StorageTek T9x40 Tape Drive

Systems Assurance Guide

Part Number: MT5003
May 2010, Revision AG

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StorageTek T9x40 Tape Drive Systems Assurance Guide

MT5003

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Summary of Changes

Date	Revision	Description
10/98	A	Initial Release
2/99 - 09/05	B through Y	Refer to these revisions for a description of the changes.
09/06	AA	Refer to this revision for a description of the changes.
01/08	AB	Refer to this revision for a description of the changes.
04/08	AC	Added support for SL3000 library. Revised the order number tables for T9840C & D new parts. Updated the information regarding cartridge ordering. Separated the T9940 conversion bill numbers into their own table.
06/08	AD	Added T9840D Fibre Channel drive information.
12/08	AE	Added • New short wavelength and long wavelength port kits • Airborne contamination information and reference to the *Data Center Site Planning Guide* (P/N 805-5863-13)
4/09	AF	Added: • IPv6 information • Updated the tape drive part number tables in Chapter 5
5/10	AG	Revised marketing part numbers. Removed Sun branding throughout the document.

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Preface

This guide contains information about the planning, ordering, and delivery activities required for Oracle's StorageTek T9840 tape drive or a T9940 tape drive. For more information about library-attached configurations, refer to the system assurance guide for the appropriate library.

The term **T9x40** is used in this publication to generically reflect all models of either drive series. The term **T9840** represents all models of the T9840 series. The term **T9940** represents all models of the T9940 series. The specific model suffix is used whenever differentiating to a specific model is appropriate.

Related Documentation

The following table lists publications that either pertain to the use of T9x40 tape drives or assist with planning an automated tape solution. Many of the publications are available at:

http://docs.sun.com/app/docs/prod/tape.storage#hic

Title	Part Number
T9x40 Publications	
T9840 Tape Drive User's Reference Manual	95739
T9840B/T9840C Tape Drive FICON Configuration [1]	
T9940 Tape Drive Operator's Guide	95989
T9940B Tape Drive FICON Configuration [1]	
Related Product Publications	
Crypto Key Management Station Systems Assurance Guide	TM0018
L180/L700x/L1400x Tape Libraries Ordering and Configuration Guide	MT9112
L5500 Automated Cartridge System, System Assurance Guide	MT9142
Nearline Enterprise 9310/4410/9360 System Assurance Guide	ML6500
StorageTek SL8500 Modular Library System, System Assurance Guide	MT9229
StorageTek SL3000 Modular Library System Systems Assurance Guide	316194101
VolSafe Feature Software Information Guide Release 2.0 [2]	316109301

1. White paper located on the SE Support Tools Web-site.
2. Locate the manual at http://dlc.sun.com/pdf/VolSafe/VolSafe.pdf.

Documentation, Support, and Training

Function	URL
Web site	http://www.oracle.com/index.html
Documentation:	
Customer	http://docs.sun.com
Employee	http://docs.sfbay.sun.com
Partner	http://spe.sun.com/spx/control/Login
Downloads:	
Customer	http://www.sun.com/download/index.jsp
Employee	https://dlrequest-zn-dlapps1.sfbay.sun.com/usr/login
Support	http://www.sun.com/support/
Training	http://www.oracle.com/global/us/education/sun_select_country.html

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StorageTek T9x40 Tape Drive Systems Assurance Guide, MT5003

Product Overview

1

This chapter provides an overview of T9x40 tape drives.

Descriptions

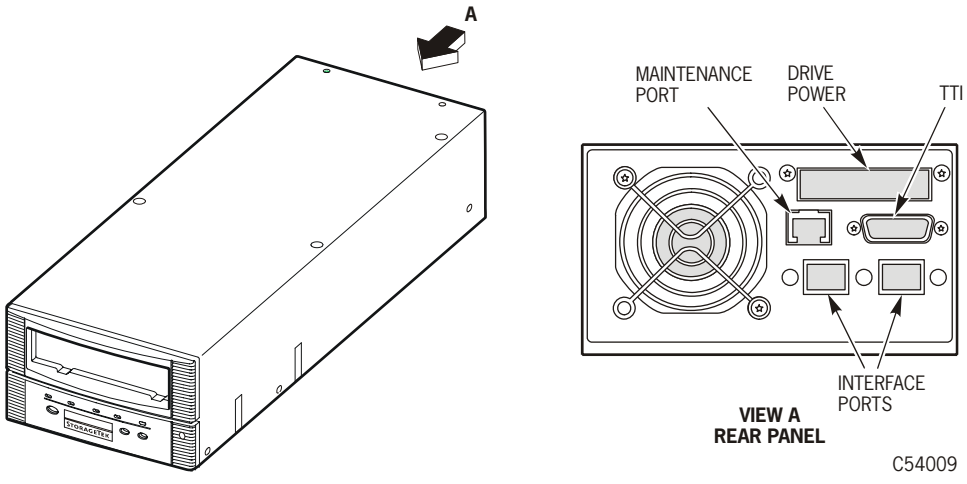
The T9x40 tape drives are small, modular, high-performance drives designed for the enterprise and client-server environments. There are four generations of T9840 access-centric drives and two generations of T9940 high-capacity drives.

T9840 Tape Drive

The T9840 tape drives (Figure 1-1) provide applications with high data throughput and fast recall. T9840 tape drives read/write dual-reel cartridges (see "9840 Cartridge Description" on page 1-13, for more information about 9840 cartridges). The dual-reel cartridge loads to midpoint, which eliminates tape threading time, and minimizes first-file access time (see Table A-2 on page A-2).

- T9840A/B tape drives read/write 20-GigaByte (GB) dual-reel cartridges.
- T9840C tape drive is an enhanced version for 40-GB recording, using partial response maximum likelihood (PRML) format.
- T9840D encryption-capable drive provides 75-GB recording when using block sizes between 32 KB and 256 KB. With drive code level 1.44.x04 and Key Management System (2.1), the drive complies with FIPS Level 1. Level 1 is the lowest classification and has production-grade requirements.

Figure 1-1. T9840B/C/D Tape Drive



The T9840B/C/D rear panel has a Maintenance Port (standard RJ45 receptacle) for Service Delivery Platform (SDP) and/or Customer Service Engineering (CSE) interface.

The T9840D maintenance port supports the use of the Virtual Operator Panel to perform drive operations, retrieve error information, and configure the tape drive. VOP version 1.0.13 in conjunction with the appropriate drive code level supports the use of an IPv6 address.

