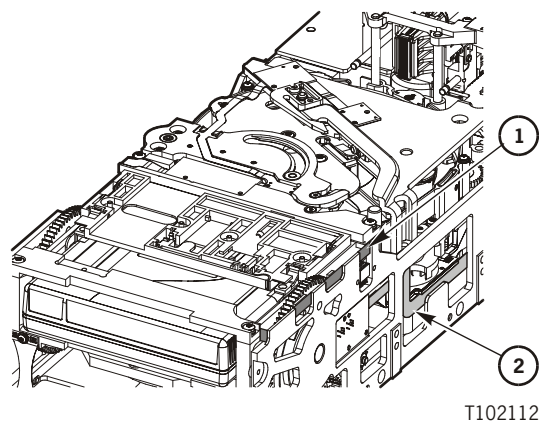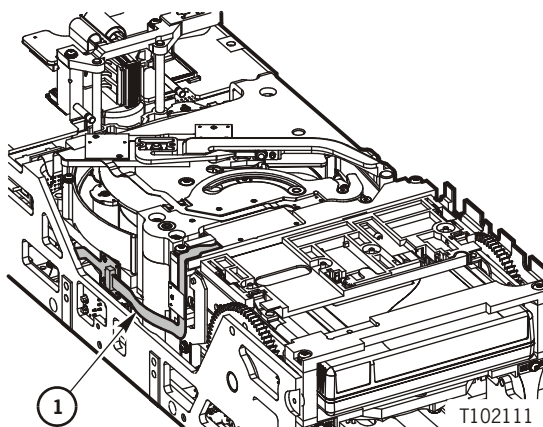
1.Large Flex Cable (One on each side)   2. Small Flex Cable

6. Install the top cover on the drive.

    Note: Sixteen screws (Torx Plus T6) secure the top cover.
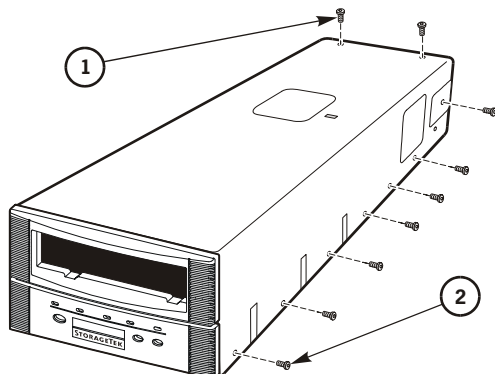
1. Cover Screw (2x, top)
2. Cover Screw (7x, each side)

7. Reinstall the original drive. See "Drive Replacement" on page 6-15.

Notes:

- The referenced procedure assumes a replacement T9940 drive, without an upper bezel, and a locked head restraint mechanism. When reinstalling the original drive, skip the bezel replacement steps; but, make sure the head restraint mechanism is in the unlocked position.
- Do not reinstall a drive that has previously broken a tape leader block. Replace it with a serviceable drive.
- If the original drive was replaced, make sure the head restraint mechanism, on the defective drive, is in the locked position; and, the shipping container is marked for Failure Analysis (see "Head Restraint and Packaging Procedure" on page 6-37).

Leader Block Replacement

This section describes the replacement of a broken leader block so that data can be transferred to a different tape cartridge. Return the repaired cartridge, identified by a red replacement leader block, to StorageTek for failure analysis.

1. Obtain Field Bill 62410 to replace the detached leader block.

    Note: The replacement leader block has a red body to flag the repaired cartridge for failure analysis.

2. Use the Field Instructions to attach the red leader block to the tape media

   CAUTION:
   TAPE DAMAGE. A servo track is written on the tape media at the factory. Degaussing the tape erases this track and renders the tape unusable and unrecoverable. DO NOT DEGAUSS A T9940 TAPE CARTRIDGE.

3. Transfer data from the repaired tape cartridge to a different tape cartridge.

   Note: If desired, security erase the repaired tape cartridge.

4. Open a Clarify/Pinnacle Issue for tracking purposes, and assign the primary issue:
   TYPE> ENBU, ID> NLTS

5. Package the repaired cartridge with the red leader block, the recovered original leader block, and all removed tape media (any sections cut off prior to leader block replacement).

   Note: Use bubble wrap to pad the package.

6. Send the package to StorageTek headquarters, ATTN: NLTS.

Tape Broken Midway in Drive

You must replace any drive that has tape broken midway within the drive, or the tape transport is inoperable. The removed drive, with the tape cartridge still loaded, must be shipped to StorageTek headquarters.

Note: StorageTek will remove the tape cartridge and attempt to recover as much data as possible. If necessary, contact Nearline Technical Support (NLTS) for assistance.

1. Remove the drive. See "Drive Removal" on page 6-12.

   Note: Do not attempt to remove the tape cartridge from the drive.

