



StorageTek™ T10000 Tape Drive

Operator's Guide

Part Number: 96174

Revision: EB



StorageTek™ T10000 Tape Drive

Operator's Guide

Sun Microsystems, Inc.
www.sun.com

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Revision History

EC	Date	Revision	Description
129914	February 2006	A	Initial release
129967	May 2006	B	See this edition for a description of changes.
135058	September 2006	C	See this edition for a description of changes.
135066	January 2007	D	See this edition for a description of changes.
135462	September 2007	E	Added Interface Port Usage information, updated Figure 1-3, and corrected cleaning cartridge maximum use quantity in Chapter 1. Updated Emulation options information in Chapter 3 and Appendix C. Revised cartridge shipping information in Appendix A.
EC000653	July 2008	EA	Added references to the SL3000 library. Added information on the T10000B tape drive throughout the guide.
EC000768	September 2008	EB	Added information on the T10000B FICON tape drive throughout the guide. Added some information on the StorageTek Library Console to Chapter 1. Miscellaneous changes to standardize wording in the text and procedures.

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Preface

This book is intended for those persons using the T10000 tape drive after it has been installed. It also provides information about the various cartridges and their labels.

Organization

The organization of this guide is:

Chapter 1	“Introduction” provides an overview of the T10000 tape drive and its data cartridges.
Chapter 3	“Operator Tasks” describes the operator job functions associated with the T10000 tape drive and provides information about the data cartridges.
Chapter 2	“Rack Mount Controls and Indicators” describes the controls and indicators on the T10000 tape drive’s front and rear panels.
Chapter 4	“Menu System” describes use and navigation of the T10000 tape drive’s menu system.
Chapter	“Service Calls and Help” describes where an operator can get help and how to place a service call.
Appendix A	“Cartridge Care” details care of the data cartridges.
Appendix B	“Data Cartridge Labels” has the specifications for the various labels used on the data cartridges.
Appendix C	“Initial Drive Configuration Settings” describes the settings configured on the T10000 tape drive at the factory.
Appendix D	“Messages and Translated Messages” lists messages that might be displayed by the tape drive and their meaning. This appendix also lists the translated displays for various languages.
Appendix E	“Specifications” lists the physical and environmental specifications for the tape drive.
Glossary	“Glossary” defines some terms and abbreviations used in this guide.

Alert Messages

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

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



Caution – A caution informs you of conditions that might result in damage to hardware, corruption of data, or corruption of application software. A caution always precedes the information to which it pertains.



Warning – Possible Physical Injury. A warning alerts you to conditions that might result in long-term health problems, injury, or death. A warning always precedes the information to which it pertains.

Mensajes de alerta

Los mensajes de alerta llaman la atención hacia información de especial importancia o que tiene una relación específica con el texto principal o los gráficos.

Note – Una nota expone información adicional que es de interés especial. Una nota puede señalar excepciones a las normas o procedimientos. Por lo general, aunque no siempre, las notas van después de la información a la que hacen referencia.



Precaución: Una precaución informa sobre situaciones que podrían conllevar daños del hardware, de los datos o del software de aplicación. Las precauciones van siempre antes de la información a la que hacen referencia.



Warning – Possible Physical Injury. Una advertencia llama la atención sobre condiciones que podrían conllevar problemas de salud crónicos, lesiones o muerte. Las advertencias van siempre antes de la información a la que hacen referencia.

Typographical Conventions

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

Item	Example	Description of Convention
Commands	Mode Select	Initial cap
Document titles	<i>System Assurance Guide</i>	Italic font
Emphasis	<i>not or must</i>	Italic font
Menu options	Exit	Bold
Hypertext links	Figure 1 on page 25	Blue (prints black in hardcopy publications)
URLs	http://www.sun.com	Blue (prints black in hardcopy publications)

Related Publications

Publications relating to the tape drive:

Document Title	Part Number
<i>Virtual Operator Panel User's Guide</i>	96179
<i>Crypto Key Management Station, User's Guide</i> ¹	96262
<i>Crypto Key Management Station, Configuration and Startup Guide</i> ¹	96261
<i>Crypto Key Management Station and Data-at-Rest Encryption, Technical Brief</i> ¹	TT0018
<i>Crypto Key Management System, Installation and Service Manual</i>	3161949xx
<i>Crypto Key Management System, System Administrator Guide</i>	3161951xx

1. KMS 1.x documentation

You can find most of the documentation listed in the previous table online at the following URL: <http://docs.sun.com/app/docs/prod/tape.storage#hic>.

Publications regarding Sun Microsystems tape device software products:

Sun Microsystems Software Products

A list of Sun Microsystems tape device software products can be found online at: <http://docs.sun.com/app/docs/prod/tape.device#hic>

Documentation, Support, and Training

Sun Function	URL
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Notices

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



Caution – Potential equipment damage: Cables that connect peripherals must be shielded and grounded; refer to descriptions in the cable instruction manuals. Operation of this equipment with cables that are not shielded and not 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 voids the warranty. In addition, changes or modifications to this equipment might cause it to create harmful interference.

United States 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 with the limits for a Class A digital device pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user is 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 Technical Requirement of the Voluntary Control Council for Interference by Information Technology (VCCI). In a domestic environment, this product may cause radio interference, in which case the user may be required to take corrective actions.

Taiwan Warning Label Statement

The following warning label statement 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.

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NOTICE

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 - c. "Maintenance Code" is defined as Microcode and other software, including data files, which might 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.
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Introduction

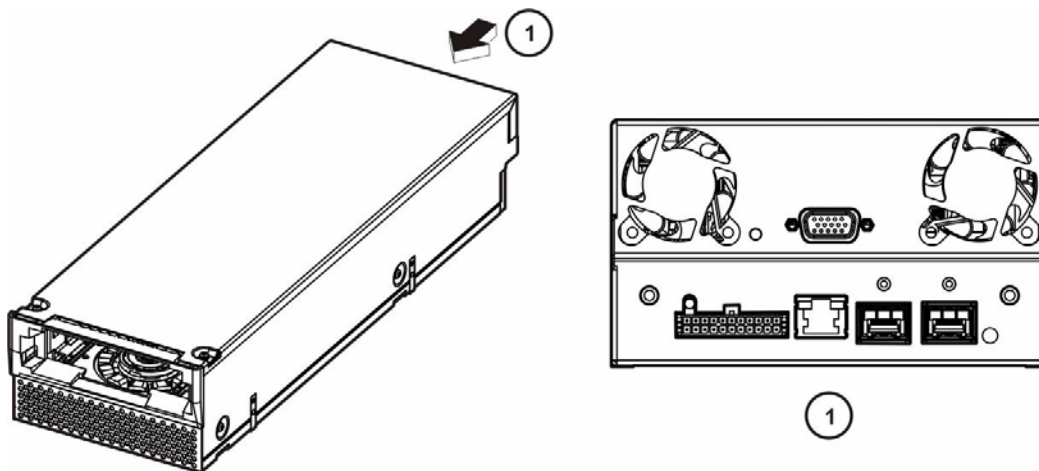
T10000 Tape Drive Description

The StorageTek™ T10000 (FIGURE 1-1) is a family of small, modular, high-performance tape drives designed for high-capacity data storage. The drives are either rack mounted or used in various libraries (see “Library Drives” on page 25 for a complete listing).

The tape drives use a technology called “partial response, maximum likelihood” (PRML) to provide a high-density data format. PRML enables the T10000A tape drive to record and store up to 500 gigabytes (GB) while it enables the T10000B tape drive to record and store up to 1 terabyte (TB) of uncompressed data. The unique data cartridge uses a single reel for high capacity. The file reel is located inside the data cartridge while the machine reel resides inside the tape drive.

The host connections to the tape drive are fiber optic to provide a high rate of data transfer.

FIGURE 1-1 T10000 Tape Drive



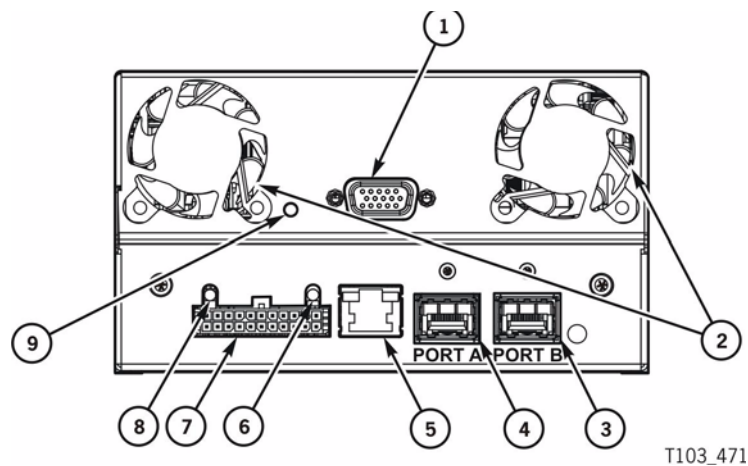
T103_141

Tape Drive Rear Panel

The rear panel (FIGURE 1-2) contains five connectors, two cooling fans, two tri-color LED indicators, and a recessed push-button switch. The drive status LED is on all drives while the encryption status LED is only on encryption-capable drives. The recessed switch is used by service representatives to toggle the drive in/out of the service mode.

Note – See TABLE 1-1 on page 21 for drive status LED states.
See TABLE 1-2 on page 22 for encryption status LED states.

FIGURE 1-2 Tape Drive Rear Panel



T103_471

1. Tape transport interface (TTI) connector (library use)
2. Cooling fans (2)
3. Interface port B
4. Interface port A
5. Maintenance port (Ethernet)
6. Encryption status LED
7. Power supply connector
8. Drive status LED indicator
9. Recessed switch (service representative use only)

Interface Ports Use

The T10000 tape drive supports connection of both ports, in accordance with ANSI Fibre Channel specifications (ref. InterNational Committee on Information Technology Standards [INCITS] documents: SCSI Primary Commands -3, Section 5.6, and Fibre Channel Protocol -3). The drive will support two hosts, providing that both hosts honor the “reserve/release” and/or the “persistent reserve/release” specifications.

It is not recommended that a T10000 tape drive be connected to the same host bus port with another tape or a disk subsystem. The stress on the host bus adapter, due to the bandwidth needs, creates unacceptable error recovery issues between both solutions.

Maintenance Port Use

All Sun service calls to tape drives under warranty, maintenance contract, or time-and-materials service require physical access and connection to the rear panel Ethernet port. In the event that a customer has an Ethernet cable physically connected to the drive requiring service, the service person must disconnect this cable to provide the required service. T10000 non-encryption drives supported by the Service Delivery Platform (SDP) require that the drive's Ethernet port must be 100% dedicated to the SDP unit.

Drive Status LED

The tri-color drive status LED on the rear panel (see [FIGURE 1-2 on page 20](#)) indicates the general status of the drive. The normal sequence of the drive status LED during the drive power-on IPL: slow-flashing red, slow-flashing amber, steady or slow-flashing green. [TABLE 1-1](#) interprets the various states of the drive status LED:

TABLE 1-1 Drive Status LED State Descriptions

LED State	Description	Meaning/Action
Off	Drive powered off	Power not applied to the drive. Turn on the power supply. Possible power related failure if it remains off with power supply switch on.
Red	Hardware failure	Processor not functioning - call for service.
Red SF ¹	IPL started.	Booting, no communication with drive until IPL is complete.
Amber SF ¹	Functional code loading.	Initializing, no communication with drive until IPL is complete.
Green	IPL complete (dumps NOT present)	Normal operating condition, drive is ready for functional tasks. Communication with drive is possible.
Green SF ¹	IPL complete (dumps are present)	Normal operating condition, drive is ready for functional tasks. Communication with drive is possible.
Amber	Boot Monitor	Engineering maintenance mode - call for service.
Red/Green ²	Service mode. Dump-again state	Initiated by service representative. While in the service mode, the drive's IP is static 10.0.0.1. If indication is present without service mode active, it could indicate a recurring malfunction present, call for service.
Red FF ³	Dump in progress.	Do not power off..... while the drive is performing a dump operation (drive memory could be corrupted). No communication at this time.
Amber FF ³	Firmware update in progress.	Do not disturb the drive until the firmware update is complete. When the update is complete, the LED will change to green FF.
Green FF ³	Firmware update is complete	Initiate an IPL when the drive is idle, if the IPL did not auto-initiate.

1. Slow flash (1 cycle per second)
2. Alternating at the slow flash rate.
3. Fast flash (2 cycles per second)

Encryption Status LED

T10000 drives that are encryption capable have a tri-color encryption status LED on the rear panel, near the right end of the power connector (see [FIGURE 1-2 on page 20](#)). This LED indicates the drive's encryption status.

If the encryption status LED is green, it indicates that the drives is encryption capable, but not encryption enabled. In this state, the drive functions only in a non-encryption "Safe" mode, and cannot read/write encrypted tape cartridges. However, the drive can function normally for non-encryption tasks.

Once the drive is encryption enabled, the LED turns red, indicating that the drive is now "Armed", and functional in the encryption mode. In this state, the drive can read/write encrypted tape cartridges. The drive can also read non-encrypted tape cartridges, but CANNOT write to non-encrypted tape cartridges.

Note – After a drive has been "Armed", it cannot be restored to the "Safe" mode in the field.

[TABLE 1-2](#) interprets the various states of the encryption status LED. Refer to Crypto Key Management documentation listed in the Related Pubs section for additional information:

TABLE 1-2 Encryption Status LED State Descriptions

LED State	Mode	Description
Green	Safe	Encryption capable, but not enabled. Normal-unencrypted drive write/read cartridge operations.
Red	Armed	Encryption enabled/active. Ready to encrypt.
Green SF ^{1, 2}	Reset	Encryption previously enabled, but requires keys. Drive is capable read-only, unencrypted cartridge operations.
Red SF ¹		Encryption read/write cartridge operation in progress.
Amber		Requires media key.
Amber SF ¹		Requires device key.
Cycling ³	Zeroed	Media, device, and enabling keys missing. The drive is unusable, and must be returned to manufacturing.

1. Slow flash (1 cycle per second)

2. Drive is no longer capable of unencrypted write operation once encryption has been enabled.

3. The LED continuously cycles through all three colors at the slow flash rate.

Encryption Option

Most T10000 tape drives support data-at-rest encryption. Encryption-capable drives have a second status LED on the rear panel (see [FIGURE 1-2 on page 20](#)). The drive is shipped from the factory encryption-capable, but not encryption-enabled. You must explicitly enable the drive for encryption.

Note – A tape drive that has NOT been enabled for encryption cannot read or append to any encrypted tape cartridge.

What an Encryption-Enabled T10000 Tape Drive *CAN* Do:

- Write to a tape cartridge in encrypted mode *ONLY*, using its assigned write key
- Read an encrypted tape cartridge, if it has the proper read key
- Read non-encrypted tape cartridges
- Format or reclaim tape cartridges

What an Encryption-Enabled T10000 Tape Drive *CANNOT* Do:

- Append to a non-encrypted tape cartridge
- Write a non-encrypted tape cartridge
- Mix encrypted and non-encrypted data on the same tape cartridge

Encryption Resources

For additional information on the encryption capabilities and features of the StorageTek T10000 Tape Drive, see:

- KMS 2.0
 - *Crypto Key Management System, Installation and Service Manual*, PN 3161949xx
 - *Crypto Key Management System, System Administrator Guide*, PN 3161951xx
- KMS 1.x
 - *Crypto Key Management Station, User's Guide*, PN 96262
 - *Crypto Key Management Station, Configuration and Startup Guide*, PN 96261
 - *Crypto Key Management Station and Data-at-Rest Encryption, Technical Brief*, PN TT0018

These are available from Sun Microsystems.

For further information on the encryption option, see your Sun Microsystems sales representative.

Interface with the Tape Drive

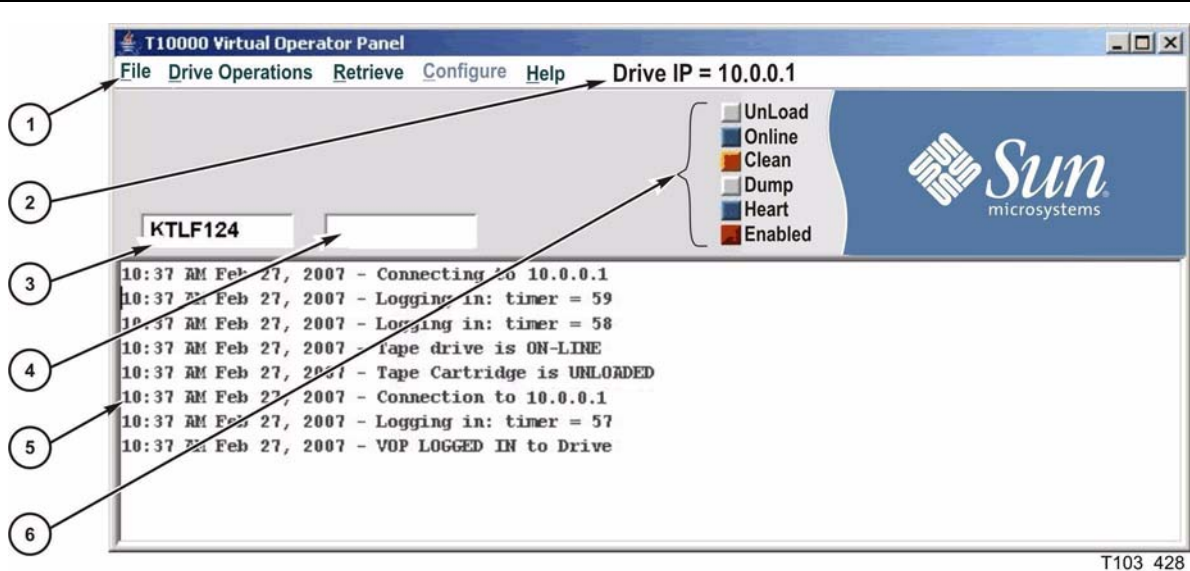
The T10000 tape drive does not have a built-in physical operator panel; therefore, your communication with library-attached drives is normally through the Virtual Operator Panel (VOP) application (see [FIGURE 1-3](#)).

The T10000 rack mount configuration drive tray chassis has a physical operator panel mounted on the chassis front panel (see [FIGURE 2-2 on page 32](#)).

Virtual Operator Panel

The VOP application window ([FIGURE 1-3](#)) provides a graphical user interface (GUI) to the connected drive. For more information regarding VOP, and guidelines for operation, see the *Virtual Operator's Panel Customer User's Guide* (PN 96179).

FIGURE 1-3 VOP Application Window



1. Menu bar
2. Drive IP/name
3. Primary drive message window
4. Secondary drive message window
5. VOP text message pane
6. Drive status indicators

Rack Mount Drives

Operation of rack mounted drives, by an operator, is normally through the drive tray chassis physical operator panel (see ["Operator Panel Controls/Indicators" on page 32](#)).