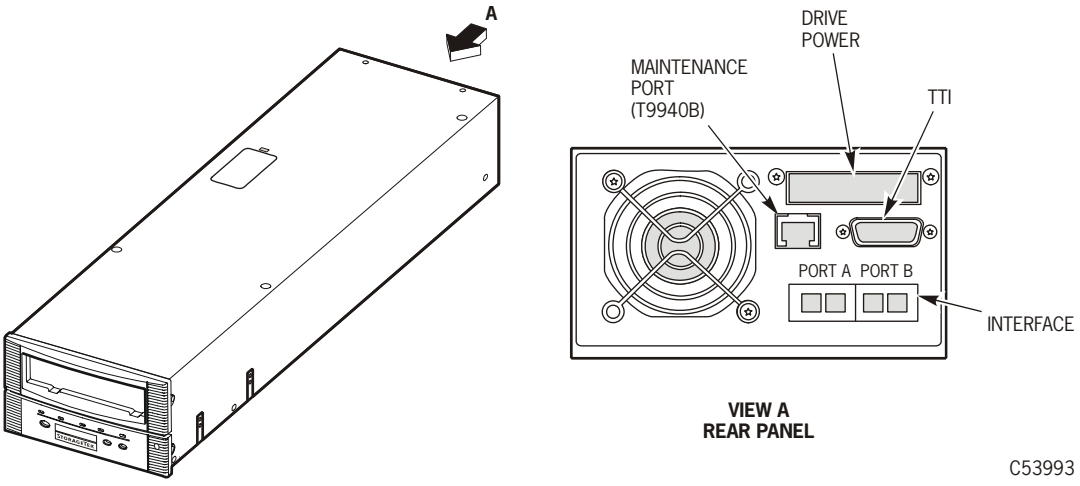
T9840 tape drives are also capable of reading/writing specially designated, write-only (VolSafe) cartridges, which provide a non-erasable, non-rewritable storage solution for important data. See "T9x40 VolSafe" on page 1-3 for additional information.

T9940 Tape Drive

The T9940 tape drives (Figure 1-2) are capacity-centric for data-intensive applications. The T9940A tape drive reads/writes 60-GB, single-reel cartridges (see "9940 Cartridge Description" on page 1-16, for more information about 9940 cartridges). The T9940B tape drive is an enhanced version for 200-GB recording, using PRML format, better performance, (see Table A-13 on page A-11), and better serviceability. Like the T9840B/C/D tape drives, the T9940B tape drive rear panel has a RJ45 Maintenance Port that uses TCP/IP for SDP and/or CSE interface.

The T9940 tape drive is approximately 140 mm (5.5 in.) longer than the T9840 tape drive. The increased length is due to the tape path mechanism being inside the tape drive. The increased length also requires additional mounting space available for installation.

Figure 1-2. T9940B Tape Drive



T9940B tape drives are also capable of reading/writing specially designated, write-only (VolSafe) cartridges, which provide a non-erasable, non-rewritable storage solution for important data. See "T9x40 VolSafe" on page 1-3 for additional information.

T9x40 VolSafe

T9x40 VolSafe capability is a combination of hardware (VolSafe enabled tape drives), microcode, and special media (VolSafe cartridges). This combination provides write-once, read-many (WORM) functionality to safeguard selected data files. Once written to a VolSafe cartridge, data cannot be over-written or erased. New data can be added (appended) to a density-compatible VolSafe cartridge until the cartridge is full.

VolSafe cartridges have a magnetic signature in the Media Information Region (MIR), distinct machine readable features, and are visually identified by colored labels and write-protect switches. See "9840 Cartridge Description" on page 1-13 or "9940 Cartridge Description" on page 1-16 for more information on VolSafe cartridge identification features.

Write

To write to a VolSafe cartridge, a T9x40 tape drive must have compatible data density with the specific VolSafe cartridge, and the drive must be VolSafe-enabled. For instance,

- T9840A/B drives write to 20-GB 9840 VolSafe cartridges only (yellow identification)
- T9840C drives write to 40-GB 9840C VolSafe cartridges only (green identification)
- T9840D drives write to 75-GB 9840D VolSafe cartridges only (purple identification)

  Note: See "9840 Cartridge Description" on page 1-13, for VolSafe cartridge identification

- T9940B tape drives write to 200-GB 9940B VolSafe cartridges only (see "9940 Cartridge Description" on page 1-16, for VolSafe cartridge identification)

The specific tape drive's VolSafe configuration setting must also be enabled (indicated by Ready A, when a compatible VolSafe cartridge is loaded).

Read

To read VolSafe cartridges, a T9x40 tape drive only needs to be density-compatible, the tape drive VolSafe configuration setting need not be enabled. The tape drive recognizes VolSafe cartridges as file-protected (Ready F), regardless of the write-protect switch position. For instance, the T9840C tape drive reads 40-GB 9840C VolSafe cartridges and 20-GB 9840 VolSafe cartridges, but T9840A/B tape drives only read 20-GB 9840 VolSafe cartridges.

Drive - VolSafe Cartridge Compatibility

A 20-GB 9840 VolSafe cartridge, loaded in a T9840C or T9840D tape drive is recognized as file-protected (Ready F), regardless of the cartridge write-protect switch position, and whether the tape drive is VolSafe enabled or not. Therefore, a T9840C or T9840D tape drive reads a 20-GB 9840 VolSafe cartridge, but cannot write to it, even if the tape drive is VolSafe enabled.

Attempts to load a 40-GB 9840C VolSafe cartridge into a T9840A/B tape drive, a 75-GB 9840D VolSafe cartridge into a T9840A/B/C tape drive, or a 200-GB 9940B VolSafe cartridge into a T9940A tape drive results in a load error condition.

Table 1-1 correlates T9x40 tape drives to VolSafe cartridge compatibility.

Table 1-1. T9x40 Tape Drive - VolSafe Cartridge Compatibility Matrix

	VolSafe Cartridge			
Drive	**9840 (20 GB)**	**9840C (40 GB)**	**9840D (75 GB)**	**9940B (200 GB)**
T9840A	Read/Write	Load Error	Load Error	N/A
T9840B	Read/Write	Load Error	Load Error	N/A
T9840C	Read Only	Read/Write	Load Error	N/A
T9840D	Read Only	Read Only	Read/Write	N/A
T9940A[1]	N/A	N/A	N/A	Load Error
T9940B	N/A	N/A	N/A	Read/Write

1. T9940A tape drive is not VolSafe compatible.

Configurations

The following pages describe the T9x40 tape drive configurations.

Note: See Chapter 5, "Information for Ordering" for specific marketing part numbers (PN) availability.

T9840A

The T9840A tape drive is used in the following configurations:

- Desktop, with a choice of: 1) manual load or 2) cartridge scratch loader (CSL).
- Rack mount, with a choice of: 1) manual load or 2) CSL.
- Library attached, see "Library-attached T9x40" on page 1-5.

T9840B

The T9840B tape drive is used in the following configurations:

- Desktop, manual load
- Rack mount, manual load
- Library-attached, see "Library-attached T9x40" on page 1-5.

T9840C

The T9840C tape drive is used in the following configurations:

- Rack mount, manual load
- Library attached, see "Library-attached T9x40" on page 1-5.

T9840D

The T9840D tape drive is used in the following configurations:

- Rack mount, manual load
- Library attached, see "Library-attached T9x40".

T9940A

The T9940A is used in the following configurations:

- Rack mount, manual load, shipboard
- Library attached, see "Library-attached T9x40".

T9940B

The T9940B is used in the following configurations:

- Rack mount, manual load, shipboard
- Library attached, see "Library-attached T9x40".

Configuration Details

This section provides a list of available configurations for the various drive models. Library configurations are listed first, followed by rack mount, and finally desktop.