2. Make sure head restraint mechanism is locked. See figure on page 6-32.

3. Obtain a replacement drive and follow all the appropriate instructions in "Drive Replacement" on page 6-15 to install it.

4. Package the defective drive, with the loaded tape cartridge.

5. Ship the package to StorageTek headquarters, ATTN: NLTS.

■ Prepare Defective T9940B FRU for Shipment

Once a FRU removal and replacement is completed, you must prepare the defective FRU for shipment.

Simply repackage a defective power supply FRU in the shipping container retained from the replacement power supply and return it to the depot for shipment to StorageTek.

On a defective drive, move the tape carriage into the shipping position, and stabilize (lock) the read/write (R/W) before shipment.

Use either the "Automated Procedure", below, or the "Manual Procedure" on page 6-33, to place the tape carriage mechanism into the shipping position. Then, use "Head Restraint and Packaging Procedure" on page 6-37 to lock the R/W head and package the drive FRU for shipment.

Automated Procedure

If power can be applied to the drive, you can use the following procedure to move the tape carriage into the shipping position.

1. Make sure there is not a tape cartridge in the drive.

   Note: To manually remove a tape cartridge from the drive, or if the tape cartridge has a broken leader block, see "Detached Leader Block Recovery" on page 6-22.

2. Press and release the **Select** switch.

3. Press and release the **Unload** switch seven times.

4. Press and hold the **Unload** switch, and then press the **Select** switch.

5. Go to "Head Restraint and Packaging Procedure" on page 6-37 for final preparation for shipment.

Manual Procedure

If power cannot be applied to the drive, you must use the following manual procedure to move the media carriage into the shipping position.

1. Make sure there is not a tape cartridge in the drive.

   Note: To manually remove a tape cartridge from the drive, or if the tape cartridge has a broken leader block, see "Detached Leader Block Recovery" on page 6-22.

2. Remove sixteen screws (T6 Torx Plus bit) that secure the top cover.

   Note: Rearmost right side screw is under the warranty sticker.

3. Lift off the top cover.
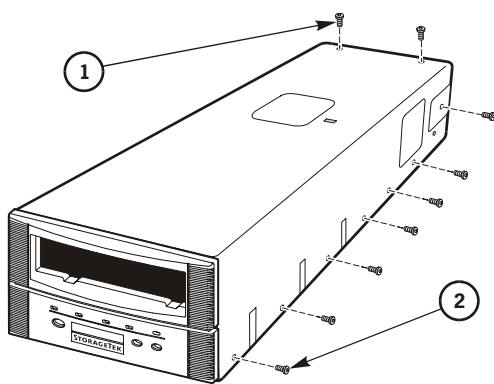
1. Cover Screw (2x, top)
2. Cover Screw (7x, each side)

T102067

CAUTION:
POTENTIAL HEAD DAMAGE. T9940B tape carriage movement, with the wrap ring out of position, could cause the wrap ring to contact and damage the R/W head.
MAKE SURE BOTH HEAD-PROTECT PINS ARE PROPERLY IN PLACE before any repositioning of a T9940B tape carriage.

4. Insert two head-protect pins into the slots on each side of the R/W head area.
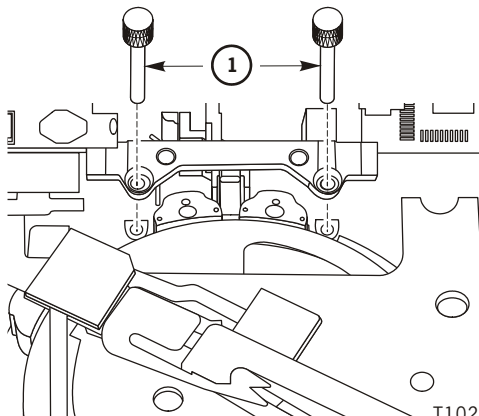
1. Head Protect Pin (2x)
   Note: Two head-protect pins (PN 3144124) are contained in Field Bill 102916.

T102134

5. Turn both black plastic cam gears towards the rear of the drive into a detent position after the threader base raises.

    Note: The first action of the cam gear is to raise the threader base. The detent position comes after the threader base has risen.
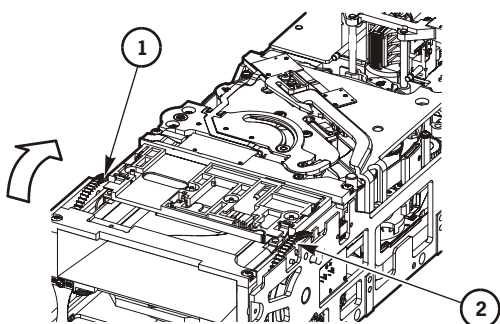
    1. Left Cam Gear
    2. Right Cam Gear

    T102125

6. Move the wrap ring fully counterclockwise until it stops.

    Note: It will take more than 360 degrees counterclockwise rotation until the two "D" bearings stop in front of the R/W head.