However, you can also operate it through VOP with a connection to the drive tray chassis rear panel Ethernet port (see [FIGURE 2-3 on page 35](#)).

Library Drives

Host operation of a library-attached T10000 drive is by means of the library firmware through the drive's rear panel TTI connection (see [FIGURE 1-2 on page 20](#)). Manual drive operations, such as configuration settings and utilities, can be directed by VOP through the drive's rear panel Ethernet maintenance port (see [FIGURE 1-2 on page 20](#)).

The following libraries support the T10000 tape drive:

- SL3000
- SL8500
- L180
- L700e
- L1400M
- 9310 (T10000A only)

StorageTek Library Console

The SL3000 and SL8500 libraries have a GUI called the StorageTek Library Console (SLC) that presents basic drive information. The drive folder, shown in the following figure, contains a list of installed drives and data about each drive (the drive access state, the drive type, the drive serial number, and the code version). When you select a specific drive, additional unique data is available for that drive such as the drive state, drive properties, drive display, or drive tray information (see [FIGURE 1-5 on page 26](#)).

Note – The SLC drive folder information changes frequently, and your display might be different than the one shown. Refer to the help information (the ? button) for details.

FIGURE 1-4 StorageTek Library Console

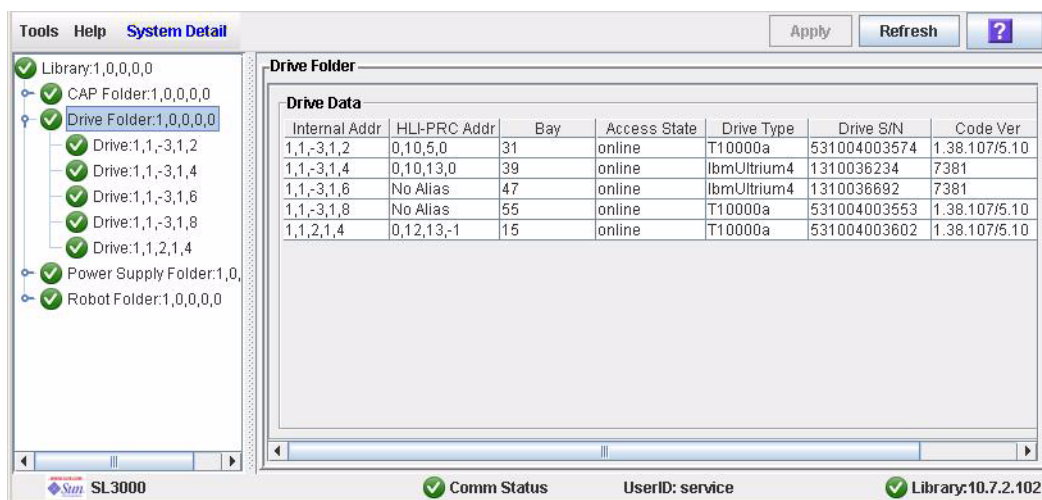
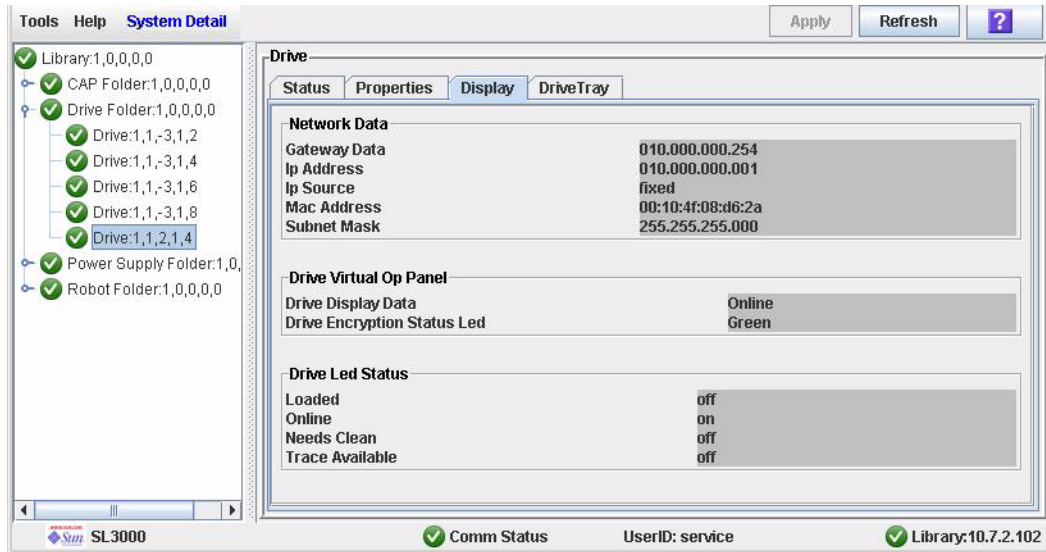


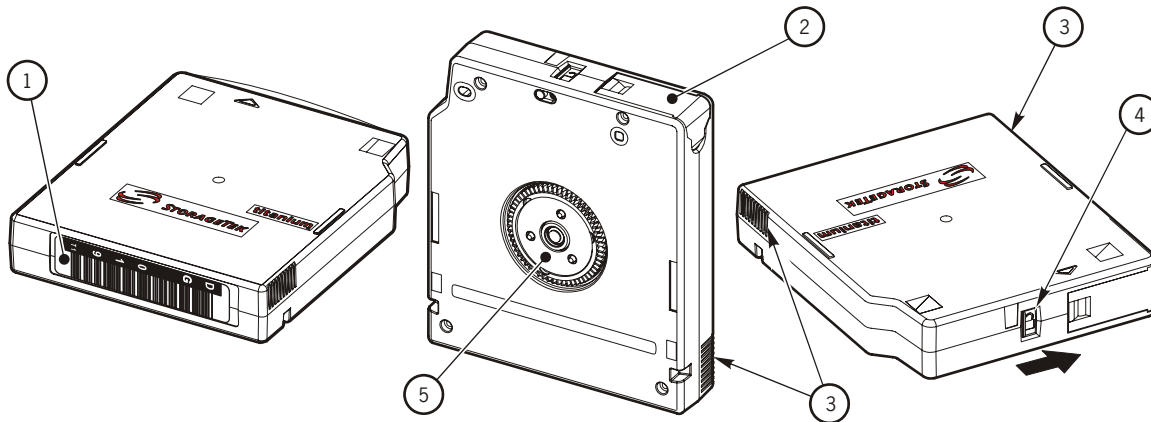
FIGURE 1-5 Drive Display - StorageTek Library Console



T10000 Cartridges

FIGURE 1-6 identifies key areas of the T10000 cartridge.

FIGURE 1-6 T10000 Cartridge



T103_109

- 1. Volume label
- 2. Leader access door
- 3. Finger grips
- 4. File protect switch
- 5. Hub

T10000 Cartridge Types

Basic types of data cartridges are:

- Standard
- Diagnostic
- Sport
- VolSafe
- Sport VolSafe
- Cleaning

Note – The T10000 data cartridge can be used only in a T10000 tape drive, and the T10000 tape drive does not accept any other type of data cartridge.

Standard Data Cartridge

The Standard data cartridge is the common read/write data cartridge. You can identify a standard data cartridge by the black leader access door (see [FIGURE 1-6 on page 26](#)). The data cartridge has a native capacity of:

- 500 GB when formatted by a T10000A tape drive
- 1 TB when formatted by a T10000B tape drive

The data cartridge is under warranty for 15,000 mounts or 200 full file writes (T10000A tape drive) to the media. The tape drive issues a warning message to the host when either number is exceeded

Note – A mount is defined as the tape drive threading the tape onto the take-up reel and moving to the load point.

Diagnostic Cartridges

The Diagnostic cartridge is a special-use version of the standard data cartridge with a special label. The diagnostic cartridge is typically used by a service representative and most libraries store one or more diagnostic cartridges. (See [“Diagnostic Cartridge Labels” on page 82.](#))

Sport Data Cartridges

The Sport data cartridge is a smaller capacity version of the standard data cartridge. You can identify a sport data cartridge by the red leader access door (see [FIGURE 1-6 on page 26](#)). These sport data cartridges have a native capacity of:

- 120 GB when formatted by a T10000A tape drive
- 240 GB when formatted by a T10000B tape drive

The Sport data cartridge is under warranty for 15,000 mounts or 200 full file writes (T10000A tape drive) to the media. The tape drive issues a warning message to the host when either number is exceeded

VolSafe Data Cartridges

VolSafe data cartridges are write-once data cartridges. They cannot be erased without destroying the tape itself. The tape drive writes data on the tape and appends data to the cartridge on free space until the cartridge is full. The tape drives may read these cartridges multiple times (see the mount limitations for the standard data cartridges). These cartridges are commonly used for information that must be stored for legal reasons and not altered. There are two versions of the VolSafe cartridge:

- VolSafe cartridge - you can identify this cartridge by a yellow leader access door (see [FIGURE 1-6 on page 26](#)). This cartridge has the same capacity as the standard data cartridge.
- You can identify the Sport VolSafe cartridge by a yellow leader access door and red file protect switch (see [FIGURE 1-6 on page 26](#)). This cartridge has the same capacity as the sport data cartridge.

Cleaning Cartridges

As the name implies, you would use a cleaning cartridge to clean a drive's read/write head up to 50 times. An attempt to use a cleaning cartridge beyond that number results in the tape drive rejecting the cleaning cartridge and posting an error message to the host. You can identify a cleaning cartridge by a white leader access door (see [FIGURE 1-6 on page 26](#)).

Note – It is recommended that you clean the T10000B tape drive every ten full file operations due to its higher linear density and capacity. This is three times more frequent than with the T10000A tape drive.

Media Information Region

The T10000A/B tape drives use information recorded on each tape cartridge to reduce access times and manage the useful life of the cartridge. This information is recorded in the cartridge's radio frequency identification (RFID) chip and at the beginning of tape in an area known as the media information region (MIR). The information stored in the RFID is a proper subset of the information stored in the MIR. The media information falls into two categories: statistical counters and data pointers.

Statistical Counters

Statistical counters reflect the usage of the cartridge and includes read/write activity, error activity, cumulative mounts, and other information about its use.

Data pointers

The data pointer information is basically a directory (map) used to locate the customer (logical) data on the physical tape media. Since customer data is compressed and written in drive controlled blocks on the tape, a map is needed to efficiently locate the

data after it is written. This map provides an index between customer data and the physical block on the tape media. Once data is written the drive accesses this map to optimize access to the customer data.

To locate/space to customer data, the logical object that identifies the block is translated to the physical location on the tape media and the drive determines the quickest method to read the block. If the block is some physical distance from the current location, a calculation results in a high-speed locate to the block location and is followed by a normal speed read.

The existence of the media information is usually transparent to the customer unless it has a problem. This can occur if the information update fails during a dismount. The impact of invalid media information occurs in several areas. Since it enables high speed positioning, invalid media information forces all operations to a slow speed mode. This has no impact on a sequential read from the beginning of the tape. However, any operation using locate defaults to a sequential slow speed read to the requested block, which can result in longer processing time.

Note – An invalid media information might be suspected if you observe poor performance on a specific tape cartridge.

The following sections describe how media information is processed and some potential implications of problems with the information.

Normal Processing

Every time a tape cartridge is loaded, the media information is read from the tape media and saved in drive-resident memory. After being loaded in drive memory, a read-invalid state is written in the tape-resident RFID. The tape-resident media information is marked open, read-invalid because it does not reflect results of activity in the current mount session. All subsequent media information accesses during the current mount session are saved in the drive-resident information. If no writes are performed to the cartridge, the RFID remains in the read-invalid state meaning the MIR directory information is still completely valid. Once a write takes place, the RFID is marked write-invalid meaning the MIR directory information on tape is invalid.

The T10000A and B use the drive-resident copy of the information to access customer data pointers for read-only functions. Statistical counters are continuously updated in the memory-resident information with any drive activity.

When the cartridge is unloaded as part of the unload routine, the drive-resident information is written to the cartridge's RFID and the tape-resident MIR with the closed state indication set.

Cross-Density Cartridge Processing

In an environment with both T10000A and T10000B drives, a mandatory T10000A firmware update provides the capability for the T10000A drive to read the RFID of a T10000B formatted cartridge; the drive can never read its MIR because of the different tape formats. If the drive is reclaiming the cartridge, the only available operation, the cartridge's statistical data from previous usage is included in the current usage when the media information is rewritten.

A T10000B drive can read both the RFID and the MIR of a T10000A cartridge. If the T10000B is only reading the cartridge, the memory-resident statistical counters are updated to reflect any read operations. Because the T10000B drive cannot rewrite the tape-resident T10000A MIR, only the RFID is updated when the cartridge is unloaded. If the T10000B drive is reclaiming the cartridge, the cartridge's statistical data from previous usage is included in the current usage when the media information is rewritten.

Note – When the T10000A&B drive identifies the data cartridge as an unreadable-density data format, it displays 3215 on the Virtual Operator Panel (VOP) or the physical operator panel of the rack mount drive.

Invalid Media Information Conditions

There are four media invalid conditions for the T10000A/B drives:

- If the cartridge's RFID is unreadable, the drive will refuse to mount the cartridge with an FSC of 403B. The cartridge must be returned to engineering to recover the customer data.
- If the cartridge's RFID can be partially read, the drive will mount the cartridge as read-only.
- If the RFID and MIR are out-of-sync, none of the block information, coarse-grained in the RFID or fine-grained in the MIR, can be trusted. The cartridge is usable but since none of the block information is trusted it is rebuilt as the drive sequentially reads all of the data up to the desired customer data.

Note – This scenario can cause the drive to spend an hour or more rebuilding the block information, potentially causing the application running on the host to time-out.

- If the MIR is corrupted or unreadable, the fine-grained block location information on the cartridge cannot be used; the tape can be used with the coarse-grained block information on the RFID but with lower performance.

The T10000A/B drive posts a 4031/4032 informational FSC whenever a cartridge with an invalid MIR is loaded.

Once a tape cartridge has invalid media information, some action is required to correct it. Invalid media information can be corrected in several ways:

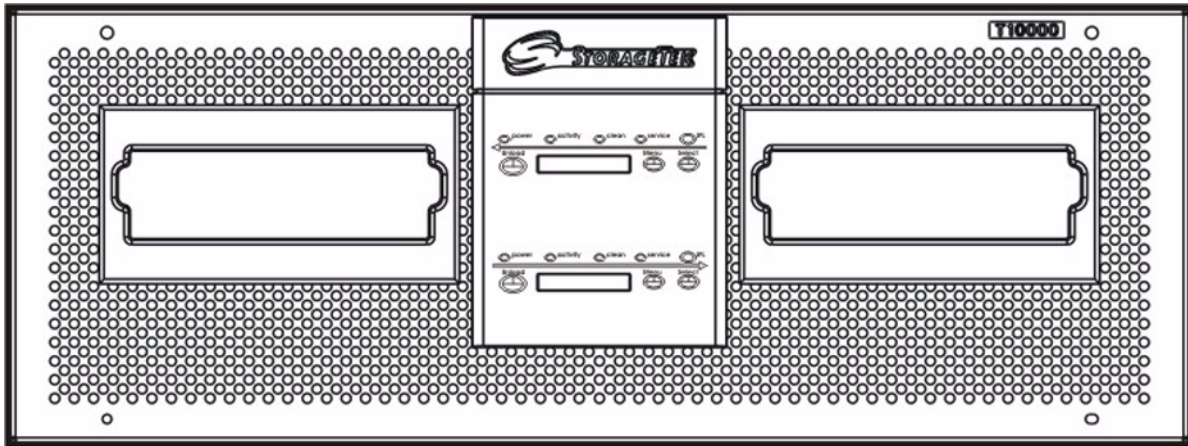
- Run the media correction utility through the VOP (see [“Rebuilding an MIR” on page 47](#)).
- The drive itself will recover the media information as it processes host commands, but very slowly.

Rack Mount Controls and Indicators

Front Panel

The T10000 Tape Drive rack mount configuration chassis contains one or two drives. The chassis front panel (FIGURE 2-1) provides manual loading/unloading of tape cartridges into each drive through separate cartridge loading slots. The front panel also has a dual operator panel mounted between the cartridges loading slots. The upper portion is for drive A (left), and the lower portion is for drive B (right).

FIGURE 2-1 Rack Mount Chassis Front Panel



Load/Unload Slot

The load/unload slots only accept T10000 tape cartridges. All other cartridge types will not load into the T10000 tape drive.

After you have inserted a tape cartridge, the loader mechanism lowers the cartridges onto the hub motor, and threads the tape (see [“Load a Cartridge” on page 43](#)).

See [“Unload a Cartridge” on page 44](#) to unload and remove a tape cartridge.

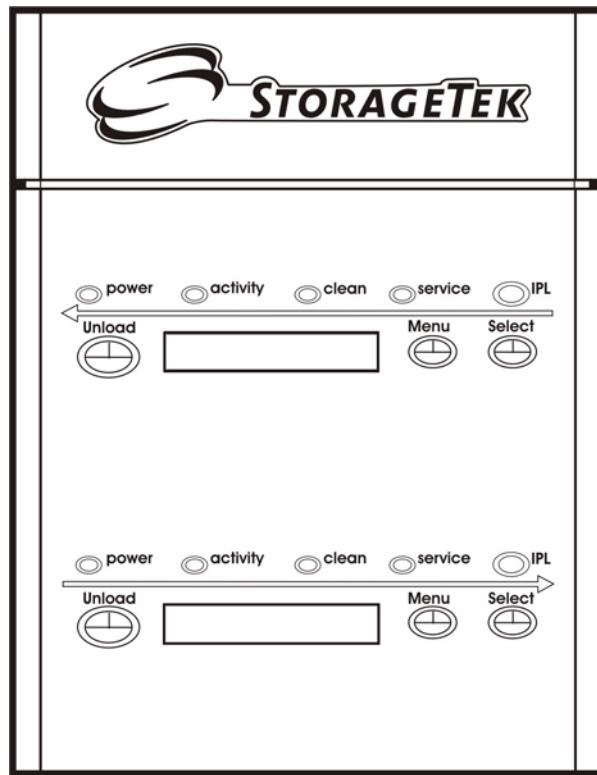
Operator Panel Controls/Indicators

The rack mount chassis dual-operator panel (FIGURE 2-2) provides independent control and indications for the two rack mount T10000 tape drives.

Each section contains four push-button micro-switches, four LEDs, and a ten-character display window.

Note – TABLE 2-1 on page 33 describes the controls.
TABLE 2-2 on page 33 describes the LED indicators.

FIGURE 2-2 Operator Panel



T103_393

TABLE 2-1 lists the functions of the operator panel four push button micro-switches.