Library-attached T9x40

The *T9840* tape drive is attached to trays for the following StorageTek libraries:

- 9310 (PowderHorn): Up to 80 tape drives in four 20-drive walls
- 9360 (WolfCreek) *(T9840A only)*: Up to 20 tape drives [**end of support**]
- 9710 (TimberWolf) *(T9840A/B only)*: Up to 10 drives [**end of support**]
- 9738 (TimberWolf) *(T9840A only)*: Up to 3 drives [**end of support**]
- 9740 (TimberWolf) *[T9840D is not supported]*: Up to 10 tape drives
- L180 Tape Library: Up to 6 tape drives
- L700/L1400 Tape Library: Up to 12 tape drives
- L5510 LSM (L5500 ACS) *[T9840D is not supported]*: Up to 77 tape drives in four 20-drive walls
- StorageTek SL3000 modular library system *(T9840C/D only)*: Up to 56 tape drives
- StorageTek SL8500 modular library system: Up to 64 tape drives

The *T9940* tape drive is attached to trays for the following StorageTek libraries:

- 9310 (PowderHorn): Up to 80 tape drives in four 20-drive walls
- 9360 (WolfCreek) *(T9940A only)*: Up to 20 tape drives [**end of support**]
- 9740 (TimberWolf): Up to 10 tape drives
- L180 Tape Library *(T9940B only* provided you use the expansion door*)*: Up to 6 tape drives
- L700/L1400 Tape Library: Up to 12 tape drives

- L5510 LSM (L5500 ACS): Up to 77 tape drives in four 20-drive walls
- StorageTek SL8500 modular library system *(T9940B only)*: Up to 64 tape drives

Notes:

1. See "Related Documentation" on page xi, for ordering information for the StorageTek libraries that accept the T9x40 tape drive, including drive cabinet and minimum software requirements, refer to the system assurance guide for the appropriate library.

2. In the L5500 ACS, the total number of mixed drives, including the Linear Tape Open (LTO) Ultrium tape drives attached to one L5510 LSM is 80 tape drives. The PLM unit, required for LTO drives, blocks three T9x40 power supply slots; therefore, in a mixed 20-drive cabinet, a maximum of 17 tape drive slots are available for T9x40 tape drives.

   Additional drive cabinets would also be limited to a maximum 17 slots for T9x40 tape drives, when a PLM is present. However, if the serial TTI (Tape Transport Interface) cable was installed in place of the PLM unit, a second cabinet could have all 20 tape drive slots available for T9x40 tape drives.

   While an L5510 LSM could theoretically have up to 77 tape drive slots available for T9x40 tape drives, it will most likely be less. For instance, if four drive cabinets were attached, each with a PLM unit installed, there would be a maximum of 68 drive slots (4 X 17) available for T9x40 tape drives.

   The total number of drive cabinets and total mix of T9x40 and LTO tape drives is determined by the site parameters for each library installation.

Desktop T9840

The desktop configuration of T9840A/B tape drives consist of one manual-load drive and one power supply in a desktop chassis. The T9840A drive can also be contained in a Cartridge Scratch Loader (CSL) desktop chassis.

The operator loads a data cartridge by manually inserting it into the drive loading slot; and, unloads a data cartridge by pressing the Unload switch, then manually removing it from the drive loading slot.

With the T9840A desktop CSL chassis, the operator stacks up to seven data cartridges in the CSL mechanism; the mechanism then loads and unloads the cartridges sequentially. Also, operators can manually load/unload a single data cartridge through the loading slot.

Rack Mount

The rack mount T9840 drive tray chassis mounts into a 483-mm (19-in.) rack cabinet. The chassis consists of single/dual manual-load tape drives. The T9840A drive can also be configured in a rack mount CSL chassis. Each tray can hold:

- One manual-load drive in position A (T9840A/B/C/D)
- Two manual-load drives, side-by-side, positions A and B (T9840A/B/C/D)
- One CSL chassis (one T9840A drive only)

The rack mount configuration of the T9940 tape drive consists of two manual-load tape drives mounted on a shock absorbing platform in a rack mount tray.

Rack Cabinets

The rack mount configurations of the T9x40 tape drives are designed to fit into a standard 483-mm (19-in.) rack cabinet (such as the SL-RACK-42-Z). If the customer supplies the rack cabinet, make sure that the cabinet is at least 780 mm (30.75 in.) deep. You can mount:

- Up to six T9840 drive trays in any combination of one drive, two drive, or CSL configurations in a single rack cabinet.
- Up to four T9940 rack mount drive trays in single rack cabinet.
- T9940 rack mount trays in combination with T9840 and/or T10000 rack mount trays within the same rack cabinet. Therefore, the tray totals are limited to the following combinations:

Drive type:	T9940[1]	T9840 or T10000[2]
Drive trays:	1	1 to 4
	2	1 to 3
	3	1

1. Each T9940 drive tray is 6U (266.7 mm / 10.5 in.)
2. Each T9840 or T10000 drive tray is 4U (177.8 mm / 7.0 in.)

Note: The total vertical space cannot exceed 24U (1066.8 mm / 42.0 in.).

To supply power to rack mount drive trays in a rack cabinet, you must order one internal AC power cord per drive tray to connect to a power strip mounted in the cabinet.

Other supported racks:

- CBNT42U is a fully ROHS-compliant, basic 19-inch rack cabinet
- StorageTek RACK001 is a 19-inch 35U rack cabinet, but it is not ROHS compliant

  Note: If you are installing more than four drive trays in the RACK001, a second power strip and power cord (compatible to the site's AC power source) are required.

Figure 1-3 shows configurations of the T9840 tape drive.