    There will be some resistance as the wrap ring nears the end of rotation.
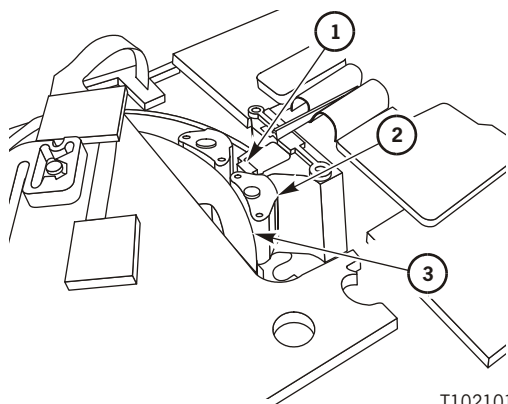
    1. Read/Write Head
    2. "D" Bearing
    3. Wrap Ring

    T102101

7. Move the left and right cam gears toward the rear of the drive all the way until they stop.

   Note: The tape carriage is now in the shipping position, with the R/W head between the two "D" bearings.
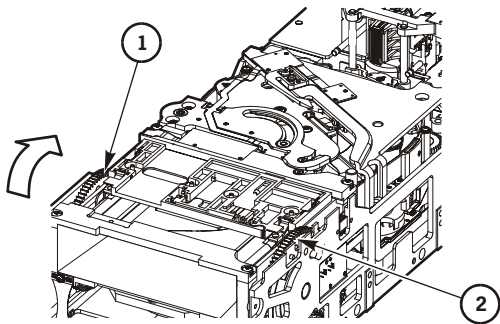
1. Left Cam Gear
2. Right Cam Gear

T102125

8. Remove both head-protect pins from slots on each side of the R/W head area.

   Note: The T9940B drive top cover cannot be installed with head-protect pins in place. Make sure both pins are removed before you attempt to install the top cover on a T9940B drive.
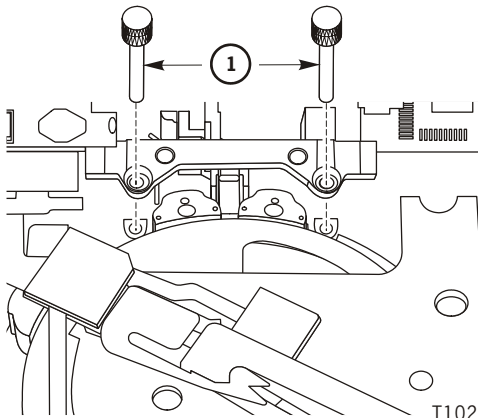
1. Head Protect Pin (2x)

T102134

CAUTION:
EXPOSED FLEX CABLES. Two large flex cables on both sides of the drive, and one small flex cable by the drive carriage (right side) could be snagged/damaged by top cover. MAKE SURE FLEX CABLES ARE SEATED WITHIN THE DRIVE before you position the top cover.
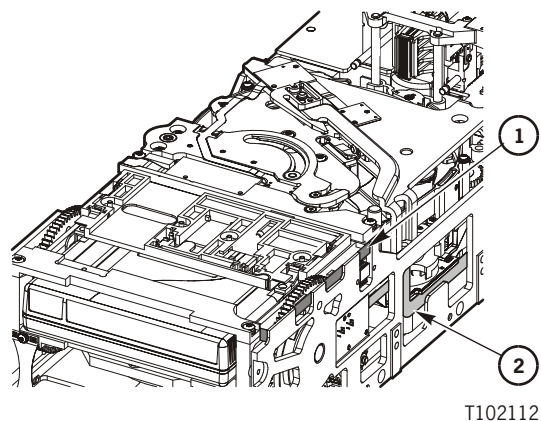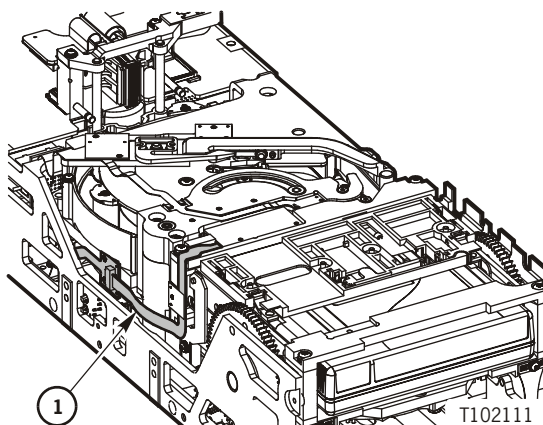
1.Large Flex Cable (One on each side)   2. Small Flex Cable

9. Install the top cover:

    a. Carefully position top cover the top cover on the drive.

    b. Insert all 16 screws loosely into the drive.