TABLE 2-1 Operator Panel Controls

Push Button	Use
Unload	Initiates a cartridge rewind and unload operation.
Menu	Steps through a menu sequence, or answers "No" to option appearing in the display window.
Select	Answers "Yes" to an option appearing in the display window, or toggles/increments variables during a menu sequence.
IPL (recessed)	Initiate an IPL.

TABLE 2-2 lists the front-panel indicator states and recommended action.

TABLE 2-2 Operator-panel Indicators

Indicators					
Power (green)	Activity (green)	Clean (amber)	Service (red)	Description	Recommended Action
Off	Off	Off	Off	The drive is not powered.	Power on the drive.
Flashing	Off	Off	Off	Power on, IPL in progress.	Wait for the IPL to complete.
Flashing does not stop	Off	Off	Off	Power on, IPL sequence failed	Power cycle the drive. If the problem persists, contact authorized service personnel.
On	Off	Off	Off	Power on, IPL complete, cartridge not loaded	Load a cartridge as required
On	On	Off	Off	Power on, cartridge loaded (tape not moving)	Ready for read/write commands from the host software application.
On	Flashing	Off	Off	Power on, cartridge loaded (tape moving).	None, locating or read/write operation in progress.
On	On/Off	On	Off	The drive tape path needs cleaning.	Insert a cleaning cartridge.
On	Flashing	Flashing	Off	Cleaning cartridge loaded and moving.	Wait for the cleaning operation to complete.
On	On/Off	Off	Flashing	An error has occurred and dump data was saved.	Read the display message. See TABLE D-1 on page 87, for more information about the message.
On	Off	Off	On (steady)	A drive hardware error has occurred.	Initiate an IPL. If the problem persists, contact authorized service personnel.

Operator Panel Display Window

The window displays alpha/numeric messages relative to drive operation:

- Drive status
- Menu selections and configuration choices
- Error messages and fault symptom codes
- Host-generated messages

The display window is formed by a horizontal row of ten LED array segments. Each segment is an array of 35 dots—five wide and seven high. Each array can form an uppercase or lowercase alpha character, a numerical digit, or a special character, such as an asterisk (*).

Multiple messages, or a message greater than ten characters will be displayed by the window, alternating between required character groups.

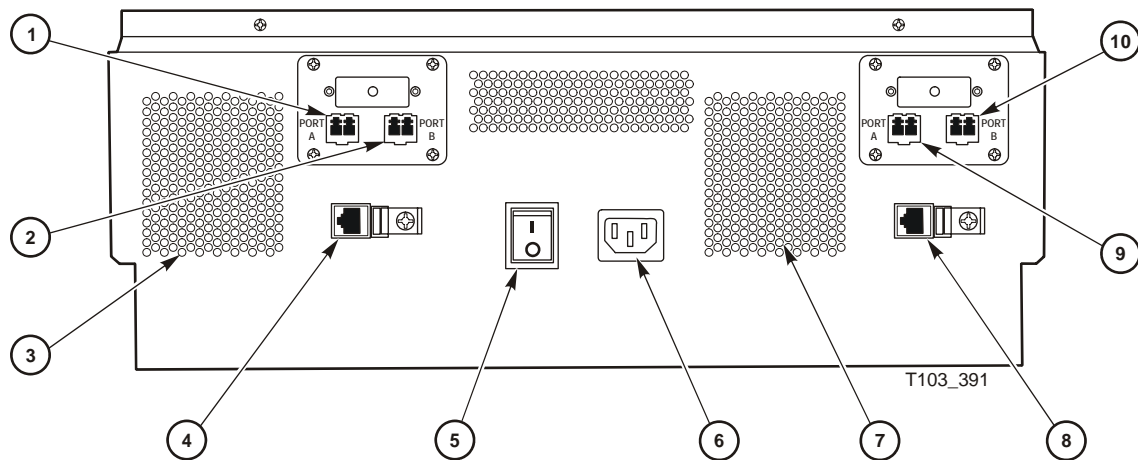
Note – [Appendix D, “Messages and Translated Messages”](#) lists messages that could appear in the display window.

Rear Panel

FIGURE 2-3 shows the rear of the rack mount chassis. Two sets (one for each drive) of host interface cable couplers, and one Ethernet connector is available for each drive. One AC power connector and one AC switch supplies AC power to both drive power supplies, which are mounted internally, between the drives.

Note – The drive status LED (and encryption status LED for encryption-capable drives) for each drive are visible through the drive cooling grids.

FIGURE 2-3 Rack Mount Chassis Rear Panel



1. Drive B host interface port A
2. Drive B host interface port B
3. Drive B cooling grid
4. Drive B Ethernet port (connects to the drive maintenance port)
5. AC power switch
6. AC power receptacle
7. Drive A cooling grid
8. Drive A Ethernet port (connects to the drive maintenance port)
9. Drive A host interface port A
10. Drive A host interface port B

Operator Tasks

This chapter discusses operator tasks primarily for rack-mounted T10000 tape drives. For operator tasks relating to drives within a library, consult library operator guides.

Power-on Rack Mount Drives

To apply power to the rack mount tray:

1. **Make sure the rack mount tray is connected to an AC power outlet or power strip.**
2. **Make sure that all interface cables are fully seated.**
3. **Set the rear panel power switch to on (|)** [see [FIGURE 2-3 on page 35](#)].

Both drives power-on and start performing an initial program load (IPL).

Note – The power indicator flashes while the IPL is in progress. It is the left most operator panel LED, see [FIGURE 2-2 on page 32](#).

The operator panel display window displays various messages relative to the IPL sequence. These messages do not require operator action.

The drive successfully completes an IPL when:

- The drive power indicator is steady.
- The operator panel display window displays an asterisk (*).

Power-off Rack Mount Drives

To remove power from the rack mount tray:

1. **Make sure there is not a job or application running on the host that is using this tape drive. If there is, stop that job or application.**
2. **Make sure a cartridge is not loaded in the tape drive.**
3. **Set the rack mount tray rear panel power switch to off (O).**
(see [FIGURE 2-3 on page 35](#))

IPL the Drive (Operator Panel)

To reset a rack mount drive that is already powered on:

1. **Make sure there is not a job or application running on the host that is using this tape drive. If there is, stop that job or application.**
2. **Make sure a data cartridge is NOT LOADED.**
3. **Press the operator panel IPL button.**

(see [FIGURE 2-2 on page 32](#))

Once the IPL starts, the following things happen:

- The drive power indicator flashes
- The operator panel display window displays various messages relative to the IPL sequence. These messages require no action on your part

When the drive successfully completes an IPL:

- The drive power indicator is steady
- An asterisk (*) appears in the operator panel display window

Note – If there is a dump present, the operator panel display window alternates between the asterisk and the dump message. The dump present indication will stop when a tape cartridge is loaded.

IPL the Drive (VOP)

This process assumes you are viewing the VOP screen (see [FIGURE 1-3 on page 24](#)).

1. **Make sure there is not a job or application running on the host that is using this tape drive. If there is, stop that job or application.**
2. **Make sure a data cartridge is NOT LOADED.**
3. **Click the Online button, if the drive is not offline, to set it offline.**

The Online button is now grey, indicating that the drive is offline. This can also be done from the File drop-down menu. Select Drive Operations > Set Offline.

4. **Select Drive Operations > IPL to start the IPL process.**

Place the Drive Online (Operator Panel)

To change the tape drive state from offline to online:

1. Press the operator panel **Menu** button until **Offline** appears in the display window.
2. Press the operator panel **Select** button to toggle the drive state.
Online appears in the display window, indicating the drive state is now online.
3. Press the **Menu** button until **Exit Menu?** appears in the display window.
4. Press the **Select** button to exit the menu system.
5. Bring the tape drive back online to the host.

This is accomplished by:

- **Enterprise:** Vary the tape drive online for all host paths to the tape drive by keying in one of the following commands:
MVS: V <address> online
VM: Vary on, <address>
- **Open Systems:** if there is a switch unit installed and the port to this tape drive was blocked, unblock that port.

Place the Drive Online (VOP)

Note – In a multi-host open systems setting, if there is a switch unit and it had a port blocked to this tape drive, unblock that port before proceeding.

On the VOP screen, if the tape drive is offline, the button next to the word **Online** is grey. To change the tape drive state to online, click the button. When the button changes to blue, the tape drive is online.

The state change can also be done from menu bar **File** drop-down menu.

Select menu bar: **File** > **Drive Operations** > **Set Online**.

View Configuration (Operator Panel)

Note – See [Chapter 4, “Menu System”](#) for complete information and guidelines.

To view current drive configuration:

1. **Press the operator panel Menu button to enter the menu system:**
 - If `Online` appears in the tape drive’s front panel display, go to [Step 2](#).
 - If `Offline` appears, press the `Select` button to toggle the drive state (see [“Place the Drive Online \(Operator Panel\)”](#) on page 39).

Note – It is important that you view configuration settings in the online state, since settings cannot be accidentally changed online. To change settings, you must first set the drive to the offline state (see [“Place the Drive Offline \(Operator Panel\)”](#) on page 46).

2. **Press the Menu button until `View CFG ?` appears in the window display**
3. **Press the operator panel Select button (Yes) to enter view configuration submenus.**
The first configuration setting appears in the operator panel display window.
4. **Press the Menu or the Select button to step through the configuration settings.**

Note – In the drive online state, the `Select` button has the same stepping function as the `Menu` button, except when answering a displayed question.

5. **Press the Menu or Select button until `Exit CFG ?` appears in the display window .**
6. **Press the Select button (Yes) to exit the configuration submenus, or press the Menu button (No) to repeat the view configuration sequence.**
7. **Press the Menu button until `Exit Menu?` appears in the display window .**
8. **Press either the Select button (Yes) to exit the menu system or the Menu button (No) to return to the online/offline selection menu.**

View Configuration (VOP)

Note – See *Virtual Operator’s Panel Customer User’s Guide* (PN 96179) for complete VOP information and guidelines.

To view current drive configuration:

Select menu bar: **Retrieve > View Drive Data,**

Note – There are several tabs to select specific configuration groups to view.

Cartridge Handling Precautions



Caution – Tape data corruption: Be certain that a data cartridge never comes close to strong electrical fields or any form of magnet or magnetic field.

Magnetic fields are present near electric motors (the larger the electric motor, the stronger the magnetic field surrounding it in most cases) and disk drives. Items containing buzzers of any form produce alternating current electrical fields strong enough to partly erase a magnetic tape.



Caution – Tape media damage: You must keep cartridges dry.

Never store cartridges on a floor where moisture might be present or near air conditioners or air handlers. Air conditioners might leak water as a function of cooling the air, and air handlers might be adding moisture to the air as a function of controlling the environment in a computer room.



Caution – Cartridge damage: Avoid dropping or handling cartridges roughly.

There is a hub locking mechanism within the T10000 data cartridge, but it has limitations on just how much braking it provides. Rough handling of a data cartridge could cause the locking mechanism or brake to slip, resulting in a loose tape. Loose tapes are easily damaged by a tape drive.

Identify a Defective Cartridge

Before you load a cartridge into a drive or library, look for these problems:

- A cracked or broken case (including the access door)
- A dirty case
- A missing, broken, or cracked leader

Note – In most cases, your service representative can fix broken leaders.

- A damaged write-protect switch
- Liquid in the data cartridge case
- A loose label
- Any other obvious damage

Also see [“Dropped Cartridges” on page 79](#).

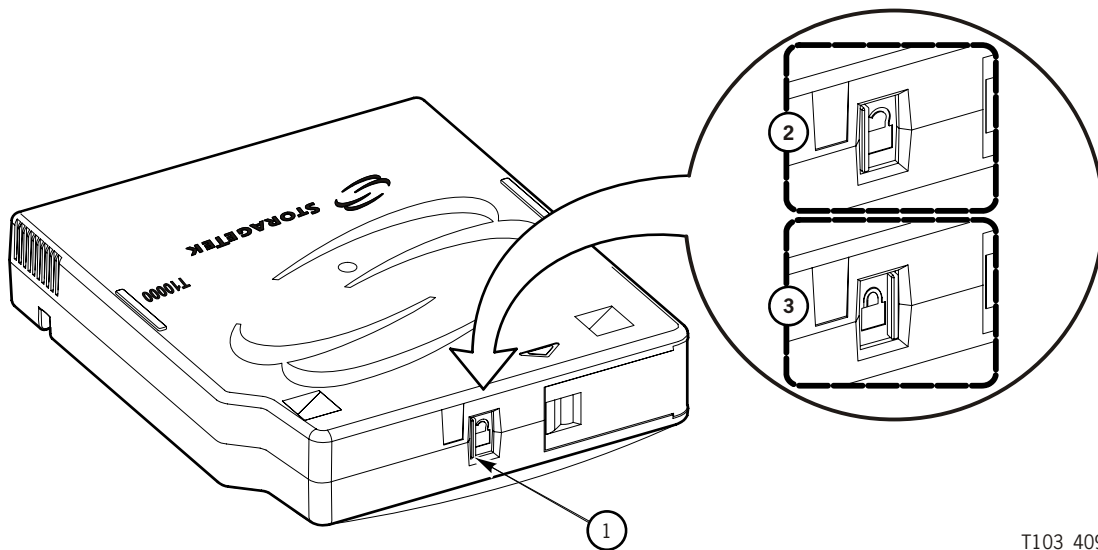
Write-Protect/Write-Enable a Cartridge

To write-protect or write-enable a cartridge, move the write-protect switch (see [FIGURE 3-1](#)) to the desired setting. The symbols indicate the following status:

Locked—(lock image shown closed) Write-protected. The tape drive can only read data from the data cartridge. Write operation attempts will fail.

Unlocked—(lock image shown open) Write-enabled (unprotected). The tape drive can read an/or write data to/from the data cartridge.

FIGURE 3-1 Data Cartridge Write Protect/Enable Switch



T103_409

1. File protect switch
 2. Unlocked position
 3. Locked position
-

Manually Load/Unload Cartridges

Manual loading and unloading are usually only done on rack mounted drives. In the event of a library failure, you might be required to manually load or unload a data cartridge.

Load a Cartridge

To load a cartridge into a T10000 tape drive, do the following:

Note – A T10000 tape drive accepts only T10000 cartridges.

1. **Look into the drive load/unload slot to make sure there are no obstructions.**

Note – For scratch data cartridges and other data cartridges on which the tape is written, make sure the write protect switch on the data cartridge is in the unlocked position. See the previous figure.

2. **Hold the cartridge by the finger grips (FIGURE 1-6 on page 26), and with the hub side down, carefully insert the cartridge into the tape drive loading slot.**
3. **Push the cartridge all the way into the slot**

You have to push on the label edge of the cartridge as there is not enough room in the finger grip area to accomplish this (the finger grip recessions on the bezel do not exist on tape drives used inside a library). You have to overcome a slight resistance to fully seat the cartridge. When the cartridge is fully seated, the drive lowers the data cartridge a short distance onto the file reel motor hub assembly.

Note – When manually loading a library-attached drive, make sure the library hold-off signal to the drive is disabled. Otherwise, the drive will not accept a manual load.

Note – If a cartridge fails to load, remove the cartridge, open the cartridge access door and see if the leader is either cracked near the hole at the end or if the leader is missing entirely.

Note – For rack mounted tape drives, when a cartridge is loaded, the operator panel display window indicates:

- a. **Ready U** when the tape is ready and NOT file protected
 - b. **Ready F** when the tape is ready and file protected
 - c. **Ready A** when the tape is ready and is a VolSafe cartridge
 - d. **Ready H** when T10000B formatted non-VolSafe cartridge is ready and not file-protected in a T10000A tape drive
 - e. **Ready L** when T10000A formatted non-VolSafe cartridge is ready and not file-protected in a T10000B tape drive
-

Unload a Cartridge



Caution – Possible data corruption: Do not push the Unload button while a data cartridge is in use. Doing so could cause the tape drive to stop writing to a tape resulting in corrupted data on the tape.

Use the following procedure to remove cartridges from the drive.

1. Make sure the tape drive is not in use.

This is done by checking the following:

- a. There are no active jobs, applications, or programs using this drive.
- b. The rack mount operator panel activity indicator is steady, and NOT flashing.
- c. The display window (VOP or operator panel) does not indicate any activity relative to tape movement, such as reading, writing, or locating.

2. Unload the tape drive.

- a. **Rack mounted tape drive:** Press the operator panel **Unload** button and wait for the drive to raise the cartridge to the unload position.

The display should show an asterisk (*) when the operation is complete.

Note – If the drive is offline, the asterisk will alternate with *Offline*.

- b. **VOP unload:** Click **Drive Operations > Unload Tape**.



Caution – Tape damage: Any resistance to removing the cartridge, beyond the usual friction between the cartridge case and the drive, probably indicates that the leader is not fully rewound.

If you believe the leader is not fully rewound, use the operator panel (rack-mount drives only), VOP, or library software (if it supports that function) to attempt another load operation followed by another unload operation. Should that fail to correct the situation, contact your service representative about a possible stuck cartridge.

DO NOT forcibly remove a cartridge.

3. Remove the cartridge.

- a. **Rack mount drives:** Use the finger grips on the cartridge and carefully withdraw the cartridge from the drive slot (see [FIGURE 1-6 on page 26](#)).
- b. **Library-attached drives:** Grip top and bottom of the cartridge with your finger tips and carefully withdraw the cartridge from the drive slot.

Note – A T10000 tape drive does not eject the cartridge from the tape drive as other cartridge tape drives commonly do.

Cleaning the T10000 Tape Drive

After the tape drive transports a predetermined length of tape or records a predetermined number of errors, the **Clean** indicator lights. It is time to clean the tape drive.

Note – It is recommended that you clean the T10000B tape drive every ten full file operations due to its higher linear density and capacity. This is three times more frequent than with the T10000A tape drive.

Caution – Equipment damage: Do not wet-clean the tape drive. Do not clean the tape drive unless the Clean indicator lights.



To clean the tape drive:

1. **Make sure the tape drive is not in use.**

Note – If there is a tape loaded in the tape drive, make sure the application or job that was using that tape drive is no longer running before proceeding to [Step 2](#).

2. **Unload any data cartridge in the tape drive. See “Unload a Cartridge” on page 44 if the tape drive has a data cartridge loaded in it.**
3. **Insert a cleaning cartridge in the tape drive.**

Once loaded, the activity light flashes. When the activity and clean indicators turn off, cleaning is complete and the tape drive unloads the cleaning cartridge.

Note – If the tape drive immediately ejects the cleaning cartridge and the tape drive’s front panel display screen displays the message `Exp ClCart`, (a similar message is displayed on the VOP if that program is being used to monitor the tape drive) indicating that the cleaning cartridge has been used to its maximum number of 50 cleaning cycles. Discard the worn cleaning cartridge and insert a new cleaning cartridge into the tape drive. The cleaning cartridge can be used about 50 times before you must discard it. (See “Cleaning Cartridges” on page 28.)