Figure 1-3. T9840 Tape Drive Configurations

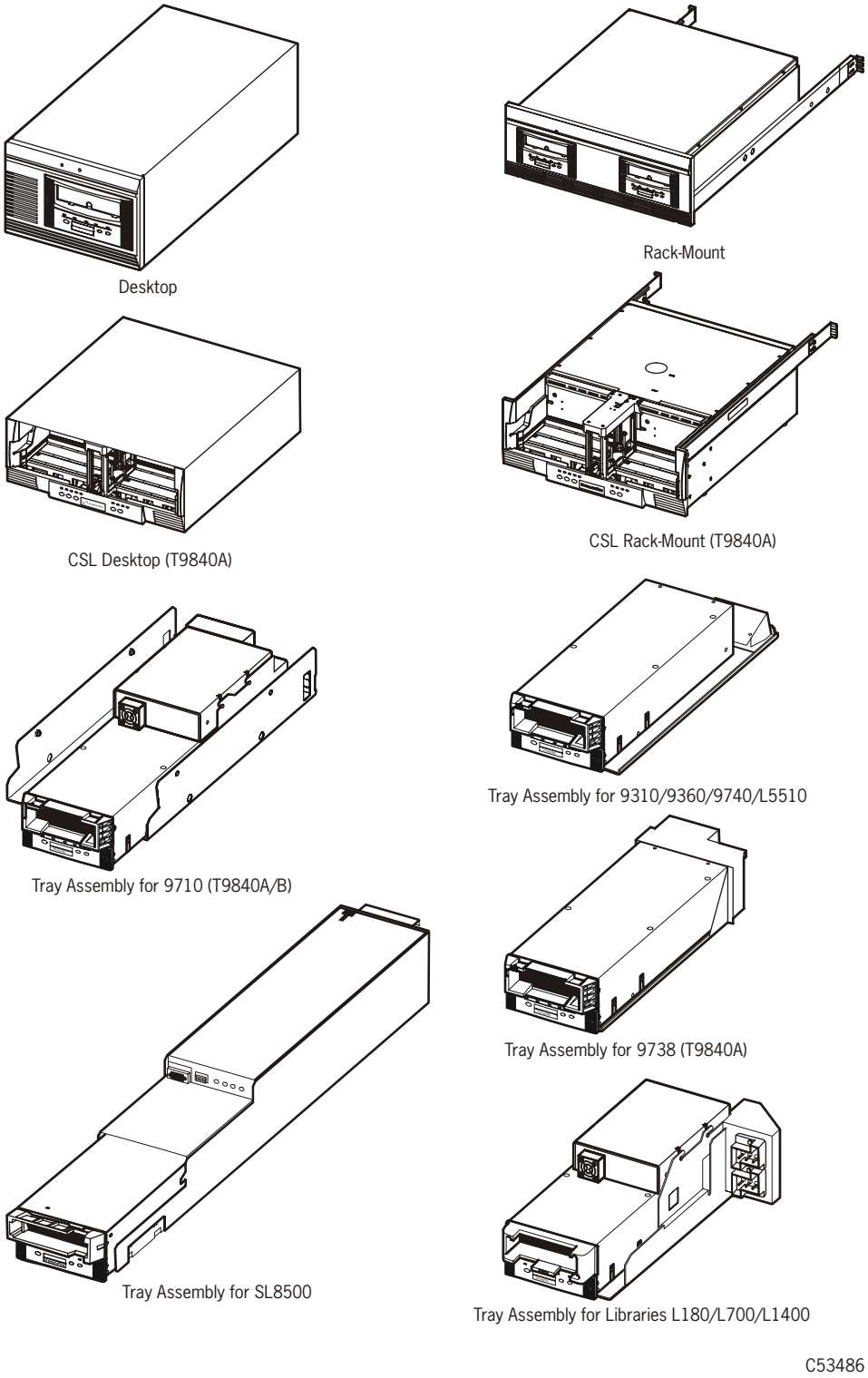


Figure 1-4 shows T9940 tape drive on library trays.

Figure 1-4. T9940 Tape Drive, Library attached

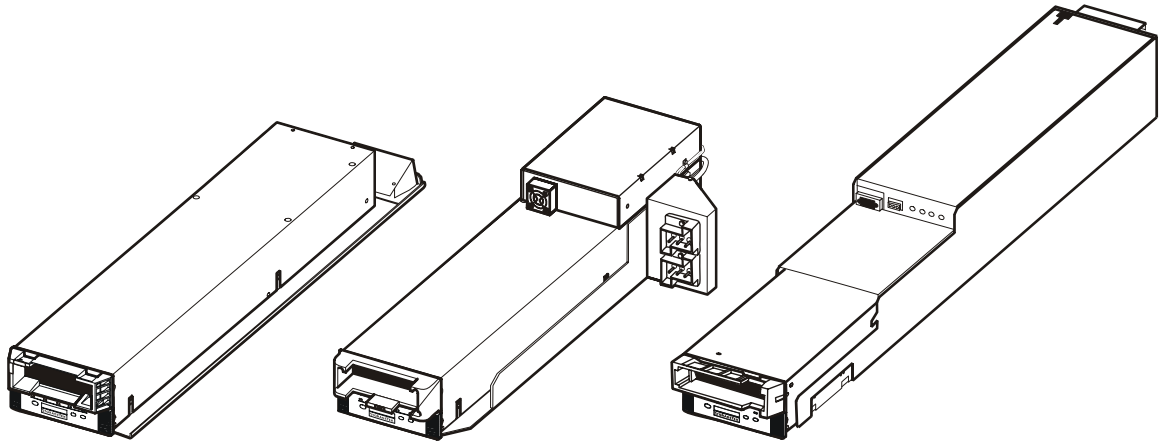
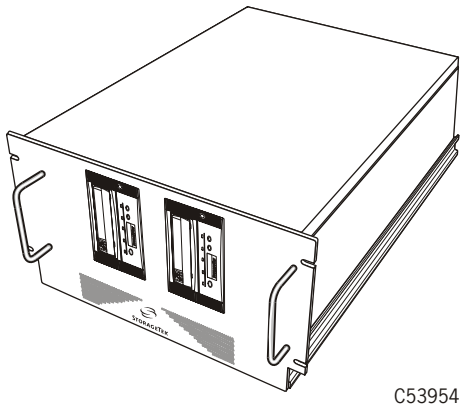


Figure 1-5 shows the T9940 Rack Mount configuration.

Figure 1-5. T9940 Tape Drive, Rack Mount



Power Cords

The power cord options for the desktop and rack mount T9x40 tape drive are:

- Desktop or rack mount 120 VAC operation in the U.S. and Canada with a 120 VAC three-prong standard plug
- Desktop 250 VAC operation outside the U.S. and Canada with a continental European standard plug

- Rack Mount 250 VAC operation in the U.S. and Canada with either a Hubbell or a Russellstoll plug

Device Emulation Modes Supported (T9840D)

- Fibre Channel:
  - T9840D native mode
  - 3490E11 and 3590E11 (AS400 attachments)
  - T9840C (testing only)
- FICON: 3490E11 and 3590H10
- ESCON: 3490E11 and 3590H10

Interfaces

The following interface types are available on T9x40 tape drives:

ESCON

The ESCON-configured T9x40 tape drives have one ESCON Duplex interface port to connect a 62.5-micron (µm) ESCON Duplex cable.

- The drive emulates a single-port 3490E or 3590 tape drive.
- 128 logical paths.

Note: Maximum total non-repeated channel distance for an ESCON tape drive, using a 62.5 micron multimode cable is 3 km (1.86 mile).

FC

The FC-configured T9x40 tape drives have dual fiber-optic ports to allow for point-to-point, arbitrated-loop (including redundant-loop) and fabric topology.

- T9x40A tape drives use short wavelength transceivers with SC type ports and operate on a 1-Gb channel.
- The T9840B tape drive uses short wavelength transceivers with LC type ports and operate on a 2-Gb channel.
- The T9840C/D and T9940B tape drives use small form-factor pluggable (SFP) transceivers with LC type ports and operate on a 2-Gb channel. The drives support the use of short or long wavelength SFP modules.

See "Fibre Channel and FICON Cable Facts" on page 1-11 for information on types of fiber-optic cable and maximum cable lengths.

The FC interface for the T9x40 uses Ultra-SCSI protocol. The FC T9x40 tape drives connect to other devices with the following equipment:

- A hub that connects FC devices to each other in a loop
- A switch that connects FC devices to each other in a fabric

The 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).

Note: The drive will support two hosts, providing that both hosts honor the "reserve/release" and/or the "persistent reserve/release" specifications.

FICON

Fibre Connection (FICON) is a proprietary channel for IBM processors. T9x40 FICON tape drives can be configured with:

- A single-port, short or long wave transceiver
- Dual-port, short or long wave transceivers; or
- Dual-port, mixed wave (one short wave and one long wave transceiver)

The benefits of a FICON channel include greater bandwidth, more logical paths, more devices per channel, and greater distance.

- A total of 256 logical paths are possible. On dual-port tape drives, the 256 total logical paths can be unevenly split between Port A and Port B.
- Approximately six T9x40 FICON tape drives, concurrently reading/writing large (64-KB) blocks, can be attached to a single channel.
- Approximately sixteen T9x40 FICON tape drives, concurrently reading/writing small (16-KB) blocks, can be attached to a single channel.

T9x40 FICON drives use small form-factor pluggable (SFP) transceivers.

The 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).

Note: The drive will support two hosts, providing that both hosts honor the "reserve/release" and/or the "persistent reserve/release" specifications.