    Note: Seven screws on each side, and two screws on top of cover.

    c. Tighten all cover screws (T6 Torx Plus bit) to secure the top cover.
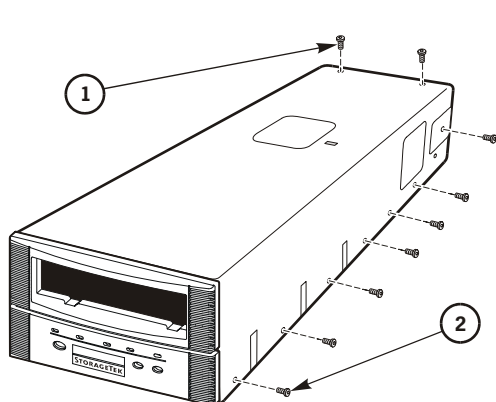
1. Cover Screw (2x, top)
2. Cover Screw (7x, each side)

10. Go to "Head Restraint and Packaging Procedure" on page 6-37 for final preparation for shipment.

Head Restraint and Packaging Procedure

Make sure the R/W head-restraint mechanism is locked before you package the drive FRU for shipment.

CAUTION:
FRAGILE HEAD. An unlocked drive R/W head will be damaged during shipment. STABILIZE/LOCK the drive R/W head prior to shipment.

1. Lock the R/W head-restraint mechanism of the defective drive FRU.

   a. Locate the access hole in the top cover.

   b. Use a small, common screwdriver to slide the mechanism toward the center of the drive to "lock" the R/W head. (See illustration below.)

1. Head Restraint Access Hole
2. Tool
3. Unlock
4. Lock
5. Front of Drive
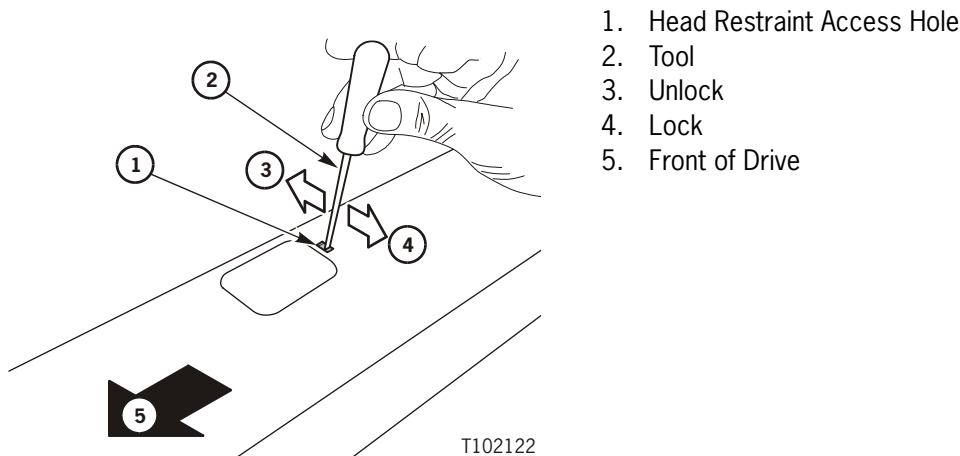
T102122

CAUTION:
SHIPPING DAMAGE. A T9940B drive FRU will be damaged in shipment if it is packed in any packaging other than T9940B drive FRU specific packaging. MAKE SURE T9940B DRIVE FRU IS PACKED ONLY IN T9940B SPECIFIC PACKAGING.

2. Package the defective drive FRU in the same packaging that the replacement drive FRU was delivered in, and return it to the depot for shipment to StorageTek.

Notes:

1. The T9940B drive FRU packaging is clearly marked with "**T9940B**", and has additional shock-resilient material fore and aft of the drive FRU compartment. DO NOT package a T9940B drive FRU in a T9940A drive FRU packaging.

2. If the drive FRU is to be sent to Failure Analysis (FA), mark all four sides of the container with: **"FA Required"**, and include the open Clarify/Pinnacle number.

■ Cleaning

This section describes how to clean fiber-optic components.

Note: See the *Fiber-Optics User's Guide*, PN 9433; for more information about fiber-optics, including safety, installation, and specifications.

Follow all fiber optic safety precautions in "Fiber Optic Safety" on page xxiii.

Cleaning Materials

The cleaning instructions require the following materials:

- alcohol pads
- cloth pads
- Texwipe micro-swabs
- Texwipe foam swabs.

Fibre Channel Cable Connector

To clean a fibre channel cable (Figure 6-1):

1. Blow any dust from the ferrule and the connector using compressed air.

   Note: Position the air nozzle approximately 50 mm (2 in.) away from the connector and blow for 5 seconds.

2. Gently wipe the ferrule and the connector with an alcohol pad.

   Note: Make sure the pad makes full contact with the end surface.