Note – If the tape drive’s front panel displays `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 your service representative.

Caution – Tape damage: Any resistance to removing the tape cleaning cartridge, beyond the usual friction between the tape cleaning cartridge case and the tape drive, probably indicates that the leader is not fully rewound.

If you believe the clean tape leader is not fully rewound, attempt another load operation by pushing the tape back into the tape drive and then use the tape drive’s



front panel **Unload** button to attempt another unload operation. Should that fail to correct the situation, contact your service representative about a possible stuck tape cleaning cartridge. **Do not forcibly remove a tape cleaning cartridge.**

4. Remove the cleaning cartridge from the tape drive.

This completes the cleaning process and the tape drive is ready to resume normal operations.

Place the Drive Offline (Operator Panel)

To change the drive state to offline:

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

In mainframe environments, this is done by varying the tape drive offline for all host paths to the tape drive by keying in one of the following commands:

- **MVS:** V <address> offline
- **VM:** Vary off, <address>

In open systems environments, this is usually done by either:

- Stopping the job that is using the tape drive
- Or, in a multi-host setting, make sure that any job using the tape drive has been stopped and then, if there is a switch unit in use, blocking the port in that switch to the tape drive.

2. Press the operator panel Menu button.

`Online` appears in the display window, indicating the current state of the drive.

3. Press the operator panel Select button to toggle the drive state.

`Offline` appears in the display window, indicating a successful transition to the offline state.

4. Press the Menu button until `Exit Menu?` appears in the display window .

5. Press the Select button to exit the menu system.

Place the Tape Drive Offline (VOP)

To change the tape drive state to offline:

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

In mainframe environments, this is done by varying the tape drive offline for all host paths to the tape drive by keying in one of the following commands:

- **MVS:** V <address> offline
- **VM:** Vary off, <address>

In open systems environments, this is usually done by either:

- Stopping the job that is using that tape drive

- Or, in a multi-host setting, make sure that any job using that tape drive has been stopped and then, if there is a switch unit in use, blocking the port in that switch to that tape drive.
2. **Click the VOP Online button.**

If the tape drive is online, the button is blue. You can click the blue button to change the button to grey, indicating that the tape drive is offline. You can also set the drive offline from the File drop-down menu. Select Drive Operations > Set Offline.

Rebuilding an MIR

This section discusses the rebuilding of the MIR. This is an abnormal situation as the tape drive automatically builds and changes the MIR as the tape is used. The rebuild process is only used in the event that the MIR on a tape becomes damaged or corrupted.

Note – Make sure the write protect switch on the data cartridge is set to the **Unlocked** position.

Operator Panel MIR Rebuilds

This process rebuilds an MIR from the rack mount drive tray operator panel.

1. **Set the drive to the offline state.**
(see [“Place the Drive Offline \(Operator Panel\)”](#) on page 46, if required)
2. **Press the Menu button until Drv Menu? appears in the display window.**
3. **Press the Select button (Yes) once.**
The display window now shows the beginning of drive utilities submenus.
4. **Press the Menu button until Build MIR appears.**
5. **Press the Select button to begin the MIR rebuilding process.**
Ld Cust Tp appears in the display window.

Note – Any loaded cartridge unloads at this time.
If present, remove any unloaded cartridge.

6. **Insert a cartridge with a defective MIR.**
(see [“Load a Cartridge”](#) on page 43, if required)

Note – Rebuilding an MIR could take 90 minutes (T10000A formatted cartridge) or longer (T10000 B formatted cartridge) for a full data cartridge. When the rebuild is complete, the cartridge unloads.



Caution – Tape damage: Any resistance to removing the cartridge, beyond the usual friction between the data cartridge case and the tape drive, probably indicates that the leader is not fully rewound.

If you believe the leader is not fully rewound, attempt another load operation by pushing the cartridge back into the tape drive. If it loads OK, use the tape operator panel **Unload** button to attempt an unload operation. Should that fail to correct the situation, contact your service representative about a possible stuck cartridge. **Do not forcibly remove a cartridge.**

7. Remove the cartridge from the drive load/unload slot.

If there are other cartridges for MIR rebuilding, repeat [Step 6](#) and [Step 7](#) for each cartridge. When all cartridges with defective MIRs have been rebuilt, continue with [Step 8](#).

8. Press the Menu button once.

Exit Drv? appears in the display window.

9. Press the Select button (Yes) to exit the drive utilities submenus, or press the Menu button (No) to repeat the utilities submenu sequence.

10. Return the drive to an online state

(see [“Place the Drive Online \(Operator Panel\)”](#) on page 39, if required)

VOP MIR Rebuild

This process rebuilds an MIR using the virtual operator panel.

To rebuild the MIR from the VOP:

Note – This can be a lengthy process, especially on a fully written cartridge.

1. The tape drive must be in an offline state. If the display shows Online, click Drive Operations> Set Offline.

This sets the tape drive to the `Offline` state.

2. Click Drive Operations > Format Tape... > Rebuild MIR.

Note – This function can be aborted after it has started by clicking **Abort** on the Format Tape submenu.

3. Follow the on-screen prompts and directions.

Note – If more than one tape has a defective MIR, load the next cartridge into the tape drive when the VOP screen displays the prompt to load a customer cartridge. This process continues until all defective MIRs have been rebuilt.

Note – A successful MIR rebuild results in the tape drive automatically unloading the cartridge.

If an MIR rebuild fails:

- The message part of the VOP screen contains a failed message and an FSC.
- The tape drive does NOT automatically eject the cartridge.
- Attempt another rebuild of the MIR before declaring that the MIR part of the tape in that cartridge is defective. Click **Drive Operations > Unload Tape** and after the cartridge unloads, gently push it back into the tape drive until it lowers onto the hub assembly to reload it.



Caution – Tape damage: Any resistance to removing the data cartridge, beyond the usual friction between the data cartridge case and the tape drive, probably indicates that the leader is not fully rewound.

If you believe the leader is not fully rewound:

1. Attempt another load operation (click **Drive Operations > Load**).
2. Followed this with another unload operation (click **Drive Operations > Unload**).

If a load and unload operation fails to correct the situation, contact a service representative about a possible stuck data cartridge. **Do not forcibly remove a data cartridge.** Attempt another build of the data cartridge before deciding that the data cartridge is defective. To do this:

1. Click **Drive Operations > Unload**.
 2. After the data cartridge unloads, gently push it back into the tape drive until it lowers onto the hub assembly to reload it.
-

4. **When all cartridges with defective MIRs have been repaired, click the Done button on the format selection submenu.**
5. **Drive Operations > Set Online.**

This completes the rebuild of the MIR on one or more cartridges. The tape drive is now back online and ready for normal operations.

Menu System

This chapter provides information for using the T10000 menu system with the virtual operator panel (VOP) application or the physical operator panel of a rack mount drive. VOP provides a graphical user interface (GUI) representation of the drive menu system.

Note – See the *Virtual Operator's Panel Operator's Guide* for information regarding VOP and guidelines for operation.

Menu System Overview

The T10000 tape drive menu system provides the operator and service representative a means to determine the drive configuration settings and access the drive utilities. The rack mount drive chassis has a physical operator panel on the front panel (see [FIGURE 2-2 on page 32](#)) that enables direct access to the menu system, as an alternative to using VOP. On library-attached drives, the primary means of connection is through the drive's Ethernet maintenance port and the use of the virtual operator panel (VOP) application.

Note – Service representatives can also use the PC-based StorageTek Diagnostic System (STDS) application to navigate through the T10000 tape drive menu system. Use version 1.55 (or higher) with a T1000A or version 1.57 (or higher) with a T10000B drive.

The menu system information is provided in the following order:

1. ["Menu Structure Overview" on page 52](#)
2. ["Menu Operations" on page 53](#)
3. ["View/Change Configuration Settings" on page 55](#)
4. ["View/Change TCP/IP Settings" on page 68](#)
5. ["Drive Operations Menu" on page 72.](#)

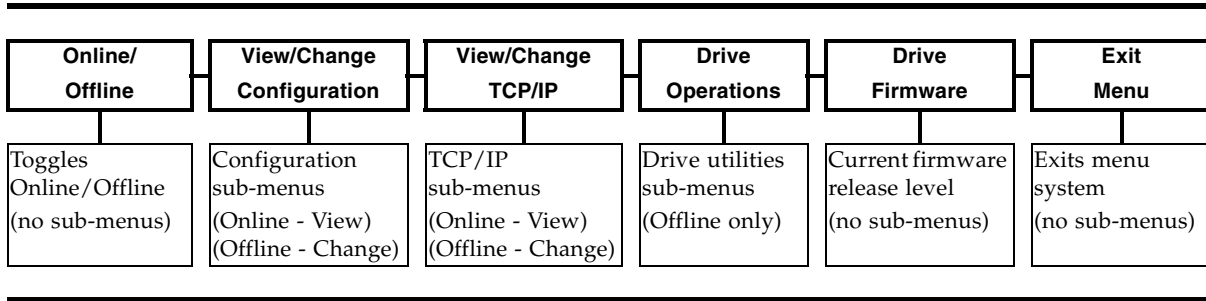
The information describes the menu system as seen through the physical operator panel and the STDS application.

Note – Although the VOP GUI representation is visually very different from the operator panel view, the information is still quite useful for VOP.

Menu Structure Overview

The T10000 main menu system is very similar to the T9x40 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 **Select** switch to toggle between online mode and offline mode as desired, then press the Menu switch to advance to the next menu.



View/Change Configuration menus display drive configuration settings (view only) when online, or allow drive configuration changes when offline. Press **Menu** to advance the display to the next menu. Press **Select** to enter submenus.

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

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

The Drive Firmware menu displays (view only) the current drive firmware release level.

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 (View) mode and offline (Change) mode are very similar. Online menus only provide viewing of current settings and/or status. Offline menus allow option selections and/or change to various settings. In both menu systems, press Menu to advance, or to answer No; press Select to scroll options, or to answer Yes.

Online Menu Operation

When the drive is Online, the menus below are available. Press Menu to advance to the View Configuration menu.

Note – At each main menu you have two choices:

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

View Configuration	View TCP/IP	Drive Firmware	Exit Menu
Interface Select	DHCP	Current firmware release level	Exits menu system
Port A Attributes	IP (High)		
Port B Attributes	IP (Low)		
Emulation	Net Mask (High)		
Compress	Net Mask (Low)		
DSE	Gateway (High)		
Logical Drive Address (FICON only)	Gateway (Low)		
	Exit (Y/N)		
Standard Label Protect			
Language			
Tape Bar Usage			
Library Address			
WWN (High)			
WWN (Low)			
Serial Number			
Exit (Y/N)			

The View Configuration submenus allow you to view current drive configuration settings. See [TABLE 4-1 on page 58](#) for additional information.

The View TCP Configuration submenus allow you to view current TCP/IP settings. (See [TABLE 4-3 on page 69](#) for additional information.)

The view-only Drive Firmware Level menu displays the drive's current firmware release level in *Rx.yy.zzzc* format, where:

- *x* = major revision level,
- *y* = minor revision level,
- *z* = integration number,
- *c* = channel interface type: for FC.

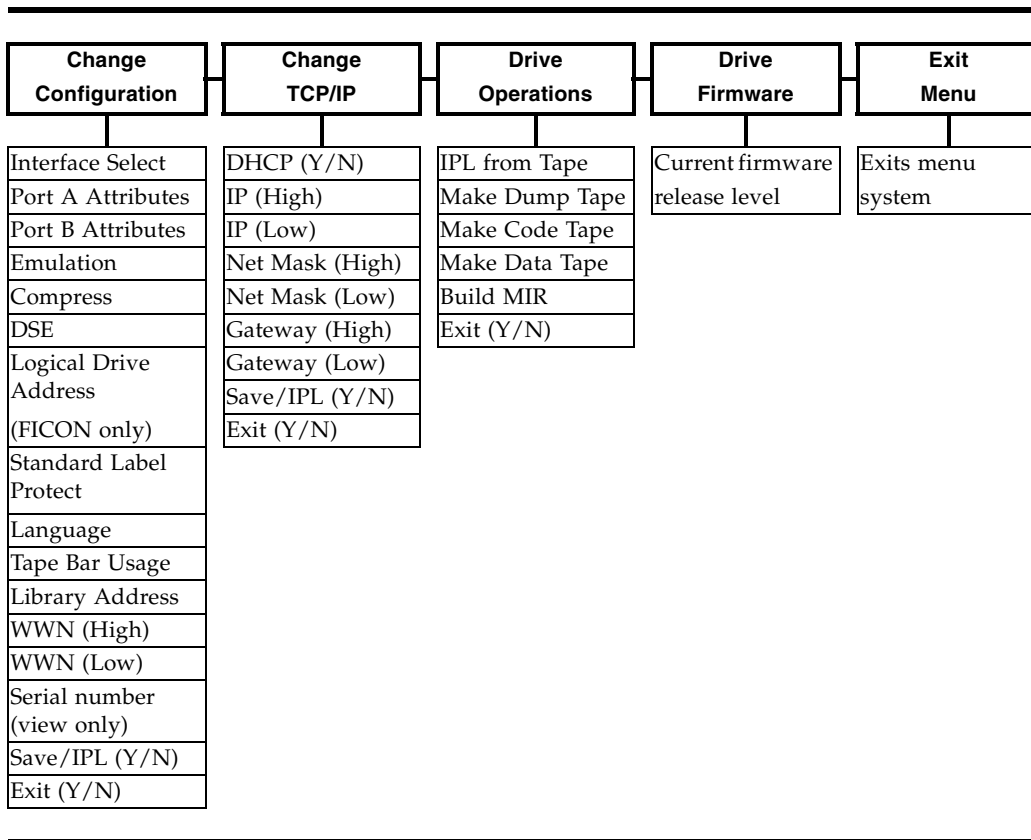
The Exit Menu option allows you the choice to either return to the Online/Offline selection menu by pressing Menu (No) or to exit the menu system by pressing Select (Yes).

Offline Menu Operation

When the drive is offline, the menus shown below are active. Press Menu (one or more times) to advance to the Change Configuration menu.

Note – At each main menu you have two choices:

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



The Change Configuration submenus allow you to change drive configuration settings. See [TABLE 4-1 on page 58](#) for additional information.

The Change TCP Configuration submenus allow you to enable/disable Dynamic Host Control Protocol (DHCP), set a static IP address, set a static Network Mask (NM), and/or set a static net Gateway. See [TABLE 4-3 on page 69](#) for additional information.

The Drive Operations submenus allow you to perform various drive utilities. See [TABLE 4-4 on page 73](#) for additional information.

The view-only Drive Firmware Level Menu displays the current drive firmware release level, same as the Online Main Menu Operation.

The Exit Menu allows you the choice to either 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 data 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.

View / Change Configuration Settings

You can view (only) current configuration settings when the drive is online; or, you can view or change configuration settings when the drive is offline. Use the menu trees for quick reference road maps, or the drive configuration table ([TABLE 4-1 on page 58](#)) for more detailed instructions.

Explanation of the Trees

Press Menu to advance the menu display, 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 segment begins to flash.) Each additional press of the Select switch increments the value one step. When the desired value appears, 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.

Online Configuration Menu Tree

Use the online view configuration menu tree as a brief guide. See [TABLE 4-1 on page 58](#) for details. If you want to change any settings, you must place the drive offline.

Online/Offline

Press **S**elect to toggle, then press **M**enu to set.

View CFG ? (View Configuration)

Press **S**elect to enter, press **M**enu to bypass.

Intf FCP/FICON (displays active interface)

View PrtA? (view current port attributes)

A= (24-bit address identifier, when logged on to an interface system)

B= when viewing port B)

SFP module parameters (i.e. **4G MM0150m**)

Hard PA . (Physical Address) Y/N

PA=xx,ddd (PA=hex, decimal index) (only when Hard PA is yes)

Soft PA .. HI/LO (only when Hard PA is no)

Rate (Auto/fixed rate - 4Gb, 2Gb, 1Gb) (interface speed negotiation)

MaxSz (2112/2048) (maximum data frame size)

H= (first half, 64-bit port node world-wide-name)

L= (second half, 64-bit port node world-wide-name)

WWN Custom (only when custom or dynamic WWN is set)

View PrtB? (current port B attributes) (same sub-menus as port A)

Emulation Mode: (displays current emulation, based on active interface)

FCP: **Emul STD/*** (standard/*/*/3592/*)

(* =special modes, used only when directed by Engineering/Tech Support)

FICON: **Emul VSM/3592** (selected to match site requirements)

Cmprss . . . (Yes/Off/No) (compression mode)

Full DSE . (Y/N) (data security erase mode)

Drv Adr xy (2-character hexadecimal logical drive address) (FICON only)

SL Prot . (Y/N) (standard label protection mode)

English/Espanol/Francais/Italiano/Deutsch (current language)

Tape Bar . (Y/N) (tape completion indication)

Lib Adr xy (2-character hexadecimal library address)

H= (first half, 64-bit drive node world-wide-name)

L= (second half, 64-bit drive node world-wide-name)

WWN Custom (only when custom/dynamic WWN is set)

S/N= (drive serial number) (last six-characters of drive DMOD)

Exit CFG ? (exit view configuration)

View TCP ? (see ["View/Change TCP/IP Settings" on page 68](#))

Rx.yy.zzza (current drive firmware release level)

Exit Menu ?

Offline Configuration Menu Tree

Use the menu tree for brief guidelines. See [Table 4-1 on page 58](#) for details.

Note – Make sure the host has varied the drive offline before setting the drive offline.

Online/Offline

Press **Select** to toggle, then press **Menu** to set.

Chng CFG ? (Change Configuration)

Press **Select** to enter, press **Menu** to bypass.

Intf FCP/FICON (active interface displayed,
alternate selection initiates a drive IPL to activate alternate interface)

Cfg Port A ? (change port A attributes)

SFP module parameters (i.e. **4G MM0150m**)(display only, no change)

Hard PA . (Y/N)

PA=xx,ddd (Hard PA Y only) (change decimal index, PA hex auto-changes)

Soft PA .. HI/LO (Hard PA N only)

Rate (Auto/fixed rate - 4Gb, 2Gb, 1Gb) (interface speed negotiation)

MaxSz (2112/2048) (maximum data frame size)

H= (first half, 64-bit port node world-wide-name)

L= (second half, 64-bit port node world-wide-name)

WWN Custom (only when custom or dynamic WWN is set or changed,
Select toggles to Normal, which recalls factory preset WWN)

Cfg Port B ? (change port B attributes) (same sub-menus as port A)

Emulation Mode: (displays current emulation)

FCP: **Emul STD/3592/*** (standard/*/*/3592/*)

(* =special modes, select only when directed by Sun StorageTek Support)

FICON: **Emul VSM/3592** (select to match site requirements)

Cmprss ... (Yes/Off/No) (compression mode)

Full DSE . (Y/N) (data security erase mode)

Drv Adr xy (2-character hexadecimal logical drive address) (FICON only)

SL Prot . (Y/N) (standard label protection mode)

Language ? (scrolls through options, beginning with current)
(English/Espanol/Francais/Italiano/Deutsch)

Tape Bar . (Y/N) (tape completion indication)

Lib Adr xy (2-character hexadecimal library address)

H= (first half, 64-bit drive node world-wide-name)

L= (second half, 64-bit drive node world-wide-name)

WWN Custom (only when custom/dynamic WWN is set or changed,
Select toggles to Normal, which recalls factory preset WWN)

S/N= ((display only)) (last six-characters of drive DMOD)

Save/IPL ? (if there are pending changes)

Exit CFG ? (no, restarts change configuration mode)

Chng TCP ? (see [“View/Change TCP/IP Settings” on page 68](#))

Drv Menu ? (see [“Drive Operations Menu” on page 72](#))

Rx.yy.zzza (current drive firmware release level) (display only)

Exit Menu ?