Hardware Configuration Definition

Once you have installed FICON drives, you need to set the hardware configuration definition (HCD) for each drive. Go to the White Papers section of the SE Tools website at http://xmen.east.sun.com/setools/aaaNotForCD/Papers/WhitePapers.htm, then select the appropriate drive article for HCD information and guidelines.

Fibre Channel and FICON Cable Facts

T9x40 Fibre Channel and FICON tape drives use Fibre Channel cables.

Use multimode cables when connecting to short wave ports. Multimode cables have an orange jacket, and the fiber within the cable is 50 microns in diameter.

Use single mode cables when connecting to long wave ports. Single mode cables have a yellow jacket, a blue LC connector, and the fiber within the cable is 9 microns in diameter.

Notes:

1. Maximum total non-repeated channel distance for a short wave 850 nm transceiver using a 50 micron multimode cable on a 100 MB/s channel is 500 m (1640 ft.).
2. Maximum total non-repeated channel distance for a short wave 850 nm transceiver using a 50 micron multimode cable on a 200 MB/s channel is 300 m (984 ft.).
3. Maximum total non-repeated channel distance for a long wave 1310 nm transceiver using a single mode cable is 10 km (6.21 mi).
4. Single mode cable maximum distances can be extended through an amplifier-repeater unit (RPQ) to 20 km (12.4 mi) for a 100 MB/s channel or to 12 km (7.46 mi) for a 200 MB/s channel.

SCSI

The SCSI-configured T9840A/B and T9940A tape drives have two connectors to attach 68-conductor SCSI P-cables. SCSI enables devices to be connected either directly, in a daisy-chain configuration, or in a combination of direct and daisy-chain configurations. Two connectors facilitate daisy-chaining tape drives. The following SCSI equipment may also be required:

- A terminator that connects to the last device in a SCSI daisy chain
- A bridge that connects SCSI devices to an FC network

A maximum of two daisy-chained devices are possible, with the total SCSI cable length of no more than 25 meters (82 feet).

Note: SCSI interface T9x40 Tape Dives are only available as used equipment.

SCSI on the T9x40 is either differential, wide ultra, or a lesser implementation. The T9x40 tape drive does not supply terminator power; therefore, the host bus adaptor (HBA) card must supply SCSI terminator power.

Tape Cartridges and Labels

The following pages describe the 9x40 data cartridges, VolSafe cartridges, cleaning cartridges, and bar-coded volume serial number (VOLSER) labels. See "Ordering Cartridges and Labels" on page 5-20 to order cartridges and/or labels.

Note: Maximum block size is 256 Kilobytes.

9840 Cartridge Description

The T9840 tape drives use a cartridge (Figure 1-6 on page 1-14) that is the same physical size as a 3490 or 9940 data cartridge; however, they are not interchangeable. Three types of cartridges are available: data, VolSafe and cleaning (100 uses maximum).

The media identification labels for 9840 cartridges have unique letters:

R 9840 standard data and VolSafe data cartridges

U 9840 cleaning cartridge (use with T9840A/B/C drives)

Y 9840D cleaning cartridge (use with T9840D only)

Data Cartridge

The 9840 data cartridges achieve fast access by having both the supply and takeup reels in the cartridge and by facilitating midpoint loading. The standard data cartridge has an uncompressed capacity of:

- 20 GB when written by T9840A/B tape drives,
- 40 GB when written by a T9840C tape drive, or
- 75 GB when written by a T9840D tape drive.

VolSafe Cartridge

Three variations of the VolSafe data cartridge are available for append-only use:

- 20-GB 9840 VolSafe cartridge, with yellow identifying features
- 40-GB 9840C VolSafe cartridge, with green identifying features
- 75-GB 9840D VolSafe cartridge, with purple identifying features

Note: The different VolSafe cartridges are NOT interchangeable (see "Drive - VolSafe Cartridge Compatibility" on page 1-3).

Figure 1-6. 9840 Cartridge

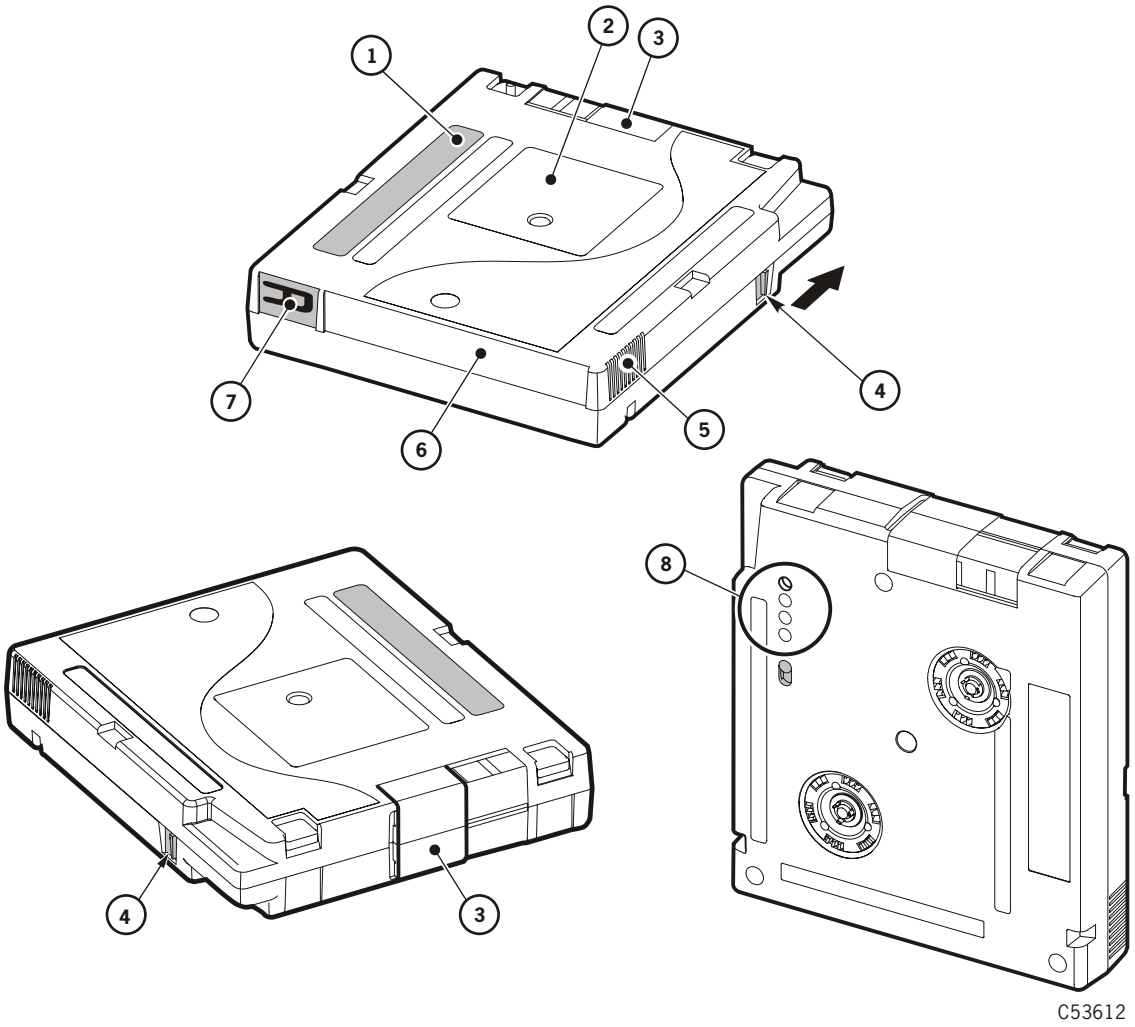


Illustration call-outs (8)