3. Wait 5 seconds for the surface to dry.

4. Repeat Step 1.

5. Wipe the ferrule and the end surface of the connector using a clean surface of the alcohol pad.

6. Wait 5 seconds for the surface to dry.

7. Repeat Step 1 for final cleaning.

Figure 6-1. Fibre Channel Connector
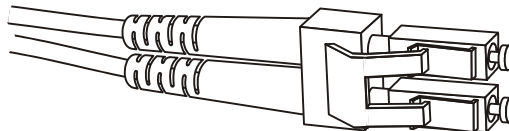
T102075

Fiber Optic Ports

To clean the drive ports (Figure 6-2):

1. Power off the drive.

2. Remove the FC cable and protective cap to gain access to Ports A and B.

3. Blow any dust from the ferrule and the port using compressed air.

   Note: Position the air nozzle approximately 50 mm (2 in.) away from the connector and blow for 5 seconds.

4. Clean the inside the optical ports with a micro-swab saturated with isopropyl alcohol.

5. Wait 5 seconds for the surface to dry.

Figure 6-2. Fibre Channel Drive Ports

T102124
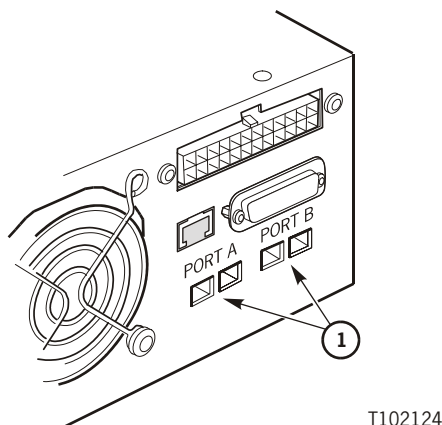
1. Fibre Channel Ports

6. Repeat Step 3.

7. Wipe the ferrule and the end surface of the port using a clean surface of the micro-swab.

8. Wait 5 seconds for the surface to dry.

9. Repeat Step 3.

10. Connect FC cable to Port A and protective plug to Port B.

11. Power on the drive and make sure it performs Initial Program Load (IPL) without errors.

    Note: A steady asterisk (*) on the operator display indicates the drive completed IPL and is online, but not loaded.

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Specifications

A

This appendix contains the following information about the T9940BR3 rack-mount configuration:

- Rack-Mount Physical Specifications
- Power Specifications
- Tape Drive Performance Specifications
- Tape Cartridge Specifications
- Environmental Requirements

Note: The specifications in this appendix can change. For current information, contact your StorageTek representative.

■ Rack-mount Tray Physical Specifications

The rack-mount configuration consists of two T9940B Tape Drives, on a shock mount carriage, and two wall-mounted power supplies within a rack-mount tray. Table A-1 lists the physical specifications of the configuration.

Table A-1. T9940BR3 Rack-mount Tray Physical Specifications

Width	483 mm (19.0 in.)
Depth	635 mm (25.0 in.) plus 76 mm (3 in.) for cables
Height	267 mm (10.5 in.)
Weight	36.5 kg (80.5 lb)

■ Power Specifications

Table A-2 lists the power specifications of the power supply, when paired with the T9940B Tape Drive.

Table A-2. Power Specifications

Characteristics	Value
Input voltage	100 to 240 VAC
Input frequency	50 to 60 Hz
Power consumption	82 VA
Power dissipation	280 Btu/hr

■ Tape Drive Performance Specifications

Table A-3 lists the performance specifications of the T9940B Tape Drive.

Table A-3. T9940B Tape Drive Performance Specifications

Characteristic	Value
Capacity and Performance	
Capacity, native	200 GB[1]
Data buffer size	64 MB
Tape speed, read/write	3.4 m/sec
Performance, native (head-to-tape)	
(uncompressed)	30 MB/sec[1]
(compressed, maximum)	70 MB/sec
Burst (Fibre Channel)	200 MB/sec
Interface data	
Fibre Channel	2 Gb
Ultra-SCSI HVD	N/A
ESCON	N/A
Access times	
Tape load and thread to ready	18 sec
File access (average)	41 sec
Rewind to logical BOT	
(maximum/average)	90/45 sec
Unload	18 sec
Reliability	
Mean time between failure (MBTF)	
Power on @ 100% duty cycle	290,000 hr
Tape load @ 10 loads/day (100,000 loads)	240,000 hr
Tape path motion (TPM) @ 70% duty cycle	196,000 hr
	8.5 yr.
Head life @ 70% TPM duty cycle	1×10^{-18}
Uncorrected bit error rate	1×10^{-33}
Undetected bit error rate	

1. VR[2] is a trademark of Overland Storage.
   VR[2] technology is used to achieve T9940B capacity and performance.

■ T9940 Tape Cartridge Specifications

Table A-4 lists the tape cartridge physical and performance specifications.