TABLE 4-1 provides drive configuration setting details and guidelines for changing selected settings when the drive is offline.

TABLE 4-1 Drive Configuration Settings

Options	Notes	Procedure
Online/Offline Menu		
Online/ Offline	Defaults to Online at power-on. You must select Offline to change a configuration setting. OffLn Pend might appear while waiting for a system response or diagnostics completion.	<ol style="list-style-type: none"> 1. Press Menu repeatedly until Online or Offline appears, if required. 2. Press Select to change modes. 3. Press Menu to advance to the next menu.
View/Change Configuration Menu		
View CFG ? (online)	If bypassed, the display advances to the View/Change TCP/IP Configuration Menu.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu (No) to bypass. ■ Press Select (Yes) to enter submenus.
Chng CFG ? (offline)	This is the entry point to the configuration submenus.	
Interface Select Submenu		
Intf FCP	Defaults to the last saved selection. Enables the drive interface to run FCP protocol.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass. ■ Press Select (offline) to toggle; then, press Menu to set, and initiate an IPL to load the alternate firmware modules.
Intf FICON	Enables the drive interface to run FICON protocol In the online (View) mode, only the current interface selection appears. You must switch to the offline (Change) mode to toggle the selection.	
<p>Note: Manufacturing ships drive FRUs with the Intf FCP option selected. When a defective drive in a FICON interface is replaced, the selection must be changed to Intf FICON. After IPL is complete, the menu system displays appropriate FICON related items</p> <p>Do not select Intf FICON with code level 1.38.207.</p>		

TABLE 4-1 Drive Configuration Settings (Continued)

Options	Notes	Procedure
Port A Attributes Menu		
View PrtA ? (online) Cfg PrtA ? (offline)	View/configure port attributes as defined in the following submenus.	Do one of the following: ■ Press Menu (No) to bypass. ■ Press Select (Yes) to enter the submenus.
Port A/B 24-Bit Address Identifier Submenu		
A=xyyzzan B=xyyzzan (online only) A=..... B=..... appears when the port is not logged onto an interface	24-bit (6 hexadecimal characters) port identifier at interface log on, plus connection type and speed. <i>xx</i> = domain (00 priv. loop or p-t-p) <i>yy</i> = area (00 in priv. loop or p-t-p) <i>zz</i> = 00 - EF (per connection type) <i>a</i> = connection type: <i>f</i> : fabric <i>n</i> : point-to-point <i>0</i> : public loop <i>v</i> : private loop <i>n</i> = connection speed: 1, 2, or 4 (Gb)	Press Menu or Select to advance to the next submenu.
Port A/B SFP Module Parameter Submenu		
<i>nG</i> MM0 <i>nnm</i> or <i>nG</i> SM <i>nn.nk</i>	Shows the Small Form-factor Pluggable (SFP) module information. Appears when an SFP module is present and readable: <i>nG</i> = max. Gigabit speed (2 - 4) MM - Multimode, (short wave) SM - Single Mode, (long wave) <i>nnmm</i> = maximum distance, meters (m) (short wave) <i>nn.nk</i> = maximum distance, kilometers (k) (long wave)	Press Menu or Select to advance to the next submenu.
?G ??	Appears when an SFP module is present but unreadable.	
No SFP	Appears when an SFP module is not present in the port. Note: Display is information only, and appears in both online and offline menus.	
Port A/B Hard Physical Addressing Submenu		
Hard PA N	Defaults to the last saved selection. Disables hard physical address (PA), and causes the drive to seek a soft PA assignment at loop initialization.	Do one of the following: ■ Press Menu to bypass. ■ Press Select to toggle; then, press Menu to set, and advance to the next submenu.
Hard PA Y	Enables a hard PA, manually set by the Hard Physical Address Submenu. If the preset hard PA is not available at loop initialization, the drive then seeks a soft PA.	
Note: Manufacturing ships drives with the Hard PA N option selected.		

TABLE 4-1 Drive Configuration Settings (Continued)

Options	Notes	Procedure
Port A/B Hard Physical Address Submenu		
PA=xx,ddd	<p>Defaults to the last saved selection.</p> <p>xx (hex) is the Arbitrated Loop Physical Address (AL_PA). ddd is the decimal index into the ALPA table.</p> <p>Appears only with Hard PA Y</p> <p>As you manually change the decimal index digits (valid indexes are 125-000), the PA hex display automatically changes (see TABLE 4-2 on page 67).</p>	<ol style="list-style-type: none"> Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select to start the change mode. Press Select to increment the digit until the desired value appears, then press Menu to set. Repeat step 1 for each digit. Press Menu to advance to the next submenu; or, press Select to restart the change mode.
Port A/B Soft Physical Addressing Submenu		
Soft PA HI	<p>Defaults to the last saved selection.</p> <p>The drive seeks a soft PA in an ascending order at loop initialization.</p>	<p>Do one of the following:</p> <ul style="list-style-type: none"> Press Menu to bypass. Press Select to toggle; then, press Menu to set and advance to the next submenu.
Soft PA LO	<p>The drive seeks a soft PA in a descending order at loop initialization.</p> <p>Appears only with Hard PA N</p>	
<p>Note: Manufacturing ships drives with Soft PA LO option selected. The Solaris default FCP-driver behavior requires Soft PA LO.</p>		
Interface Speed Rate Submenu		
Rate Auto	<p>Selects interface speed rate.</p> <p>Speed determined by network.</p>	<p>Do one of the following:</p> <ul style="list-style-type: none"> Press Menu to bypass. Press Select until desired option appears; then, press Menu to set and advance to the next submenu.
Rate 4Gb	Speed rate fixed at 4 Gb	
Rate 2Gb	Speed rate fixed at 2 Gb	
Rate 1Gb	Speed rate fixed at 1 Gb	
<p>Note: When fixed speed rate is selected, the drive only operates at the selected rate. If the network is fixed at a different rate, the drive does not log on.</p>		
<p>Note: Manufacturing ships drives with the Rate Auto option selected.</p>		
<p>T10000A drives operating in AS400 environments with code level 1.37.114 should support 4Gb transfer rates. If the user encounters problems when writing highly compressible data, the service representative should refer to Field Action Bulletin (FAB) 200869.</p>		
Port A/B Maximum Data Frame Size Submenu		
MaxSz 2112	Selects maximum frame size.	<p>Do one of the following:</p> <ul style="list-style-type: none"> Press Menu to bypass. Press Select to toggle; then, press Menu to set and advance to the next submenu.
MaxSz 2048		
<p>Note: Manufacturing ships drives with the MaxSz 2112 option selected.</p>		

TABLE 4-1 Drive Configuration Settings (Continued)

Options	Notes	Procedure
Port A/B World Wide Name (WWN) Submenu		
<p>Note: You can create or edit a “Custom” WWN as required for special circumstances. When Custom WWNs are used, Port A, Port B, and Drive Node WWNs should <i>all</i> be changed to designated Custom WWNs to meet special circumstances. Make sure the Custom WWN is registered in the Host interface software. Unregistered or duplicate WWNs cause Host interface anomalies. Libraries using the dynamic WWN (dWWN) feature automatically set the drive Custom WWN setting to a library-determined WWN.</p>		
H=500104F0	<p>Defaults to the last saved selection.</p> <p>Comprises the first half of a unique 64-bit WWN that identifies the specific port node. This first half includes a company identification (characters 2 through 6); and for StorageTek branded devices, the company ID is “00104F”. Therefore, you would not typically edit the first half of a WWN.</p>	<ol style="list-style-type: none"> Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select to start the change mode. Press Select to increment the character until the desired value appears, then press Menu. Repeat step 2 for each character. Press Menu to advance to the second half of the WWN; or, press Select to restart the change mode.
L=yyyyyyyy	<p>Defaults to the last saved selection.</p> <p>Comprises the second half of the 64-bit WWN that identifies this specific port node. Typically, only the last character is different than the other port node. Generally, when setting a Custom WWN in a drive, you edit the second half of the WWN to replicate the second half of the WWN which was in use for the removed drive.</p>	<ol style="list-style-type: none"> Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select to start the change mode. Press Select to increment character until desired value appears, then press Menu. Repeat step 2 for each character. Press Menu to advance to the next submenu; or, press Select to restart the change mode.
<p>Note: Manufacturing generates “Normal” drive node and port A/B WWNs as a set, and stores them in the drive EEPROM. The format is: Drive Node: H=500104F0 (StorageTek brand device), L=yyyyyyyy. Port A: H=500104F0, L=yyyyyyyy (last character, one higher than drive node) Port B: H=500104F0, L=yyyyyyyy (last character, one higher than port A)</p>		
Port A/B Custom/Normal WWN Submenu		
<p>Note: This submenu appears only when the Custom WWN is in use or when one is being created/edited.</p>		
WWN Custom	<p>Appears whenever a Custom WWN is in use, or is being created/edited.</p> <p>WWN Custom also appears when the drive is using dynamic WWN, set by a library invoking dWWN.</p>	<ol style="list-style-type: none"> Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass to the next submenu. Press Select to toggle the selection to WWN Normal
WWN Normal	<p>Selection recalls the stored Normal WWN from the drive EEPROM.</p>	<ol style="list-style-type: none"> Do one of the following: <ul style="list-style-type: none"> Press Menu to recall the stored Normal WWN, and advance to the next submenu. Press Select to toggle the selection to WWN Custom.
Port B Attributes Menu		
View PrtB ? (online)	<p>View or change Port B attributes as defined in the preceding port A/B attributes submenus, starting on page 59.</p>	<p>Do one of the following:</p> <ul style="list-style-type: none"> Press Menu to bypass. Press Select to enter the port attributes submenus.
Cfg PrtB ? (offline)		

TABLE 4-1 Drive Configuration Settings (Continued)

Options	Notes	Procedure
Emulation Mode Submenu (FCP)		
Emul XXXXX	Emul STD is Native. Emul 9840 Emul 9940 Emul 3592	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass ■ Press Select until desired option appears; then, press Menu to set, and advance to the next submenu.
<p>Note: Manufacturing ships Fibre Channel (FCP) drives with the Emul STD option selected. Use the special emulation modes (Emul 9840 and Emul 9940) only at the direction of Sun StorageTek Support.</p> <p>When using VOP to change Emulation mode, you must have VOP version 1.0.9, or higher. Otherwise, the current mode option cannot be changed by VOP.</p>		
Emulation Mode Submenu (FICON)		
Emul XXXX	Emul 3592 Emul VSM	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass ■ Press Select to toggle; then, press Menu to set, and advance to the next submenu.
<p>Note: Manufacturing ships FICON drives with the Emul 3592 option selected. Change the selection to Emul VSM as needed to match site requirements.</p> <p>When using VOP to change the emulation mode, you must have VOP version 1.0.9, or higher. Otherwise, the current mode option cannot be changed by VOP.</p>		
Compress Mode Submenu		
Cmprss Yes	Defaults to the last saved selection. When you select Yes, data is compressed, by default. Host can request no data compression.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass. ■ Press Select until the desired option appears; then, press Menu to set and advance to the next submenu.
Cmprss Off	When you select Off, data is not compressed, and a host request has no effect.	
Cmprss No	When you select No, data is not compressed, by default. Host can request data compression.	
<p>Note: Manufacturing ships drives with the Compress Yes option selected.</p>		
Data Security Erase Mode Submenu		
Full DSE Y	Defaults to the last saved selection. Writes a random binary pattern on the media, over-writing existing data from the point of an <i>erase</i> command, to the end-of-tape.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass. ■ Press Select to toggle; then, press Menu to set and advance to the next submenu.
Full DSE N	Writes data on the media that indicates valid data does not exist beyond the point of an <i>erase</i> command.	
<p>Note: Manufacturing ships drives with the Full DSE N option selected.</p>		

TABLE 4-1 Drive Configuration Settings (Continued)

Options	Notes	Procedure
Drive Address Submenu (FICON only)		
Drv Adr xy	Defaults to the last saved selection. x & y are hexadecimal characters. Establishes the device (not CU) address for the drive. It should usually remain zero (00). Recheck this address if the link is not operating.	<ol style="list-style-type: none"> Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select to start the change mode. Press Select to increment the x character until the desired value appears, then press Menu. Repeat step 2 for the y character. Press Menu to advance to the next submenu; or, press Select to restart the change mode.
Note: Manufacturing ships drives with Drv Adr 00 selected when the FICON interface is active.		
Standard Label Overwrite Protection Submenu		
SL Prot Y	Defaults to the last saved selection. Selects standard label overwrite protection.	Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select to toggle; then, press Menu to set and advance to the next submenu.
SL Prot N	Deselects standard label overwrite protection.	
Notes:		
<ol style="list-style-type: none"> Manufacturing ships drives with SL Prot N selected. Only select "SL Prot Y" if label overwrite code is loaded, or if running standard labels and wish the drive to display a fatal error (CHK 33EX) when writing a non-80-byte record for VOLSER or HDR1. Customers using NL or NSL tape processing cannot use SL Prot. POST WRCART cannot be run with this feature enabled. Contact Technical Support for any assistance. 		
Language Selection Submenu		
Language ?	Defaults to the last saved selection. Selects display language: English, Espanol, Francais, Italiano, or Deutsch. In the online (View) mode, only the active language appears.	Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select until desired option appears; then, press Menu to set and advance to the next submenu.
Note: Manufacturing ships drives with the English option selected.		
Tape Bar Submenu		
Tape Bar Y	Defaults to the last saved selection. Enables secondary display of current read/write point, relative to the beginning of data mark on the tape.	Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select to toggle; then, press Menu to set and advance to the next submenu.
Tape Bar N	Disables the option.	
Note: Manufacturing ships drives with the Tape Bar N option selected.		

TABLE 4-1 Drive Configuration Settings (Continued)

Options	Notes	Procedure
Library Address Submenu		
Lib Adr xy	<p>Defaults to the last saved selection.</p> <p>For SL8500, SL3000, and L180/L700/L1400 libraries; use the factory preset (FF) with T10000 tape drives.</p> <p>In 9310 libraries (T10000A only), looking at the back of the drives, the address sequence in the drive cabinet is:</p> <ul style="list-style-type: none"> ■ Left column from top: 00 through 09 ■ Right column from top: 0A through 13. 	<ol style="list-style-type: none"> 1. Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass. ■ Press Select to start the change mode. 2. Press Select to increment the x digit until the desired value appears, then press Menu to set. 3. Repeat step 2 for the y digit. 4. Press Menu to advance to the next submenu; or, press Select to restart the change mode.
<p>Note: Manufacturing ships drives with Lib Adr FF selected.</p>		
Drive Node WWN Submenu		
<p>Note: You can create/edit a "Custom" WWN as required for special circumstances. When Custom WWNs are used, Drive Node, Port A, and Port B WWNs should <i>all</i> be changed to the designated Custom WWNs to meet special circumstances. Make sure the Custom WWN is registered in the Host interface software. Unregistered or duplicate WWNs cause Host interface anomalies.</p> <p>Libraries using the dynamic WWN (dWWN) feature automatically set the drive Custom WWN setting to a library-determined WWN.</p>		
H=500104F0	<p>Defaults to the last saved selection.</p> <p>Comprises the first half of a unique 64-bit node WWN that identifies this drive node. This first half includes a company identification (characters 2 through 6); and for StorageTek branded devices, the company ID is "00104F". Therefore, you would not typically custom edit the first half of a WWN.</p>	<ol style="list-style-type: none"> 1. Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass. ■ Press Select to start the change mode. 2. Press Select to increment the character until the desired value appears, then press Menu. 3. Repeat step 2 for each character. 4. Press Menu to advance to the second half of the WWN; or, press Select to restart the change mode.
L=yyyyyyyy	<p>Defaults to the last saved selection.</p> <p>Comprises the second half of the 64-bit WWN that identifies this specific node. Typically, only the last character is different than the port nodes. Generally, when setting a Custom WWN in a drive, you edit the second half of the WWN to replicate the second half of the WWN which was in use for the removed drive.</p>	<ol style="list-style-type: none"> 1. Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass. ■ Press Select to start the change mode. 2. Press Select to increment the character until the desired value appears, then press Menu. 3. Repeat step 2 for each character. 4. Press Menu to advance to the next submenu; or, press Select to restart the change mode.
<p>Note: Manufacturing generates the "Normal" drive node and port A/B WWNs as a set and stores them in the drive EEPROM. The format is:</p> <p>Drive Node: H=500104F0 (StorageTek brand device), L=yyyyyyyy. (lowest of set)</p> <p>Port A: H=500104F0, L=yyyyyyyy (last character, one higher than drive node)</p> <p>Port B: H=500104F0, L=yyyyyyyy (last character, one higher than port A node)</p>		

TABLE 4-1 Drive Configuration Settings (Continued)

Options	Notes	Procedure
Drive Node Custom/Normal WWN Submenu		
Note: This submenu only appears if either a Custom WWN is in use or when one is being created/edited.		
WWN Custom	Appears when either a Custom WWN is in use or is being created/edited. WWN Custom also appears when the drive is using a dynamic WWN set by a library invoking dWWN.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass to the next submenu. ■ Press Select to toggle the selection to WWN Normal.
WWN Normal	Selection recalls the stored Normal WWN from the drive EEPROM.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to recall the stored Normal WWN, and advance to the next submenu. ■ Press Select to toggle the selection to WWN Custom.
Serial Number Menu		
S/N=zzzzzz (online only)	Identifies the manufacturing assigned serial number of the drive. zzzzzz = the last six characters of the rear panel DMOD label. This data is read from an internal EEPROM for online viewing only.	Press Menu or Select to advance to the next submenu.
Save Configuration Submenu		
Save/IPL ? (offline only)	This submenu appears only if changes were made in any submenu. Saving CFG appears for 2 seconds after you press Select. After you save the configuration, the drive performs an IPL.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu (No) to cancel changes. ■ Press Select (Yes) to save changes and initiate an IPL.
Exit Configuration Submenu		
Exit CFG ?	This submenu allows you to either repeat the change configuration submenus or exit the configuration submenus.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu (No) to loop back to the Interface Select Submenu. ■ Press Select (Yes) to exit and advance to the TCP/IP Configuration Menu.
TCP/IP Configuration Menu		
View TCP ? (online)	If bypassed, the display advances to the Firmware Release Level Menu (online) or the Drive Operations Menu (offline). This is the entry point for the TCP/IP submenus. See “View/Change TCP/IP Settings” on page 68.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu (No) to bypass. ■ Press Select (Yes) to enter TCP/IP configuration submenus.
Chng TCP ? (offline)		
Drive Operation Menu		
Drv Menu ? (offline only)	If bypassed, the display advances to the Firmware Release Level Menu. This is the entry point to the offline drive operations submenus. See “Drive Operations Menu” on page 72.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu (No) to bypass. ■ Press Select (Yes) to enter drive operation submenus.