1. Manufacturer Label Area
2. Customer Label Area
3. Access Door
4. Write-protect Switch (black on a standard data cartridge, yellow on a 9840 VolSafe cartridge, green on a 9840C VolSafe cartridge, purple on a 9840D VolSafe cartridge, and white on a cleaning cartridge)
5. Finger Grip
6. VOLSER Label Area
7. Media ID (human & barcode identifiable: **R** = standard data or VolSafe data cartridges, **U** = T9840 A/B/C cleaning cartridge, and **Y**=T9840D cleaning cartridge)
8. Media ID (machine readable sensor area - first position recessed on a 9840 VolSafe data cartridge, second and fourth positions recessed on a 9840C VolSafe data cartridge, third and fourth positions recessed on a 9840D VolSafe data cartridge, the first three positions recessed on a U-labeled cleaning cartridge, and the second and third positions recessed on the Y-labeled cleaning cartridge)

Cartridge Reclaim

Native reclaim the ability of a drive to reclaim a cartridge it has previously written.

Forward reclaim the ability of a drive to reclaim a cartridge previously written by a legacy drive. Note that the T9840D is able to reclaim a standard data cartridge previously written by a T9840A, T9840B, or T9840C tape drive.

Backward reclaim the ability of a drive to reclaim a cartridge written by a non-legacy drive. Note that the T9840A and T9840B drives cannot distinguish between T9840C and T9840D formats.

A cartridge written by a T9840D drive that is loaded on a legacy drive that has been given the instruction to write from BOT will be allowed to write on the cartridge provided the write-protect switch allows it and the cartridge is not a VolSafe cartridge.

Note: VolSafe cartridges cannot be forward or backward reclaimed.

A VolSafe cartridge containing 25 blocks, or less, that are all tape marks or 80-byte records will be capable of being native reclaimed.

9940 Cartridge Description

The T9940 tape drives use a data cartridge (Figure 1-7) that is the same physical size as a 9840 and 3490 tape cartridge; however, they are not interchangeable. The 9940 data cartridge has a single reel (supply reel) inside the cartridge.

The 9940 data cartridge has a capacity of 60 GB, uncompressed when written by a T9940A tape drive, or 200 GB when written by a T9940B tape drive. A VolSafe (append only) variation of the data cartridge is available. 9940 cleaning cartridges are also available.

The media identification labels for 9940 cartridges have unique letters:

P 9940 standard and VolSafe data cartridges

W 9940 cleaning cartridge

Figure 1-7. 9940 Cartridge

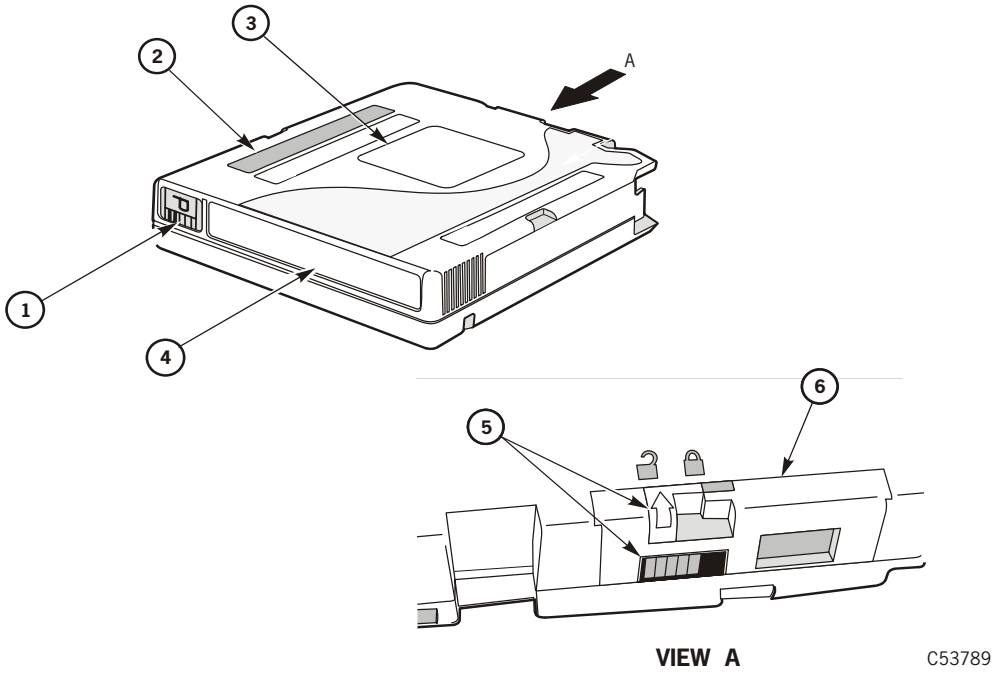


Illustration call-outs (6)

1. Media ID (human & barcode identifiable, yellow background on a VolSafe cartridge, **P** = standard data or VolSafe data cartridge, **W**= cleaning cartridge)
2. Manufacturer Label Area (yellow background on a VolSafe cartridge)
3. Customer Label Area
4. VOLSER Label Area
5. Write-protect Switch
6. Media ID, machine readable sensor area (black on a standard data cartridge, yellow on a VolSafe cartridge, or white on a cleaning cartridge)

The Media ID sensor area (6 in Figure 1-7) is machine-readable by a distinct pattern for each cartridge type. The sensor area is also color coded for visual identification.

Mixed-Media Management

Extra media management measures must be taken whenever T9x40 tape drives and data cartridges of mixed data density, or mixed Emulation images co-exist in the same library system.

The extra measures essentially involve creation and management of separate media pools/sub-pools for formatted/written 9x40 data cartridges. Guidelines for creation and maintenance of media pools/sub-pools are located in ACSLS, HSC, and independent software vender (ISV) documentation sets.

Mixed Data Density

Since all T9840 tape drive models use the same 9840 data cartridge, and both T9940 tape drive models use the same 9940 data cartridge, extra media management measures must be taken because low density tape drives (T9840A/B and T9940A) cannot read data from a data cartridge written in the high-density format by T9840C, T9840D, and T9940B tape drives. The low density tape drives must also have an appropriate drive firmware level to even identify a high-density data cartridge:

- T9840A
  - R1.33.103 or higher to identify a cartridge written by a T9840C drive
  - R1.41.104 or higher to identify a cartridge written by aT9840D drive
- T9840B
  - R1.33.303 or higher to identify a cartridge written by a T9840C drive
  - R1.41.304 or higher to identify a cartridge written by aT9840D drive
- T9840C: R1.41.504 or higher to identify a cartridge written by a T9940D drive
- T9940A: R1.32.215 or higher to identify a cartridge written by a T9940B drive

CAUTION:
Data Loss*. A low-density tape drive, without the appropriate firmware level, would consider a high-density format cartridge blank and available for scratch or would overwrite data if a write command is issued with the tape positioned at block zero. *Use media pools/sub-pools and the appropriate drive firmware level.