Table A-4. T9940 Tape Cartridge Specifications

Characteristic	Value
Cartridge physical data	
Drive compatibility	T9940A, T9940B
Form factor	1/2 in. cartridge, 3490/3490E
Width	109 cm (4.29 in.)
Length	125 cm (4.92 in.)
Height	25.4 cm (1.00 in.)
Weight	262 g (9.17 oz)
Drop strength	1.00 m (39.4 in.)
Tape media data	
Capacity, native (uncompressed)	60 GB (Low density, T9940A)
	200 GB[1] (High density, T9940B)
Tracks	288 (Low density, T9940A)
	576 (High density, T9940B)
Track-following servo	Factory pre-recorded
	CAUTION: Bulk-erase will destroy pre-recorded servo tracks. DO NOT DEGAUSS T9940 TAPE CARTRIDGES.
Formulation	Advanced metal particle (AMP)
Physical thickness	9 microns (µm)
Physical length	700 m (2,296 ft)
Recordable length (including MIR)	650 m (2,134 ft)
Reliability	
Archival life	15 - 30 years
Short-length durability	80,000 write/read passes minimum
Long-life durability	3,000 write/read passes minimum
Load/unloads	10,000 minimum
Uncorrected bit error rate	1×10^{-18}
Permanent errors	Zero

1. VR^2 is a trademark of Overland Storage.

   VR^2 technology is used to achieve T9940B capacity.

■ Environmental Requirements

This section describes environmental requirements for the T9940B Tape Drive, power supply, and T9940 tape cartridge.

Tape Drive and Power Supply

Table A-5 lists the environmental requirements for the T9940B Tape Drive, and the power supply.

Table A-5. Tape Drive and Power Supply Environmental Requirements

Temperature	
Operating	15° to 32°C (60° to 90°F)
Storage	10° to 40°C (50° to 104°F)
Shipping	-40° to 60°C (-40° to 140°F)
Relative Humidity, Non-Condensing	
Operating	20% to 80%
Storage	10% to 95%
Shipping	10% to 95%
Wet Bulb Maximum	
Operating	29°C (84°F)
Storage	35°C (95°F)
Storage	35°C (95°F)
Operating	0 to 3.05 km (0 to 10,000 ft)
Storage	0 to 3.05 km (0 to 10,000 ft)
Shipping	0 to 15.24 km (0 to 50,000 ft)
Air Flow Requirements	
Maximum media temperature	49°C (120°F)
Maximum chip T_j	90°C (194°F) unless otherwise specified for a particular component

Tape Cartridges

Table A-6 lists the environmental requirements for T9940 Tape Cartridge.

Table A-6. Tape Cartridge Environmental Requirements

Temperature	
Operating[1]	15° to 32°C (60° to 90°F)
Storage (up to four weeks)	5° to 32°C (41° to 90°F)
Storage (archival)	18° to 26°C (65° to 79°F)
Shipping[2]	4° to 40°C (40° to 104°F)
Relative Humidity, Non-Condensing	
Operating[1]	20% to 80%
Storage (up to four weeks)	5% to 80%
Storage (archival)	40% to 60%
Shipping[2]	5% to 80%
Wet Bulb Maximum	
Operating[1]	26°C (78.8°F)
Storage (non-archive)	26°C (78.8°F)
Storage (archival)	26°C (78.8°F)
Shipping[2]	26°C (78.8°F) with no condensation

1. The conditioning time before use is 24 hours.

2. The shipping environment must not exceed the limit of the storage environment, archive or non-archive, for longer than 10 days.

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Firmware Maintenance

<div style="float:right">**B**</div>

This appendix contains supplemental instructions to obtain electronic files that contain micro-code for firmware update; and, to create code tapes (tape cartridges that contain micro-code for firmware update).

■ T9940B Firmware Electronic File

When you have Internet access to the StorageTek Customer Resource Center (CRC),
use the following procedure to download and extract the micro-code electronic file.

1. Log in to StorageTek CRC (http://www.support.storagetek.com.).

2. Navigate to T9940 Tape Drive, Code.

3. Select applicable T9940B micro-code file, and download to a PC local drive.

4. Log out of CRC.

5. Extract/unzip the micro-code release file (*.rel), and the accompanying release notes file (*.pdf).

■ T9940B Code Tape

The T9940B Tape Drive is capable of downloading firmware, from the drive's EEPROM, to a tape cartridge. The created code tape can then be used to load/ update firmware in other T9940B Tape Drives.

Note: Code tapes created on a T9940A Tape Drive cannot load/update firmware in T9940B Tape Drives, nor vice-versa.

Use the "Prepare Drive" procedure on page B-2 to make sure a drive is properly setup to create valid code tapes.

Once a drive is properly setup to create valid code tapes,
"Create Code Tape" on page B-3 can be used successfully.

Prepare Drive

Only drives which have all firmware images loaded in the EEPROM can make valid code tapes. Manufacturing ships all drives with only one (partial) image that matches the drive interface (Fibre Channel for the T9940B Tape Drives). Therefore, the tape drive's EEPROM must be updated to contain all (FullCode) firmware images before the drive can successfully create valid code tapes.