TABLE 4-1 Drive Configuration Settings (Continued)

Options	Notes	Procedure
Firmware Release Level Menu		
Rx.yy.zzza	This submenu displays the current drive firmware release level.	Press Menu or Select and advance to the Exit Main Menu.
Exit Menu		
Exit Menu?	This menu allows you to either stay in the menu system to return the drive to Online or to exit the menu system.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu (No) to go to the Online/Offline menu. ■ Press Select (Yes) to exit the Menu System.
<p>Note: If you exit the menu system with the drive Offline, the display flashes <code>Offl i n e</code> every few seconds as a reminder that drive is still Offline (if a data cartridge has been loaded at least once).</p>		

The Arbitrated Loop Physical Address Table provides selection of a specific Hard PA (*xx*) by setting the associated decimal index (*ddd*). Valid entries are 125-000.

TABLE 4-2 ALPA Table

PA	Index	PA	Index	PA	Index	PA	Index	PA	Index
xx	ddd	xx	ddd	xx	ddd	xx	ddd	xx	ddd
01	125	34	100	63	075	90	050	BC	025
02	124	35	099	65	074	97	049	C3	024
04	123	36	098	66	073	98	048	C5	023
08	122	39	097	67	072	9B	047	C6	022
0F	121	3A	096	69	071	9D	046	C7	021
10	120	3C	095	6A	070	9E	045	C9	020
17	119	43	094	6B	069	9F	044	CA	019
18	118	45	093	6C	068	A3	043	CB	018
1B	117	46	092	6D	067	A5	042	CC	017
1D	116	47	091	6E	066	A6	041	CD	016
1E	115	49	090	71	065	A7	040	CE	015
1F	114	4A	089	72	064	A9	039	D1	014
23	113	4B	088	73	063	AA	038	D2	013
25	112	4C	087	74	062	AB	037	D3	012
26	111	4D	086	75	061	AC	036	D4	011
27	110	4E	085	76	060	AD	035	D5	010
29	109	51	084	79	059	AE	034	D6	009
2A	108	52	083	7A	058	B1	033	D9	008
2B	107	53	082	7C	057	B2	032	DA	007
2C	106	54	081	80	056	B3	031	DC	006
2D	105	55	080	81	055	B4	030	E0	005
2E	104	55	079	82	054	B5	029	E1	004
31	103	59	078	84	053	B6	028	E2	003
32	102	5A	077	88	052	B9	027	E4	002
33	101	5C	076	8F	051	BA	026	E8	001
								EF	000

View /Change TCP/IP Settings

Use following menu tree as a brief guide to view or change the TCP/IP settings.
See [TABLE 4-3 on page 69](#) for more detailed guidelines.

Note – Make sure the host has varied the drive offline before setting the drive offline.

Online/Offline

Press **Select** to toggle, then press **Menu** to set.

View/Chng CFG ? View (online)/Change (offline) Configuration

Press **Menu** to bypass.

View/Chng TCP ? (View (online)/Change (offline) Configuration

Press **Select** to enter, press **Menu** to bypass.

DHCP . (Y/N) (must be set to “N” to view/change the static settings)

IPh aaa . bbb (IP Address, high) (first half of static IP address)

IPl ccc . ddd (IP Address, low) (second half of static IP address)

NMh aaa . bbb (Net Mask, high) (first half of sub-net mask)

NMI ccc . ddd (Net Mask, low) (second half of sub-net mask)

GWh aaa . bbb (Gateway, high) (first half of gateway address)

GWI ccc . ddd (Gateway, low) (second half of gateway address)

Save/IPL ? (if there are pending changes)

Exit TCP ? (no, cancels changes, and restarts view/change TCP)

Drv Menu ? (offline only) (see [“Drive Operations Menu” on page 72](#))

Rx.yy.zzza (current drive firmware release level) (display only)

Exit Menu ?

TABLE 4-3 provides details of TCP/IP configuration settings, and guidelines for changing selected settings when the drive is offline.

TABLE 4-3 TCP/IP Configuration Settings

Options	Notes	Procedure
TCP/IP Configuration Menu		
View TCP ? (online)	If bypassed, the display advances to the Firmware Release Level menu (online) or the Drive Operations menu (offline). This is the entry point for the TCP/IP submenus.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu (No) to bypass. ■ Press Select (Yes) to enter the TCP/IP submenus.
Chng TCP ? (offline)		
DHCP Submenu		
DHCP Y/N	Defaults to the last saved selection. With DHCP Y selected, a DHCP server (remote to the drive) assigns the dynamic TCP/IP settings. With DHCP N selected, DHCP is disabled. The drive uses Static TCP/IP settings.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass. ■ Press Select to toggle; then, press Menu to set and advance to the next submenu.
Notes:		
1.DHCP N must be active/selected for you to change the static IP, Net Mask, and Gateway.		
2.When DHCP Y is active/selected, you <i>cannot</i> change the static IP, Net Mask, and Gateway.		
3.Manufacturing ships all drives with the DHCP N option selected.		
IP Address Hi Submenu		
IPhaaa .bbb	Defaults to the last saved selection. Valid entries are 000-255 for each digit trio. If you attempt to enter a value greater than 255 in either trio, all digits flash when the last digit is set.	<ol style="list-style-type: none"> 1. Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass. ■ Press Select to start the change mode. 2. Press Select to increment the flashing digit until the desired value appears, then press Menu to set. 3. Repeat step 2 for each digit. 4. Press Menu to advance to the next submenu; or, press Select to restart the change mode. 5. If all digits flash, press either Select or Menu to clear; then, press Select to restart the change mode.
Note: Manufacturing ships all drives with the static IP Address Hi set to 010.000.		
IP Address Lo Submenu		
IP ccc .ddd	Defaults to the last saved selection. Valid entries are 000-255 for each digit trio. If you attempt to enter a value greater than 255 in either trio, all digits flash when the last digit is set.	<ol style="list-style-type: none"> 1. Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass. ■ Press Select to start the change mode. 2. Press Select to increment the flashing digit until the desired value appears, then press Menu to set. 3. Repeat step 2 for each digit. 4. Press Menu to advance to the next submenu; or, press Select to restart the change mode. 5. If all digits flash, press either Select or Menu to clear; then, press Select to restart the change more.
Note: Manufacturing ships all drives with static IP Address Lo set to 000.001.		

TABLE 4-3 TCP/IP Configuration Settings (Continued)

Options	Notes	Procedure
Net Mask Hi Submenu		
NMh a a . b b b	Defaults to the last saved selection. Valid entries are 000-255 , for each digit trio. If you attempt to enter a value greater than 255 in either trio, all digits flash when the last digit is set.	<ol style="list-style-type: none"> Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select to start the change mode. Press Select to increment the flashing digit until the desired value appears, then press Menu to set. Repeat step 2 for each digit. Press Menu to advance to the next submenu; or, press Select to restart the change mode. If all digits flash, press either Select or Menu to clear; then, press Select to restart the change more.
Note: Manufacturing ships all drives with static Net Mask Hi set to 255 . 255.		
Net Mask Lo Submenu		
NMl c c c . d d d	Defaults to the last saved selection. Valid entries are 000-255 for each digit trio. If you attempt to enter a value greater than 255 in either trio, all digits flash when the last digit is set.	<ol style="list-style-type: none"> Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select to start the change mode. Press Select to increment the flashing digit until the desired value appears, then press Menu to set. Repeat step 2 for each digit. Press Menu to advance to the next submenu; or, press Select to restart the change mode. If all digits flash, press either Select or Menu to clear; then, press Select to restart the change more.
Note: Manufacturing ships all drives with static Net Mask Lo set to 255 . 000.		
Gateway Hi Submenu		
GWh a a a . b b b	Defaults to the last saved selection. Valid entries are 000-255 for each digit trio. If you attempt to enter a value greater than 255 in either trio, all digits flash when the last digit is set.	<ol style="list-style-type: none"> Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select to start the change mode. Press Select to increment the flashing digit until the desired value appears, then press Menu to set. Repeat step 2 for each digit. Press Menu to advance to the next submenu; or, press Select to restart the change mode. If all digits flash, press either Select or Menu to clear; then, press Select to restart the change more.
Note: Manufacturing ships drives with a static Gateway Hi set to either 0 . 0 . or 255 . 255		

TABLE 4-3 TCP/IP Configuration Settings (Continued)

Options	Notes	Procedure
Gateway Lo Submenu		
GWlccc.ddd	Defaults to the last saved selection. Valid entries are 000-255, for each digit trio. If you attempt to enter a value greater than 255 in either trio, all digits flash when the last digit is set.	<ol style="list-style-type: none"> Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select to start the change mode. Press Select to increment the flashing digit until the desired value appears, then press Menu to set. Repeat step 2 for each digit. Press Menu to advance to the next submenu; or, press Select to restart the change mode. If all digits flash, press either Select or Menu to clear; then, press Select to restart the change more.
Note: Manufacturing ships drives with static Gateway Lo set to either 0.0. or 255.255		
Save TCP/IP Submenu		
Save/IPL ?	This submenu is present if either the DHCP selection or the static TCP/IP settings were changed. Saving TCP appears for 2 seconds after you press Select. After saving the TCP configuration, the drive automatically perform an IPL. Save Fails appears for RAM problems.	<p>Do one of the following:</p> <ul style="list-style-type: none"> Press Menu (No) to cancel changes. Press Select (Yes) to save changes and initiate an IPL.
Exit TCP/IP Submenu		
Exit TCP ?	This submenu allows you to either repeat the TCP/IP submenus or to exit TCP/IP.	<p>Do one of the following:</p> <ul style="list-style-type: none"> Press Menu (No) to loop back to the DHCP Y/N submenu. Press Select (Yes) to exit and advance to the Firmware Release Level menu (online), or the Drive Operation menu (offline)
Drive Operation Menu		
Drv Menu ? (offline only)	If bypassed, the display advances to the Firmware Release Level menu. This is the entry point to the offline drive operations submenus.	<p>Do one of the following:</p> <ul style="list-style-type: none"> Press Menu (No) to bypass. Press Select (Yes) to enter the drive operations submenus.
Firmware Release Level Submenu		
Rx.yy.zzza	This submenu displays current drive firmware release level.	Press Menu or Select and advance to the Exit menu.
Exit 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.	<p>Do one of the following:</p> <ul style="list-style-type: none"> Press Menu (No) to go to the Online/Offline menu Press Select (Yes) to exit the menu system.
Note: If you exit the menu system with the drive offline, the display flashes Offl i n e every few seconds as a reminder that the drive is still offline (if a data cartridge has been loaded at least once).		

Drive Operations Menu

Use the following menu tree for drive operations. The Drv Menu is only available when the drive is offline. See [TABLE 4-4 on page 73](#) for details.

Note – Make sure the host has varied the drive offline before setting the drive offline.

Online/Offline

Press **Select** to toggle, then press **Menu** to set.

Chng CFG ? (Change Configuration)

Press **Menu** to bypass.

Chng TCP ? (Change Configuration)

Press **Menu** to bypass.

Drv Menu ? (Drive Operations Menu)

Press **Select** to enter, press **Menu** to bypass.

IPL FromTP (uploads drive firmware from code tape cartridge)

Ld IPL TP (load write-protected cartridge containing drive firmware image)

Note – After the firmware image is uploaded into the drive PROM, the drive performs an IPL to load/activate the new firmware; and, the drive returns to the online state.

MakeDumpTP (formats tape cartridge to retrieve drive dump logs)

Ld Dump TP (load write-enabled code/data/dump cartridge)

MakeCodeTP (downloads drive firmware image to tape cartridge)

Ld Code TP (load write-enabled code/data/dump tape cartridge)

MakeDataTP (reclaims/reformats tape cartridge for data read/write)

Ld Data TP (load write-enabled code/data/dump tape cartridge)

Build MIR (reclaims/reformats tape cartridge for data read/write)

Ld Cust TP (load write-enabled data cartridge with invalid MIR)

Exit Drv ? (no, restarts drive operation options)

Rx.yy.zzza (current drive firmware release level) (display only)

Exit Menu ?

TABLE 4-4 provides details for drive operation utilities.

TABLE 4-4 Drive Operations

Options	Notes	Procedure
Drive Operation Menu		
Drv Menu ? (offline only)	If bypassed, the display advances to the Firmware Release Level menu. This is the entry point to the Drive Operations submenus.	Do one of the following: <ul style="list-style-type: none"> ■ Press Menu (No) to bypass. ■ Press Select (Yes) to enter the submenus.
Code Update Submenu		
IPL FromTP	IPL From Tape, updates the drive firmware from a code tape that you insert in the drive. A normal data cartridge, if present, unloads when this function is activated. If CHK xxxx appears, try a different code tape.	<ol style="list-style-type: none"> 1. Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass. ■ Press Select to activate. 2. When Ld IPL Tp appears, insert the code tape (write-protected data cartridge that contains the desired firmware release level image). <p>Note: When the update is done, the drive unloads the code tape and initiates an IPL.</p> <ol style="list-style-type: none"> 3. Remove the unloaded code tape.
Make Dump Tape Submenu		
MakeDumpTp	Make Dump Tape specially formats and identifies a data cartridge as a <i>dump tape</i> ; but, it does not collect dump logs. Data cartridges used to collect dump logs must first be formatted this way to accept dump logs. A normal data cartridge, if present, ejects when this function is activated. If Make Dump Tape fails and CHK xxxx appears, try a different data cartridge.	<ol style="list-style-type: none"> 1. Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass. ■ Press Select to activate. 2. When Ld Dump Tp appears, insert a write-enabled data cartridge. 3. When the formatted dump tape unloads, remove the data cartridge. 4. Insert another write-enabled data cartridge, or press Menu to exit the dump tape submenu.
Make Code Tape Submenu		
Note: Only drives with all images loaded into the EEPROM can make code tapes.		
MakeCodeTp	Make Code Tape copies the firmware image from the drive EEPROM to a data cartridge. You can use this <i>code tape</i> to update firmware in other drives using the Code Update submenu. A normal data cartridge, if present, ejects when this function is activated. If Make Code Tape fails and CHK xxxx appears, try a different cartridge. If the problem persists, consult your Sun service representative. Note: This operation might not work on encryption-enabled tape drives.	<p>Note: Make sure the drive is properly prepared to create code tapes. If required, exit the Drive Operations Menu and update the drive to a full code of the desired firmware release level.</p> <ol style="list-style-type: none"> 1. Do one of the following: <ul style="list-style-type: none"> ■ Press Menu to bypass. ■ Press Select to activate. 2. When Ld Code Tp appears, insert a write-enabled data cartridge. 3. When the new code tape unloads, remove the data cartridge, and set the write-protect switch to lock. 4. Insert another write-enabled data cartridge, or press Menu to exit the create code tape submenu.

TABLE 4-4 Drive Operations (Continued)

Options	Notes	Procedure
Make Data Tape Submenu		
MakeDataTp	<p>Make Data Tape reformats cartridges so they can be reused as normal <i>data tapes</i>. This is sometimes referred to as “reclaiming.”</p> <p>A cartridge, if present, unloads when this function is activated.</p> <p>Information in the MIR about old data files on a tape being reformatted is erased.</p> <p>VolSafe data cartridges cannot be reformatted. If inserted, the drive rejects a VolSafe cartridge.</p> <p>If Make Data Tape Fails, and CHK xxxx appears, try a different data cartridge.</p>	<ol style="list-style-type: none"> Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select to activate. When Ld Data Tp appears, insert a write-enabled data cartridge. When the reformatted data tape unloads, remove the data cartridge. Insert another write-enabled data cartridge, or press Menu to exit the reclaim tape submenu.
Build Media Information Region Submenu		
Build MIR	<p>T10000 tape drives use information recorded at the beginning of tape of a data cartridge, in an area known as the Media Information Region (MIR), to access and manage data files while the data cartridge is loaded in the drive.</p> <p>Make sure the drive is unloaded before you activate Build MIR.</p> <p>Rebuild MIR flashes on the operator panel while the MIR is rebuilding.</p>	<ol style="list-style-type: none"> Do one of the following: <ul style="list-style-type: none"> Press Menu to bypass. Press Select to activate. When Ld Cust Tp appears, insert the write-enabled data cartridge with an invalid MIR. <p>Note: When the MIR is rebuilt, the data cartridge unloads.</p> Remove the data cartridge. Insert another write-enabled data cartridge requiring a MIR rebuild; or, press Menu to exit the build MIR submenu.
Exit Drive Submenu		
Exit Drv ?	This submenu allows you to either repeat the drive operations submenus or exit Drive Operations.	<p>Do one of the following:</p> <ul style="list-style-type: none"> Press Menu (No) to loop back to the Code Update Submenu. Press Select (Yes) to exit Drive Operations and advance to the Firmware Release menu.
Firmware Release Level Menu		
Rx.yy.zzza	This submenu displays the current drive firmware release level.	Press Menu or Select and advance to the Exit menu.
Exit Menu		
Exit Menu?	This menu allows you to either stay in the menu system to return the drive to Online or to exit the menu system.	<p>Do one of the following:</p> <ul style="list-style-type: none"> Press Menu (No) to go to the Online/Offline menu. Press Select (Yes) to exit the menu system.
<p>Note: If you exit the menu system with the drive offline, the display flashes <i>Offline</i> every few seconds as a reminder that drive is still Offline (if a data cartridge has been loaded at least once).</p>		

Service Calls and Help

This section describes what to do if problems occur with the tape drive. In some cases, you might be able to correct the problem. In other cases, you must contact your service representative as described in this chapter.

Most of the time, one or more fault symptom codes (FSC) appears on the Virtual Operator Panel (VOP) screen or the tape drive's front panel display screen of rack mounted tape drives. Record that information for your service representative.