The high-density tape drives can read data from a cartridge written by low-density format tape drives. However, the high-density tape drive can not append data to a low-density data cartridge. An attempt to append a low-density data cartridge on a high-density tape drive will fail, with sense byte data indicating an error, similar to that of a file-protected data cartridge.

Note: For additional information about mixed-media management refer to "Cross-Density MIR Processing" in the *T9840 Tape Drive User's Reference Manual*, PN 85739 and the *T9940 Tape Drive Operator's Guide*, PN 95989.

Table 1-2. Data Cartridge Read, Write Append Matrix

Data Cartridge	Read With				Mid- or End-Volume Append With			
	T9840D	T9840C	T9840B	T9840A	T9840D	T9840C	T9840B	T9840A
Written by T9840D	Yes	No	No	No	Yes	No	No	No
Written by T9840C	Yes	Yes	No	No	No	Yes	No	No
Written by T9840B	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Written by T9840A	Yes	Yes	Yes	Yes	No	No	Yes	Yes

Mixed Emulation Image

Extra media management measures must also be taken when a mix of T9x40 tape drives with 3490 and 3590 Emulation images co-exist in the same library system.

- Data cartridges written by T9x40 tape drives running with 3590 Emulation image are not readable by T9x40 tape drives running with 3490 Emulation image.
- Data cartridges written by T9x40 tape drives running with 3490 Emulation image are readable by T9x40 tape drives running with 3590 Emulation image, but cannot be written by the 3590 Emulation image tape drive.

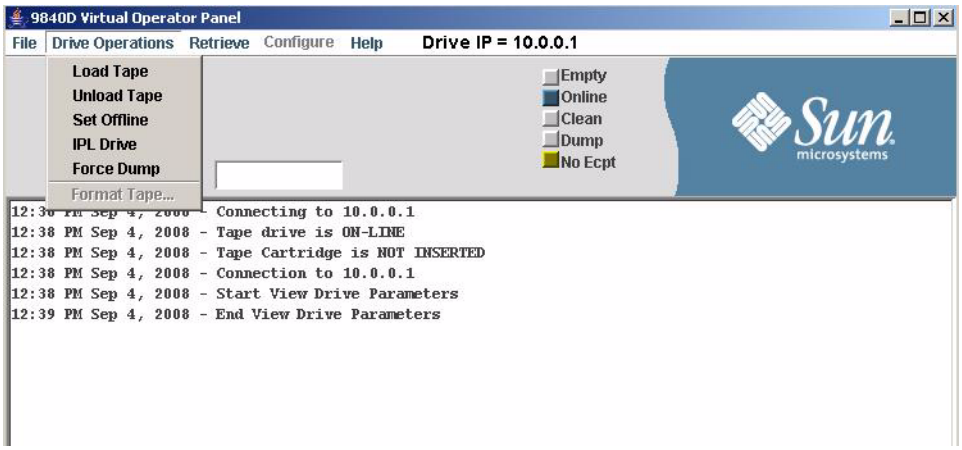
Guidelines for creation and maintenance of media pools/sub-pools are located in HSC and independent software vender (ISV) documentation sets.

Virtual Operator Panel

Figure 1-8 shows an example of the virtual operator panel (VOP) graphical user interface (GUI) for the T9840D tape drive. This panel allows operators and service representatives to monitor and perform tasks on a single tape drive.

Note: VOP version 1.0.13 in conjunction with the appropriate drive code level supports the use of an IPv6 address.

Figure 1-8. Virtual Operator Panel



System Assurance

2

The system assurance process is the exchange of information among team members to assure that no aspects of the sale, order, installation, and implementation for the StorageTek T9x40 tape drive are overlooked. The system assurance team members ensure that all aspects of the process are planned carefully and performed efficiently to promote an error-free installation and contribute to overall customer satisfaction.

This process begins when the customer accepts the sales proposal.

System Assurance Planning Meetings

The purpose of the system assurance planning meetings is to:

- Introduce the customer to the T10000 tape drive
- Explain the system assurance process and establish a team
- Identify and define the customer requirements
- Identify the proposed configurations
- Complete the sales order
- Identify any additional items needed (such as cables and tape cartridges)
- Prepare for the installation and implementation
- Schedule and track the entire process

Table 2-1. System Assurance Task Checklist

Task	Completed?
Introduce the Oracle team to the customer.	Yes ___ No __
Describe the tape drive to the team members.	Yes ___ No __
Complete the team member contact sheets in this chapter.	Yes ___ No __
Review Chapter 3, "Library Firmware/Host Software"and complete the checklists.	Yes ___ No __
Review Chapter 4, "Preinstallation Checklists"and complete the checklists.	Yes ___ No __
Does the customer want encryption-enabled tape drives? Note: Refer to the Key Management Station guide for information.	Yes ___ No __
Order the tape drive, cables, and cartridges (see Chapter 5, "Information for Ordering").	Yes ___ No __
Determine the installation schedule: Date:_____ Time: _____	Yes ___ No __

Customer Team Member Contact Sheet

Complete the following with information about the customer team members:

Name: _____
Title: _____
Telephone Number: _____
FAX Number: _____
Cell Phone / Pager: _____
E-mail Address: _____

Name: _____
Title: _____
Telephone Number: _____
FAX Number: _____
Cell Phone / Pager: _____
E-mail Address: _____

Name: _____
Title: _____
Telephone Number: _____
FAX Number: _____
Cell Phone / Pager: _____
E-mail Address: _____

Name: _____
Title: _____
Telephone Number: _____
FAX Number: _____
Cell Phone / Pager: _____
E-mail Address: _____

Client Processor Teams

List names and telephone numbers of the following client processor team personnel:

CPU Hardware Vendor Contacts

Name:_____Vendor:_____

Office:_____ Fax:_____e-mail:_____

Name:_____Vendor:_____

Office:_____ Fax:_____e-mail:_____

Name:_____Vendor:_____

Office:_____Fax:_____e-mail:_____

CPU Software Vendor Contacts

Name:_____Vendor:_____

Office:_____ Fax:_____e-mail:_____

Name:_____Vendor:_____

Office:_____ Fax:_____e-mail:_____

Name:_____Vendor:_____

Office:_____Fax:_____e-mail:_____

Oracle Team Member Contact Sheet

Complete the following with information about the team members. (Members may include: marketing and sales representatives, installation coordinator, systems engineers (SEs), and service representatives.)

Name: _____
Title: _____
Telephone Number: _____
FAX Number: _____
Cell Phone / Pager: _____
E-mail Address: _____

Name: _____
Title: _____
Telephone Number: _____
FAX Number: _____
Cell Phone / Pager: _____
E-mail Address: _____

Name: _____
Title: _____
Telephone Number: _____
FAX Number: _____
Cell Phone / Pager: _____
E-mail Address: _____

Name: _____
Title: _____
Telephone Number: _____
FAX Number: _____
Cell Phone / Pager: _____
E-mail Address: _____

Library Firmware/Host Software

3

When you are adding new/used T9x40 tape drive models to existing libraries, you must verify that library firmware level and host software release levels support the new drive models.

Library Firmware

For library configurations, determine the customer's existing library firmware level, and compare it with the currently available library firmware:

Update library firmware as required to support incoming drive models.