Use the following procedure to prepare a drive:

1. Make sure the drive is in the Offline state.

2. Press **Menu** until `Chng CFG ?` displays.

3. Press **Select** to enter configuration submenus.

4. Press **Menu** until `FullCode X ("Y"/"N")` displays.

   Note: `FullCode Y` must be selected to enable a drive to accept a FullCode update. See "Full Code Load Submenu" on page 3-19 for additional information.

   a. If required, press **Select** to toggle selection to "Y".
      Otherwise, go to step 5.

   b. Press **Menu** until `Save/IPL ?` displays.

   c. Press **Select** to save configuration change.

5. After the drive saves configuration change and completes IPL, go to "Load/Update Firmware from STDS" on page 6-1, or "Load/Update Firmware from Code Tape" on page 6-3 to update EEPROM firmware to FullCode of the desired release level.

6. If toggle was not required in step 3a, press **Menu** until `Exit CFG ?` displays.

   a. Press **Select** to exit change configuration submenus.

   b. Press **Menu** until `Exit Menu?` displays.

   c. Press **Select** to exit menu system.

7. After drive exits menu system, go to "Load/Update Firmware from STDS" on page 6-1, or "Load/Update Firmware from Code Tape" on page 6-3 to update firmware to FullCode of the desired code release level.

Create Code Tape

Use the following procedure to create a valid code tape:

Note: If the drive EEPROM does not have all firmware images loaded, the make code tape utility will fail. Manufacturing shipped drive with only the drive specific image loaded. If you are uncertain about what is in the EEPROM,
go to "Prepare Drive" on page B-2 to update firmware.

1. Make sure the drive EEPROM has the desired firmware release level:

   a. See "View Firmware Release Level" on page 4-3.

   b. If required, go to "Prepare Drive" on page B-2 to update.

2. Press **Menu** switch, then press **Select** for `Offline`.

3. Press **Menu** switch until `Drv Menu?` displays.

4. Press **Select** switch to enter Drive Operation submenus.

5. Press the **Menu** switch until `MakeCodeTp` displays.

6. Press **Select** switch.

   Note: Any tape cartridge loaded in the drive ejects.

7. Remove ejected tape cartridge, if present.

8. Load a write-enabled cartridge in the drive when `Ld Code Tp` displays.

Notes:

   - The firmware images download to the tape cartridge, overwriting any data present, and gives the tape cartridge a special identifier.

   - `CHK A738` displays if there was only a partial firmware image in the EEPROM. Go to "Prepare Drive" on page B-2.

   - `CHK xxxx` displays if the drive encounters other error conditions.

     - Try a different write-enabled tape cartridge.
     - See "Operator-panel Display Messages" on page 5-4.

   - When the download is complete, the tape cartridge ejects.

9. Remove the tape cartridge from the drive, and set the cartridge write-protect switch to lock.

   Note: To create another code tape, repeat Steps 8 and 9.

10. Exit the Drive Operations menu.

11. Return the drive to Online.

12. Exit the menu system. A steady " * " (asterisk) displays after exiting.

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Glossary

This glossary defines terms and abbreviations in this publication.

Some of the definitions are taken from other glossaries. The letters in the parentheses that follow some definitions indicate the source of the definition:

(A) *The American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI).

(E) The ANSI/Electronic Industries Association (EIA) Standard-440-A, *Fiber Optic Terminology*.

(I) The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and International Electrotechnical Commission (ISO/IEC/JTC1/SC1).

(IBM) *The IBM Dictionary of Computing*, copyright 1994 by IBM.

(T) Draft international standards committee drafts, and working papers being developed by the ISO/IEC/JTC1/SC1.

A

B

C

cartridge (1) A storage device that consists of magnetic tape on supply and take-up reels, in a protective housing. (IBM)
(2) A container that holds magnetic tape on a supply reel and is inserted into a drive for read and write operations.

config *See* configuration.

configuration (config) (1) The manner in which the hardware and software of an information processing system is organized and interconnected. (T)
(2) The physical description of a library listing the panel types, cartridge capacity, type of host connection, and number of drives.

D

drive (1) A device for moving magnetic tape and controlling its movement. (IBM)
(2) An electromechanical device that moves magnetic tape and includes the mechanisms for writing and reading data to and from the tape.
See also tape drive.

dump (1) To copy the contents of all or part of virtual storage to collect error information. (IBM)

E

error A discrepancy between a computed, observed, or measured value or condition and the true, specified, or theoretically correct value or condition. (I) (A)

F

fault symptom code (FSC) A four-character hexadecimal code generated in response to a subsystem error to help isolate failures within the device.

FC *See* Fibre Channel.

FCC *See* Federal Communications Commission.