Some errors result in the state of the drive status LED on the rear of the tape drive changing color, flashing, or both. See:

- [FIGURE 1-2 on page 20](#) for the LED's location
- ["Drive Status LED" on page 21](#) for information about the LED
- [TABLE 1-1 on page 21](#) for the various LED states and colors you may encounter

If you have as much of the following information as possible when you place a service call, the process is much easier:

- Account name
- Site location number
- Contact name
- Telephone number
- Equipment model number
- Tape drive address
- Tape drive code level
- Tape drive serial number
- Urgency of the problem
- Fault Symptom Code (FSC) from either the tape drive's front panel display screen (rack mount), the VOP window, or as displayed on the host system display screen
- Problem description
- What color and flash rate is exhibited by LED on the rear of the tape drive? (This LED is not visible when the tape drive is installed in some libraries.)
- Is the tape drive in a library? If so, which library?
- If the tape drive was running properly before this incident:
 - What changes has the site made recently?
 - What software application was running at the time of the failure?
 - Were any hardware configuration changes made recently?
 - Were any software configuration or upgrades done recently?
 - Were any additions or deletions to the hardware or software done at the site?
- If the drive was NOT running properly before this incident, what was the last problem?

Cartridge Care

T10000 cartridges require care to ensure proper operation and longevity. This appendix deals with the handling of cartridges, including unpacking and shipping cartridges to another site. For information regarding cartridge labels, particularly those cartridges used inside a library, see [FIGURE B-1 on page 82](#).

Note – In this chapter, “data cartridges” refers to all data cartridges: Standard data, Sport data, VolSafe data, and Sport VolSafe data cartridges.

Unpacking New Cartridges

Unpack new data cartridges in the area in which they are used and allow them to acclimate for a period of at least 72 hours.

Handling

Caution – *Tape Damage*: Cartridges are easily damaged and you must handle them carefully.



Follow these cartridge handling guidelines:

- Do not expose the tape or cartridge to direct sunlight or moisture.
- Do not expose a data cartridge to magnetic fields.
- Maintain clean operating, working, and storage environments.

Cleaning

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

Storing

Always store cartridges in an environment within the specified range of temperature and humidity found in [TABLE E-5 on page 96](#). When you store cartridges, follow these recommendations:

- Do not take data cartridges out of their protective wrapping until you need them.
 - Store cartridges in a dirt-free environment that, if possible, duplicates the conditions of the data processing center.
 - Before you use a cartridge that have been in storage, acclimate it to the operating environment for at least 72 hours.
-

Shipping

Use the following guidelines to prepare T10000 tape cartridges for shipment:



Caution – POTENTIAL CARTRIDGE DAMAGE: Cartridges are easily damaged in shipment if improperly packaged. USE ONLY THE DESIGNATED PACKAGING ASSEMBLIES, AND IN MATCHING QUANTITIES WITH NUMBER OF CARTRIDGES.

1. Obtain appropriate quantities of designated packaging assemblies:

Only the following assemblies are qualified for shipping T10000 cartridges:

- Single Cartridge - PN 1095329xx, T10000 Cartridge 1-Pack Packaging Assembly
- Five Cartridges - PN 1095332xx, T10000 Cartridge 5-Pack Packaging Assembly

Note – Customers must obtain cartridge shipping packages from Sun StorageTek service representatives.

The 5-Pack packaging assembly only protects *exactly* five (5) T10000 tape cartridges. DO NOT attempt to package more than five cartridges by forcing the additional cartridge/s into the package. DO NOT attempt to package less than five cartridges by filling the missing cartridge/s void with any other material. Use the single cartridge 1-Pack packaging assembly when packaging less than five cartridges.

2. Follow the packaging instructions, included in the packaging assembly.

Specific packaging instructions are included with each packaging assembly. DO NOT improvise, or use older packaging instructions, which might be no longer applicable to the current packaging assembly.

3. Attach the appropriate shipping label to the sealed package.

Shipping labels will vary relative to prescribed/available shipping services.

Dropped Cartridges

Anytime a cartridge is dropped, there is a potential for damage to the case. Even if the case is visibly undamaged, the cartridge leader might be jarred out of the home position, which causes a load failure.

A dropped cartridge must be thoroughly inspected for damage to the case; and, if necessary, the leader recovered to the home position.

Note – If the drop was greater than 75 cm (29.5 in.), the cartridge, even if otherwise undamaged, should be used only for a one-time data transfer, then discarded.

If, after full inspection, the cartridge is damaged, but load, transfer data to a serviceable cartridge.

A dropped cartridge with visible damage that precludes normal loading into a drive, might still be a candidate for data recovery. Contact your Sun service representative regarding damaged data cartridge recovery options.

Use the following procedure to inspect a dropped cartridge:

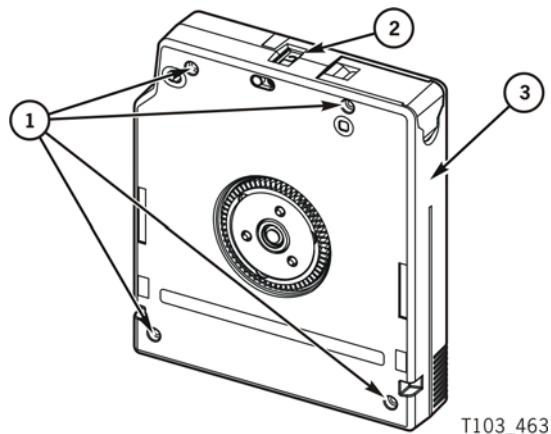
1. **Closely examine the entire case, front and back, for breaks and/or cracks.**

If cracks and/or breakage is visible, the cartridge must be discarded.

2. **Check all four case screws (1, FIGURE 5-1) for security.**

If a screw post is broken, the screw might be noticeably loose.

FIGURE 5-1 Cartridge Inspection Points



1. Case screw (4x)
2. Write-protect switch
3. Sonic weld area

3. **Attempt to separate the case halves near each screw.**

If a screw post is broken, the case separates slightly, even if the screw seems tight.

4. **Examine the sonic weld area (near the tape access door, (3, FIGURE 5-1 on page 79) for integrity.**

Sonic weld damage might not be easily discernible. If there is any question about the integrity of the sonic weld, consult your Sun service representative. If the sonic weld area has failed, the cartridge must be discarded, even if otherwise visibly undamaged.

5. **Slowly turn the cartridge over and listen for any loose items within the cartridge.**

Caution – Consult your Sun service representative if any loose items are heard before attempting to load the cartridge into a tape drive. *Loose items within the cartridge means something inside is broken and loading the cartridge could either damage the tape so its data could never be retrieved or the cartridge could damage the tape drive.*

6. **Operate the write-protect switch, (2, FIGURE 5-1 on page 79) several cycles.**

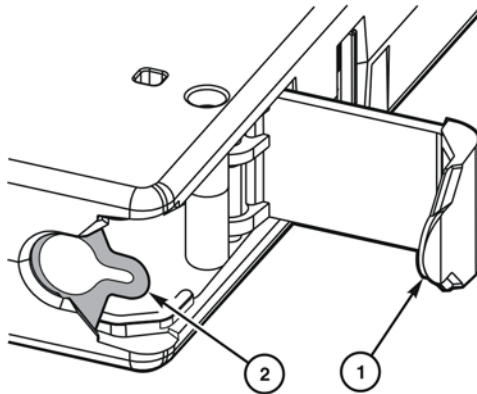
The write-protect switch should slide smoothly.

7. **Open/close the tape access door (1, FIGURE 5-2) several times, and examine the door for damage.**

If the door is visibly damaged, and/or does not open/close smoothly, the cartridge must be discarded.

8. **Hold the tape access door open, and determine if the leader (2, FIGURE 5-2) is in the home position (securely butted against stops).**

FIGURE 5-2 Cartridge Door and Tape Leader



T103 375

1. Tape access door
2. Leader



Caution – If the leader was jarred out of the home position, it is loose and floppy, or might even be fully retracted into the cartridge case.

If a load attempt was made with the leader out of the home position, the tape drive fully retracts the leader; it is pulled back into the cartridge and is no longer visible.

Do not attempt to force the leader back into the home position. If the leader is not in the home position, contact your Sun service representative.

Data Cartridge Labels

Rack Mount Cartridge Labels

If you are using the data cartridges in a rack mount situation, almost any label across the data cartridge is acceptable, as long as it does not interfere with the operation of the tape drive.

Library Use Cartridge Labels

If you are using the data cartridges in a library, the labels must conform to the specification shown in [“Label Size Specification” on page 83](#). You must put these labels on the data cartridge in the label attachment area as shown by item 1 in [FIGURE 1-6 on page 26](#). You must carefully place these labels in the label area with the bar code down (to the hub side of the data cartridge—the hub is showing in the “Bottom View” in [FIGURE 1-6 on page 26](#)).

Standard/Sport Cartridge Labels

Standard data cartridge labels consist of eight characters and the associated bar code as shown in the following figure. These characters may consist of A through Z and the numbers 0 through 9. No special characters (&,\$%@# and so on) may be used. The first six characters in the label shown in the following figure are the customer volume ID (NGD018). The last two characters (T1) are the media identifier.

The color behind the media identifier is usually white for standard cartridges.

FIGURE B-1 Standard Eight-character Label



VolSafe/Sport VolSafe Cartridge Labels

These labels are the same as standard cartridge labels with the exception that the background color of the media ID area is usually yellow.

Diagnostic Cartridge Labels

These labels must start with DG and a space (no third character is used) to be recognized by the library as diagnostic cartridges.

The label is "DG xxxT1" where "DG (and a space)" are the first three characters, "xxx" can be 000 to 999 and "T1" indicates the media type.

FIGURE B-2 Diagnostic Cartridge Label



Cleaning Cartridge Labels

The cleaning label is "CLNxxx CT" where xxx is 000 to 999 to identify each individual cleaning data cartridge. The CT media identifier is how the library knows it is a cleaning data cartridge.

FIGURE B-3 Cleaning Cartridge Label



Label Size Specification

The label specification shown in [FIGURE B-4 on page 84](#) indicates where and how the *barcode lines* need to be placed. The visual characters for the operator are shown down the left side of that label. There is no specification for the font or the spacing of those visual characters. Those visual characters are for operator use and are not used by the library. Moreover, the visual characters do not have to line up with the bar code lines for that character.

The background for the bar-code area is always white.

The backgrounds for the visual characters varies depending on the type of cartridge.

Label Reference Documents

It is very important to follow these specifications.

- AIM Uniform Symbology Specification USS-39
- ANSI MH10.8M-1993 ANSI Code 39 Barcode Specification
- ANSI NCITS 314-199X SCSI 3 Medium Changer Commands (SMC)

Initial Drive Configuration Settings

Manufacturing presets the drive configuration sector after internal testing and before the tape drive is shipped. These preset, initial settings suffice for most sites. However, specific site requirements might dictate some alternative settings.

[TABLE C-1](#) and [TABLE C-2 on page 86](#) (FICON specific) show drive configuration settings preset at the factory and available options.

TABLE C-1 Drive Configuration Initial Settings

Item	Function	Preset	Option
Hard PA (Port)	Hard Physical Address	N	Yes (Y), No (N)
Soft PA (Port)	Soft Physical Address	LO	HI, LO
Rate (Port)	Data transfer speed	Auto	Auto, 4 Gb, 2 Gb, 1 Gb
MAXSz (Port)	Maximum data frame	2112	2112, 2048
WWN (Port)	Port World-wide Name	Normal (assigned)	Normal, Custom
Emul XXXX ¹	Emulation Mode	STD	Standard, 9840B ² , 9940B ² , 3592
Cmprss	Data compression	Yes	Yes, Off, No
Full DSE	Data Security Erase	N	Yes (Y), No (N)
SL Prot	Standard Label Protection	N	Yes (Y), No (N)
Language	Message language (specific messages)	English	English, Spanish, French, Italian, German
Tape Bar	Tape activity display	N	Yes (Y), No (N)
LIB Adr xy	Library Address (hex.)	FF	Two digit hexadecimal
WWN	Drive Node World-wide Name	Normal (assigned)	Normal, Custom
TCP/IP	Maintenance Port IP		
DHCP	Dynamic Host Control	N	Yes (Y), No (N)
IP	Static IP Address	010.000.000.001	aaa.bbb.ccc.ddd
NM	Sub Net Mask	255.255.255.000	aaa.bbb.ccc.ddd
GW	Gateway	255.255.255.255	aaa.bbb.ccc.ddd

1. Fibre Channel interface only, see [TABLE C-2 on page 86](#) for FICON emulation modes.

2. Emulation modes 9840B and 9940B are special modes used only at the direction of Sun StorageTek Support.

The FICON interface has different Emulation modes, and one FICON only configuration setting, as listed in [TABLE C-2](#). All other configuration settings are the same as shown in [TABLE C-1 on page 85](#).

TABLE C-2 FICON Specific Drive Configuration Initial Settings

Item	Function	Preset	Option
Emul XXXX	Emulation Mode	VSM	VSM, 3592
Drv Adr xy	Drive Address (device)	00	Two-digit hexadecimal

The following registers are set to the conditions shown:

Network:

IP Node Name: T10000-<last 9 digits of Serial Number>

SNMP Alerts: All turned OFF

Library Locator: ACS: 0 LSM: 0 Panel: 0 Drive: 0

SNMP Managers: None Specified

Drive Statistics: All zeroed

Permanent Errors: All zeroed, pointers initialized.

Temporary Errors: All zeroed, pointers initialized.

Messages and Translated Messages

This appendix summarizes the T10000 tape drive operator-panel indicator lights and display messages. Where applicable, this appendix recommends operator actions.

Messages

TABLE D-1 lists operator panel display messages, meanings, and recommended actions.

TABLE D-1 Operator panel Display Messages

Display	Meaning	Recommended Action
* (asterisk)	The tape drive is online but a cartridge tape is not loaded.	Load a cartridge tape as required.
ASIA Diags	IPL diagnostics are running.	None
Bank n Bad	During boot, a section of memory was found bad.	IPL the tape drive. If the problem persists, contact authorized service personnel.
Boot Fail	The IPL failed.	IPL the tape drive again. If the problem persists, contact authorized service personnel.
BT Monitor	A sequence of switches accessed an engineering area.	IPL the tape drive.
CC Diags	IPL diagnostics are running.	None
Chk xxxx, where xxxx is an FSC	An operational failure occurred; the tape drive automatically performs an IPL.	Wait for the IPL to complete and retry the operation (see TABLE D-2 on page 91). If the problem persists, contact authorized service personnel.
Cleaning (*Cleaning*)	A cleaning cartridge is in the tape drive and is now cleaning.	None
cnhdnsn (Hardware revision level supported by the firmware in this drive)	The tape drive firmware level is insufficient to control the tape drive hardware.	Contact authorized service personnel.
CodCrFail1	The tape drive cannot write code onto the data cartridge tape, or the tape drive cannot position the data cartridge tape.	Ensure that the tape is write-enabled, or try another cartridge tape.

TABLE D-1 Operator panel Display Messages (Continued)

Display	Meaning	Recommended Action
CodCrFail2	The tape drive cannot read code from the data cartridge tape.	Retry the operation, or try another cartridge tape. If the problem persists, contact authorized service personnel.
CodeUpDate	The firmware in the tape drive is being updated from the host; the operator panel switches are locked.	None
CodUpFail1	The tape drive cannot read the data cartridge tape, or the tape drive cannot position the data cartridge tape.	Try another cartridge tape.
CodUpFail2	The EEPROM failed.	Contact authorized service personnel.
CodUpFail3	The tape drive cannot read code from the data cartridge tape.	Retry the operation, or try another cartridge tape. If the problem persists, contact authorized service personnel.
CodUpFail4	The data cartridge tape is not a code update cartridge tape.	Try another code update cartridge tape. If the problem persists, contact authorized service personnel.
DatCrFail1	The tape drive cannot create (reformat or reclaim) a cartridge tape.	Ensure that the data cartridge tape is write-enabled, or try to reformat the tape on another drive. If the problem persists, contact authorized service personnel.
DmpCrFail1	The tape drive cannot create (reformat or reclaim) a diagnostic dump tape.	Ensure that the data cartridge tape is write-enabled. If the problem persists, contact authorized service personnel.
DmpCrFail2	The tape drive cannot read the format of the data cartridge tape.	Retry the operation, or try another cartridge tape. If the problem persists, contact authorized service personnel.
DmpWrFail1	The tape drive cannot write diagnostic data onto the data cartridge tape, or the tape drive cannot position the data cartridge tape.	Contact authorized service personnel.
DmpWrFail2	There is no diagnostic dump data to process.	Contact authorized service personnel.
xxxx:Dmp y	Alternates with * (an asterisk) after completion of IPL, where xxxx=the FSC of last dump data collected and Y=number of uncollected dumps in non-volatile memory.	Contact authorized service personnel who accesses the diagnostic data and collects it to tape or to the host.
DumpAgain? alternating with Chk xxxx, where xxxx is an FSC. The Service indicator is flashing.	The tape drive detected the same error within a minute.	IPL the tape drive. If the problem persists, contact authorized service personnel.
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.
Fix CfgErr	The checksum does not match after an IPL.	Contact authorized service personnel.

TABLE D-1 Operator panel Display Messages (Continued)

Display	Meaning	Recommended Action
Init xxxx. where xxxx is an FSC	An initialization error occurred.	Contact authorized service personnel.
IPL Pend	The IPL switch has been pressed.	None
Load CC	The common controller code is loading; IPL is proceeding.	None
Loading	A cartridge tape is loading.	None
Load xxxx, where xxxx is an FSC	The load or unload operation failed.	If the load failed, insert another cartridge tape. If it loads successfully, suspect the original tape. If another tape fails to load, IPL the tape drive. If the problem persists, contact your Sun service representative.
Load FIBRE	Fibre Channel firmware is loading; IPL is proceeding.	None
Locating	The tape drive is doing a high-speed seek.	None
Memory Err	The IPL failed.	IPL the tape drive again. If the problem persists, contact authorized service personnel.
NTReady F	A write-protected tape is in the process of a manual unload.	None
NTReady U	A write-enabled tape is in the process of a manual unload.	None
Offline, alternating with *	The tape drive is offline.	None
Online	The tape drive is online.	None
Power Fail	The power supply failed.	Contact authorized service personnel.
Reading	The tape drive is reading data.	None
Ready A	The loaded cartridge tape is a VolSafe cartridge.	None
Ready F	The loaded cartridge tape is write-protected.	None
Ready H	The loaded T10000B non-VolSafe cartridge tape is ready and not file protected in a T10000A drive.	Reload with a low-density cartridge or intentionally over-write from BOT. Note: High-density data cannot be read by a T10000A drive.
Ready L	The loaded T10000A non-VolSafe cartridge tape is ready and not file protected in a T10000B drive.	Use for read-only jobs or intentionally over-write from BOT. Note: Low-density data file can be read, but not revised by a T10000B drive.
Ready U	The loaded cartridge tape is write-enabled (write-unprotected).	None
Rewinding	The tape drive is rewinding.	None

TABLE D-1 Operator panel Display Messages (Continued)

Display	Meaning	Recommended Action
Save Fails	The new configuration cannot be saved because the read-access memory (RAM) might be defective.	This message is associated with changing the tape drive configuration, a task for authorized service personnel only.
SavingDump	A dump is being saved to non-volatile memory.	None
Start Init	Initialization has started.	None
Trapped	The IPL process is trapped in a loop.	IPL the tape drive again. If the problem persists, contact authorized service personnel.
Unloading	A cartridge tape is unloading.	None
UnWr xxxx, where xxxx is an FSC	The Unload switch was pressed during a write operation. Some data remains unwritten.	To write the unwritten data, issue the command: ESCON Swap in VM/MVS environment Or, Press the Unload switch again; the unwritten data is lost.
Write Prot	The tape drive attempted to write to a write-protected cartridge tape.	Change the switch on the data cartridge tape to enable writing.
Writing	The tape drive is writing data.	None

Potential Operator Recovery Scenarios

The following table contains Fault Symptom Codes (FSCs) that commonly result from an operator error. The first column in the table lists an operator panel message at the time of the error event. The description column provides insight into the error condition from which you should be able to determine a recovery action.

TABLE D-2 Selected Check Message Meanings

Message	Description
CHK 6109	This drive does not contain the key needed to decrypt this tape. The ID of the missing key can be viewed from this drive using the VOP program.
CHK A33A	The user requested a motion operation that requires a tape to be installed, however, a tape has not been loaded.
CHK A34C	The user requested a write operation that requires a tape to be installed, however, a tape has not been loaded.
CHK A3FB	A format override tape write operation failed. The failure may not be serious. Error recovery was not invoked for the failure. Re-attempting the test may resolve this issue.
CHK A733	The operator or library inserted a write protected tape into the drive while in a menu selected create tape mode. If the write protect switch on the cartridge is moved to the unlocked position, operation will work.

Translated Messages

TABLE D-3 lists operator panel display messages selected for translation. These messages appear in the language selected by the drive configuration language selection submenu.

Note – See Table 4-1, “Language Selection Submenu” on page 63 for language selection guidelines.

TABLE D-3 Translated Display Messages

English	Espanol	Francais	Italiano	Deutsch
Cleaning	*LIMPIEZA*	*NETTOYAGE	*PULIZIA*	*REINIGEN*
Erasing	*BORRANDO*	EFFACEMENT	*CANCELLA*	*LOESCHEN*
Locating	Localizar	Recherche	Ricerca	Suchen
Loading	Cargando	Chargement	Carico	Laden
NT Ready F	No Listo A	NPret F	No Prnt F	N Bereit F
NT Ready U	No Listo U	NPret U	No Prnt U	N Bereit U
Ready A	Listo A	Pret A	Pronto A	Bereit A
Ready F	Listo F	Pret F	Pronto F	Bereit F
Ready H	Listo H	Pret H	Pronto H	Bereit H
Ready L	Listo L	Pret L	Pronto L	Bereit L
Ready U	Listo U	Pret U	Pronto U	Bereit U
Rewinding	Rebobinar	Rebobinage	Riavvolgi	Spulen
Unloading	Descarga	Dechargemt	Scarico	Entladen

Specifications

This appendix lists the physical, power, and performance specifications; and, environmental requirements for the T10000 tape drive and tape cartridge.

Physical Specifications

[TABLE E-1](#) lists the T10000 tape drive physical specifications.

TABLE E-1 T10000 Tape Drive Physical Specifications

Measurement	Specification
Width	14.6 cm (5.75 in.) drive, 48.3 cm (19 in.) rackmount tray
Depth	42.5 cm (16.75 in.) drive, 64 cm (25 in.) rackmount tray
Height	8.25 cm (3.25 in.), 17.8 cm (7 in.) rackmount tray
Weight (with drive tray)	
SL8500	9.4 kg (20.75 lb.)
SL3000	10.1 kg (22.25 lb.)
9310 (T10000A only)	6.9 kg (15.25 lb.)
L-Series	8.3 kg (18.3 lb.)

[TABLE E-2](#) lists the T10000 tape cartridge physical specifications.

TABLE E-2 T10000 Tape Cartridge Physical Specification

Height	2.45 cm (0.96 in.)
Width	10.9 cm (4.29 in.)
Length	12.5 cm (4.92 in.)
Media length	917 m (3,009 ft) [recordable 855 m (2,805 ft)]
Media thickness	6.5 microns (µm)
Nominal weights	Standard data cartridge: 262.5 g (0.59 lb.) Sport data cartridge: 187.0 g (0.41 lb.) Cleaning cartridge: 231 g (0.51 lb.)

Power Specifications

This section lists power specifications for tape drives.

Rack Mount Tape Drive Power Specifications

TABLE E-3 lists the input power and current requirement for each tape drive power supply in the rack mount assembly under nominal conditions at various input voltages. Nominal conditions occurring when the tape drive is moving tape in read/write and rewind modes.

TABLE E-3 Tape Drive Power Supply Input Power

Input Voltage	Power in Watts	Input Current (mA)
60 Hz		
90 V	172.3	1786
100 V	161.4	1612
240 V	161.3	691
254 V	168.2	649
50 Hz		
90 V	166.3	1767
100 V	163.2	1570
240 V	156.4	678
254 V	156.2	633

Note – The tape drive draws the same power from the power supply regardless of the AC input voltage.

For the purposes of figuring the amount of heat generated by a tape drive *and* its associated power supply, use the figure of 172.3 watts, which converts to approximately 588 Btu/hr. Because there are usually two tape drives in a rack mount unit, these figures are doubled for a complete rack mounted pair of tape drives, or 244.6 watts, which converts to 1,176 Btu/hr.

Library-attached Tape Drive Power Specifications

For SL3000 and SL8500 libraries, use the power figure of 100 watts for each tape drive and its associated power supply and use a heat figure of 341.29 Btu/hr.

For other libraries, use the power specifications for a single rack mount tape drive and power supply. In those libraries, there is one AC/DC power supply for each tape drive.

Performance Specifications

TABLE E-4 lists performance specifications for a T10000 tape drive, loaded with a T0000 tape cartridge.

TABLE E-4 T10000 Tape Drive Performance Specifications

Characteristic	Specification
Capacity and Performance	
Capacity, native	500 GB (5 x 10 ¹¹ bytes) [T10000A] 1 TB (1x10 ¹² bytes) [T10000B]
Data buffer size	256 MB
Tape speeds:	
Read and write	2.0 and 4.95 m/s (T10000A or T10000B read legacy) 2.0 and 3.74 m/s (T10000B)
File search and locates	8.0 m/s to 12 m/s (varying speeds)
High speed rewind	8.0 m/s to 12 m/s (varying speeds)
Throughput	
Data rate (native, uncompressed)	120 MB/s
Burst transfer rate	200 MB/s (2Gb) or 400 MB/s (4Gb)
Interfaces	2 Gb/4 Gb Fibre Channel/FICON (T10000A) 4 Gb Fibre Channel/FICON (T10000B)
Access times	
Tape load and thread to ready	16 seconds
File access, average (includes loading)	62 seconds
Rewind (maximum)	
Unload time	91 seconds
	23 seconds
Reliability	
Mean time between failure (MTBF)	290,000 hr.
Head life	5 years
Uncorrected bit error rate	1 x 10 ⁻¹⁹
Undetected bit error rate	1 x 10 ⁻²³

Environmental Requirements

This section lists the environmental requirements for the T10000 tape drive, and the T10000 tape cartridge.

Although the tape drive functions over the full list of ranges as specified in [TABLE E-5](#), *optimal reliability* is achieved if the environment is maintained between the optimum and recommended ranges.

Note – Important: Industry best practices recommends computer rooms maintain a relative humidity of 40% to 50% for best performance.

TABLE E-5 T10000 Tape Drive Environmental Requirements

Description	Optimum	Recommended	Extremes
Temperature			
Operating	22°C (72°F)	20° – 25°C (68° – 77°F)	10° to 40°C (50° to 104°F)
Shipping	22°C (72°F)	20° – 25°C (68° – 77°F)	-40° to 60°C (-40° to 140°F)
Storing	22°C (72°F)	20° – 25°C (68° – 77°F)	10° to 40°C (50° to 104°F)
Relative Humidity			
Operating	45%	40% – 50%	20% to 80%
Shipping	45%	40% – 50%	10% to 95%
Storing	45%	40% – 50%	10% to 95%
Wet bulb (non-condensing)			
Operating	29°C (84°F)		
Shipping	35°C (95°F)		
Storing	35°C (95°F)		

TABLE E-6 lists the T10000 tape cartridge environmental requirements.

TABLE E-6 T10000 Tape Cartridge Environmental Requirements

Temperature	
Operating*	10° to 45°C (50° to 113°F)
Storage (up to four weeks)	10° to 32°C (50° to 90°F)
Storage (archival)	15° to 26°C (59° to 79°F)
Shipping†	-23° to 49°C (-9° to 120°F)
Relative Humidity, Non-condensing	
Operating ¹	20% to 80%
Storage (up to four weeks)	5% to 80%
Storage (archival)	15% to 50%
Shipping ²	5% to 80%
Wet Bulb Maximum	
Operating ¹	26°C (78.8°F)
Storage (nonarchive)	26°C (78.8°F)
Storage (archival)	26°C (78.8°F)
Shipping ²	26°C (78.8°F) with no condensation

* The acclimation time before use is 72 hours. (See [“Unpacking New Cartridges” on page 77.](#))

† The shipping environment must not exceed the limit of the storage environment, archive or nonarchive, for longer than 10 days.

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 Electro-technical 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

access time The time interval between the instant at which a call for data is initialized and the instant at which the delivery of data is completed. (T)

address A character or group of characters that identifies a register, a particular part of storage, or some other data source or destination. (A).

alphanumeric A character or group of characters that identifies a register, a particular part of storage, or some other data source or destination. (A).

B

beginning-of-tape (BOT) The location on a tape where written data begins.

block A collection of contiguous records recorded as a unit. Interblock gaps separate blocks, and each block can contain one or more records.

- buffer** A routine or storage that compensates for a difference in the rate of data flow, or the time of occurrence of events when transferring data from one device to another.
- burst** In data communication, a sequence of signals counted as one unit in accordance with a specific criterion or measure. (A)
-

C

- capacity** Total amount of User Data stored on one data cartridge in 8-bit bytes. *Synonymous with "User Capacity" or "Native Capacity"*. This is the capacity that the user sees after the ECC/Format/ERP and other overhead has been assessed (no compression).
- capacity, raw** Total amount of data stored on one data cartridge in 8-bit bytes before any ECC/Format/ERP and other overhead has been assessed (no compression).
- capacity, user** Total amount of data stored on one data cartridge in 8-bit bytes that is sent by the host computer. This is the capacity that the user sees after the ECC/Format/ERP and other overhead has been assessed (no compression).
- cartridge** A storage device that consists of magnetic tape on a supply reel in a protective housing.
- CC** *See* cleaning cartridge
- cleaning cartridge** A data cartridge that contains special material to clean the tape path in a transport or drive.
- compress** To save space by eliminating gaps, empty fields, redundancy, or unnecessary data to shorten the length of records or files. (IBM)
- condition** One of a set of specified values that a data item can assume. (IBM)
- conditioning time** The amount of time to prepare a tape cartridge for use in a T10000 Tape Drive.
- configuration** The manner in which the hardware and software of an information processing system is organized and interconnected. (T)
- connector** An electrical or optical part that joins two or more other parts.
-

D

- data error rate** The number of errors that occur per a measurable amount of data on a tape.
- data rate** The speed of a data transfer process, usually expressed in bits per second or bytes per second. (IBM)
- data tape** A data cartridge formatted for use as a regular data tape for the system in which it is used.
- data tracks** The regions of recorded tape containing user data formed as discreet longitudinal "tracks" (similar to railroad tracks).

- diagnostics** Pertaining to the detection and isolation of errors in programs and faults in equipment.
- drive** A drive controls the movement of the tape and records or reads the data on the tape as desired by the customer.
- dump** To copy the contents of all or part of storage to collect error information.
- dynamic host configuration protocol (DHCP)** An IP protocol that a host uses to obtain all necessary configuration information, including an IP address.
-

E

- emulation** The use of programming techniques and special machine features to permit a computing system to execute programs written for another system. (IBM)
- encryption** The translation of data into a secret code. Encryption is one of the most effective ways to achieve data security. To read an encrypted file, you must have access to a special key or password that enables you to decipher it.
- environmental requirement** Any of the physical conditions required for the protection and proper operation of a functional unit; the requirement is usually specified as a nominal value and a tolerance range. For a device, there may be more than one set of environmental requirements; for example, one set for transport, another for storage, and another for operation. (T) (A)
- EOT** End of tape.
- error** A discrepancy between a computed, observed, or measured value or condition and the true, specified, or theoretically correct value or condition. (I) (A)
- ESD** Electrostatic Discharge.
-

F

- fault symptom code (FSC)** A four-character hexadecimal code generated in response to an error to help isolate failures within the device. Some FSCs are for information purposes only.
- FC** *See* Fibre Channel.
- fiber optics** The branch of optical technology concerned with the transmission of radiant power through fibers made of transparent materials such as glass, fused silica, and plastic. (E)
- fiber-optic cable** A cable made of ultrathin glass or silica fibers which can transmit data using pulses of laser light. Fiber-optic cables have several advantages over copper cables: they have much less signal loss; they allow information to be transmitted at higher speeds and over longer distances; they are not affected by external electrical noise; and they are better for transmissions which require security.

Fibre Channel The National Committee for Information Technology Standards standard that defines an ultrahigh-speed, content-independent, multilevel data transmission interface that supports multiple protocols simultaneously. Fibre Channel supports connectivity to millions of devices over copper and/or fiber-optic physical media and provides the best characteristics of both networks and channels over diverse topologies.

fibre connection

(FICON) An ESA/390 and zSeries computer peripheral interface. The I/O interface uses ESA/390 and zSeries FICON protocols (FC-FS and FC-SB-2) over a Fibre Channel serial interface that configures units attached to a FICON-supported Fibre Channel communications fabric.

FICON channel A channel having a Fibre Channel connection (FICON) channel-to-control-unit I/O interface that uses optical cables as a transmission medium. May operate in either FC or FCV mode.

file-protect To prevent the erasure or overwriting of data stored on data cartridges. *See also* write-protect switch.

FRU Field replaceable unit.

FSC Fault symptom code.

FTP File Transfer Protocol.

G

Gb Gigabit, equal to 10^9 bits.

Gbps Gigabits per second.

gigabyte (GB) One billion (10^9) bytes. When referring to disk and tape capacity, one GB equals 1,000,000,000 bytes.
When referring to memory capacity, one GB equals 1,073,741,824 in decimal notation or 2^{30} bytes.

H

hardware All or part of the physical components of an information processing system, such as computers or peripheral devices. (T) (A)

hub A Fibre Channel Arbitrated Loop switching device that allows multiple servers and targets, such as storage systems, to connect at a central point. A single hub configuration appears as a single loop.

I

- indicator** A device that provides a visual or other indication of the existence of a defined state. (T)
- interface** Hardware, software, or both, that links systems, programs, or devices. (IBM)
- internet protocol (IP)** A protocol used to route data from its source to its destination in an Internet environment. (IBM)
- internet protocol (IP) address** A four-byte value that identifies a device and makes it accessible through a network. The format of an IP address is a 32-bit numeric address written as four numbers separated by periods. Each number can be from 0 to 255. For example, 129.80.145.23 could be an IP address.
- IP** See internet protocol.

L

- library** A robotic system that stores, moves, mounts, and dismounts data cartridges that are used in data read or write operations.
- link** A physical connection (electrical or optical) between two nodes of a network.

M

- magnetic tape** A tape with a magnetizable layer on which data can be stored. (T)
- MB** Megabytes or 1,000,000 bytes for disk or tape storage but 1,048,576 (2²⁰) bytes of memory capacity.
- menu** A list of options displayed to the user by a data processing system, from which the user can select an action to be initiated. (T)

N

- network** An arrangement of nodes and branches that connects data processing devices to one another through software and hardware links to facilitate information interchange.

O

- offline** Neither controlled by, nor communicating with, a computer. (IBM)
- online** Pertaining to the operation of a functional unit when under the direct control of the computer. (T)
- operator control panel** A functional unit that contains switches used to control all or part of a computer and possibly the indicators giving information about its functioning. (T)

P

- performance** One of two major factors on which the total productivity of a system depends. Performance is largely determined by a combination of throughput, response time, and availability. (IBM)
- port** A specific communications end point within a host. A port is identified by a port number. (IBM)

R

- read/write head** The data sensing and recording unit of a tape drive. (IBM)
- reclaim** The act of overwriting a legacy data cartridge by a newer generation drive. For example, a cartridge written by a T10000A drive can be overwritten (reclaimed) by a T10000B drive while a cartridge written by a T10000B drive can be reclaimed by a T10000A drive.
- release** A distribution of a new product or new function and fixes for an existing product. (IBM)
- rewind** To move tape from the take-up hub to the supply hub. (IBM)
- R/W** Read/write

S

- SCSI** Small Computer Serial Interface.
- SDP** Service Delivery Platform.
- submenu** A menu related to and reached from a main menu. (IBM)
- subsystem** A system that is part of some larger system.
- switch** In Fibre Channel technology, a device that connects Fibre Channel devices together in a fabric.

system A combination of functionally interrelated interacting mechanical and electrical elements designed to work as a coherent entity.

T

tape *See* magnetic tape.

tape cartridge A container holding magnetic tape that can be processed without separating the tape from the container.

tape drive A device for moving magnetic tape and controlling its movement. (T)

TB *See* terabyte.

TCP/IP Transmission Control Protocol/Internet Protocol.

terabyte (TB) A unit of measure equal to one trillion (10^{12}) bytes of disk or tape storage capacity.
When referring to memory capacity, one TB equals 1,099,511,627,776 in decimal notation or 240 bytes.

**transmission control
protocol/internet protocol
(TCP/IP)**

A set of communication protocols that support peer-to-peer connectivity functions for both local and wide area networks. (IBM)

V

vary offline To change the status of a device from online to offline. When a device is offline, no data set may be opened on that device. (IBM)

vary online To restore a device to a state where it is available for use by the system. (IBM)

**virtual operator panel
(VOP)**

A software application that allows a user to monitor and perform some operations on one or more of tape drives remotely.

VolSafe VolSafe (volume safe) is a special 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 1. VOLume SERial Number. It is usually six characters long and is both the paper label stuck on the back edge of the cartridge and in the VOLID label that is recorded, particularly by MVS systems, at the beginning of the media.
2. 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.

VOP *See* virtual operator panel.

W

- wrap** A single pass of tape from either BOT to EOT or EOT to BOT with the heads in a fixed transverse location.
- write-enabled** A setting on a data 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-protected** A setting on data cartridges that prevents data from being written on the tape. Reading data is still possible.

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