Federal Communications Commission (FCC) A board of commissioners appointed by the President under the Communications

Act of 1934 with the power to regulate all interstate and foreign communications by wire and radio originating in the United States. (IBM)

Fibre Channel (FC) The National Committee for Information Technology Standards standard that defines an ultra high-speed, content-independent, multilevel data transmission interface that supports multiple protocols simultaneously. Fibre Channel supports connectivity to millions of devices over copper and/or fiber-optic physical media and provides the best characteristics of both networks and channels over diverse topologies.

field replaceable unit (FRU) An assembly that is replaced in its entirety when any one of its components fails. (IBM)

file-protect To prevent the destruction or overwriting of data stored on cartridge tape. *See also* write-protect.

firmware An ordered set of instructions and data stored in a way that is functionally independent of main storage; for example, microprograms stored in a ROM. (T) *See also* microcode.

FRU *See* field replaceable unit.

FSC *See* fault symptom code.

G

Gb *See* gigabit.

GB *See* gigabyte.

gigabit (Gb) One billion (10^9) bits.

gigabyte (GB) One billion (10^9) bytes. (IBM)

H

host (1) The primary computer on a network, with which other computers interact.

(2) A processor, usually composed of a central processing unit and memory, that typically communicates with peripheral devices over channels or networks, to perform input/output operations such as network control. It also provides end users with computation services and database access.

host interface An interface between a network and host computer. (T)

I

ID (1) Identification. (2) Identifier.

initialization The operations required for setting a device to a starting state, before the use of a data medium, or before implementation of a process. (T)

initial program load (IPL) The initialization procedure that causes an operating system to commence operation.

input/output (I/O) (1) The process of moving data between a host and an external device. I/O is a collective term for commands, reading, and writing. (2) Pertaining to a device, process, or channel involved in data input, data output, or both. (IBM)

interface Hardware, software, or both, that links systems, programs, or devices. (IBM)

I/O *See* input/output.

IPL *See* initial program load.

J

K

L

load a cartridge The process by which a drive prepares a cartridge tape for read and write operations.

M

magnetic tape A tape with a magnetizable layer on which data can be stored. (T) *Synonymous with* tape.

Main menu The top-level menu on an operator panel display.

manual operation A mode of operation for a tape drive in which an operator manually loads and unloads the drive.

tape cartridge A composite of the plastic housing and the magnetic tape.

microcode A code, representing the instruction of an instruction set, that is implemented in a part of storage that is not program-addressable. (IBM) *See also* firmware.

N

Nearline A registered trademark of StorageTek, this term is used in association with StorageTek's family of tape-library information storage and retrieval products.

O

offline Neither controlled by, nor communicating with, a computer. (IBM) *Contrast with* online. (Some status commands are possible in an offline state.)

online Pertaining to the operation of a functional unit when under the direct control of the computer. (T) *Contrast with* offline.

operator panel (1) A panel that enables users to configure and diagnose the library or drive.
(2) The user interface for libraries or drives. *Synonymous with* operator control panel.
(3) A panel that enables users to configure, diagnose, or receive status information about the library or drive.

P

Q

R

reclaim In some tape drives, the process of reformatting a tape as a data tape.

recoverable error An error condition that can be automatically corrected (for example, by initiating a retry operation) and, when corrected, allows continual processing of a job, program, or hardware function.

rewind To move tape from the take-up hub to the supply hub. (IBM

In the T9940 Tape Drive, rewind moves tape from the "machine" reel (in the drive) to the "file" reel (in the cartridge).

S

T

tape drive (TD) (1) A device for moving magnetic tape and controlling its movement. (IBM)
(2) An electromechanical device that moves magnetic tape and includes mechanisms for writing and reading data to and from the tape.
See also drive.

TCP/IP *See* Transmission Control Protocol/ Internet Protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP) A set of communication protocols that supports peer-to-peer connectivity functions for both local and wide area networks. (IBM)

U

unload a cartridge The process by which a drive finishes read and write operations and makes the cartridge ready to remove from the drive.

V

VolSafe VolSafe (volume safe) is a special StorageTek feature that provides write once, read many (WORM) technology to VolSafe-designated tape cartridges. VolSafe permits new data to only append the tape media, while it prevents erasure or overwrite of previously written data.

VOLSER *See* volume serial number.

volume serial number (VOLSER) (1) An alphanumeric label that the host software uses to identify a volume. It attaches to the spine of a cartridge and is both human- and machine-readable.

(2) A number in a volume label assigned when a volume is prepared for use in a system. (IBM)

W

write-enabled A setting on a cartridge that allows data to be written on the tape.

write operation An output operation that sends a processed record to an output device or output file. (IBM)

write-protect (WP) To set the switch on a cartridge tape to prevent data from being written on the tape. Reading data is still possible.
See also file-protect.

X

Y

Z

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X

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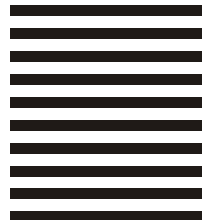
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