Host Software Configuration

The T9x40 tape drives operate with MVS, UNIX, or Windows NT platforms. Certification with these platforms and host-based applications is an ongoing process. For up-to-date information about platforms and applications, see the Tape Device Software area at the following URL:

http://www.oracle.com/us/products/servers-storage/storage/tape-storage/index.html

T9x40-Supported Software

Depending upon the host platform and the type of interface, T9x40 tape drives are subject to one the following software application groups:

- Nearline Control Solutions (NCS), which includes:
  - Host Software Component (HSC)

    Note: In HSC, implementation of VolSafe requires definition of esoteric names and cartridge tape subpools. Refer to the *VolSafe Feature Software Information Guide*, Release 2.0 PN 316109301. http://dlc.sun.com/pdf/VolSafe/VolSafe.pdf

  - Multiple Virtual Storage/Client System Component (MVS/CSC)
  - LibraryStation

  Use Table 3-1 to record the customer's current NCS software configuration against obtained requirements.

- Automated Cartridge System Library Software (ACSLS)

Use Table 3-2 on page 3-3 to record the customer's current ACSLS software configuration against obtained requirements.

- Removable Media Library Software (RMLS)

  Use Table 3-3 on page 3-3 to record the customer's current RMLS/CSC software configuration against obtained requirements.

Software Configuration Worksheets

Record the customer's NCS software configuration in Table 3-1.

Table 3-1. NCS Software Configuration Worksheet

Item	Processor 1		Processor 2	
	Existing	Required	Existing	Required
Operating system and version or release level				
DFP maintenance level				
Backup/recovery software				
Archival/migration software				
Additional information				

Record the customer's ACSLS software configuration in Table 3-2.

Table 3-2. ACSLS Software Configuration Worksheet

Item	Processor 1		Processor 2	
	Existing	Required	Existing	Required
Operating system vendor				
Driver software				
Backup/restore software				
Archival/migration software				
Performance monitoring software				
Data compression software				
Additional information				

Record the customer's RMLS software configuration in Table 3-3.

Table 3-3. RMLS Software Configuration Worksheet

Item	Processor 1		Processor 2	
	Existing	Required	Existing	Required
Operating system vendor				
Driver software				
Backup/restore software				
Archival/migration software				
Performance monitoring software				
Data compression software				
Additional information				

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Preinstallation Checklists

4

This chapter provides checklists that the system assurance team should complete before the delivery and installation of the equipment.

Predelivery Checklist

Table 4-1 lists issues that should be addressed and resolved before equipment delivery. Circle "Yes" or "No" for each item. For unresolved issues, assign an action and a due date to a system assurance team member.

Table 4-1. Predelivery Checklist

Item Description	Yes/No	Action Required/Due Date/ Person Responsible
Site Preparation		
Floor plans completed	Yes/No	
Clearance adequate	Yes/No	
Cooling adequate	Yes/No	
Cleanliness acceptable [1]	Yes/No	
Power requirements met	Yes/No	
Cable lengths determined	Yes/No	
Cable routing established	Yes/No	
Future expansion considered	Yes/No	
Dock facilities scheduled	Yes/No	
Hardware Procurement		
Options or features ordered	Yes/No	
Power cables ordered	Yes/No	
Interface cables ordered	Yes/No	
Interface adapters ordered	Yes/No	

1. See the *Data Center Site Planning Guide* (p/n 805-5863-13) and "Airborne Contamination" on page A-4for additional information.

Table 4-1. Predelivery Checklist (Continued)

Item Description	Yes/No	Action Required/Due Date/ Person Responsible
Tapes and labels ordered	Yes/No	
Software Procurement		
Software prerequisites met	Yes/No	
Software Installation		
Scheduled	Yes/No	
Completed	Yes/No	
JCL Changes		
Scheduled	Yes/No	
Completed	Yes/No	
I/O Generation Changes		
Scheduled	Yes/No	
Completed	Yes/No	
Mixed-media Subpools		
Scheduled	Yes/No	
Completed	Yes/No	
Hardware Installation		
Delivery schedule completed	Yes/No	
Dock hours scheduled	Yes/No	
Pre-staging area set	Yes/No	
Installation team identified	Yes/No	
Site access arranged	Yes/No	
Installation hours defined	Yes/No	

1. See the *Data Center Site Planning Guide* (p/n 805-5863-13) and "Airborne Contamination" on page A-4for additional information.

Delivery and Handling Information

Table 4-2 provides a place to record delivery information.

Table 4-2. Delivery and Handling Information

Yes	No	Considerations/Conditions
❑	❑	Is a receiving dock available? If yes, what is the maximum truck length allowed? 12 m / 40 ft____ 14 m / 45 ft____ 15 m / 48 ft____ other_____ If yes, what is the maximum truck height? _____ If yes, what is the dock height in inches? _____
❑	❑	Are there any physical impediments to dock use? If yes, list here: _____ _____
❑	❑	Are there any street or alley limitations to dock use? If yes, list here: _____ _____
❑	❑	Are there any days or times when dock hours are controlled or the dock is unavailable? If yes, list here: _____ _____
❑	❑	Will any stairs need to be negotiated? If yes, list here: _____ _____
❑	❑	Will an elevator be used? What are the approved hours for elevator use? _____
❑	❑	Is protective floor covering required? If yes, who will provide the necessary materials and labor? _____ _____
❑	❑	Are transport aids available (cart, hand truck, dolly)? _____ _____

Access and Administrative Issues

The worksheet in Table 4-3 identifies access restrictions to the computer room and addresses other administrative issues.

Table 4-3. Access and Administrative Issues

Yes	No	Considerations/Conditions
❑	❑	Are there physical or statutory limitations of access to the area in which this customer delivery site is located? If yes, list the limited hours here: _____ _____
❑	❑	Are there local codes that specify equipment clearances? If yes, list here: _____ _____
❑	❑	What ID badges are required to gain access to the customer facility if an outside installer is used? List a point of contact to acquire the required ID badges or to get on appropriate access lists. _____ _____
❑	❑	Are there any union or local regulations that would prevent an outside installer from performing any activities? If yes, explain here: _____ _____
❑	❑	Does the carrier need to belong to a union? If yes, which union? _____
❑	❑	Is there a secure area where test equipment, spare parts and documentation can be stored? If yes, note the location. _____ _____

Information for Ordering

5

Use this chapter to help order tape drives, cables, and media for the T9x40 tape drive. If you have answers to the following questions, the task of locating the pertinent part number becomes much easier:

What tape drive model is required?	❑ T9840D ❑ T9840C (used equipment only) ❑ T9840B (used equipment only) ❑ T9840A (used equipment only) ❑ T9940B (used equipment only) ❑ T9940A (used equipment only)
What host interface is used?	❑ FICON ❑ ESCON (used equipment only) ❑ Fibre Channel ❑ SCSI (used equipment only)
Number of FICON or Fibre Channel interface ports[1]	❑ 1 port ❑ 2 port
Type of interface transceiver	❑ Long wavelength[2] ❑ Short wavelength[3]
Will the drive be connected to a library? If yes, which model?[4]	❑ SL8500 ❑ SL3000 ❑ L180/L700e/L1400M ❑ 9310/L5500

1. ESCON and SCSI drives have one port only.
2. Long wavelength ports require single-mode (9 micron fiber) cables.
3. Short wavelength ports require multimode cables.
4. Older model libraries are not listed.

The part numbers are composed of many of the elements listed in the table above. For example, the part number 9840D-FIDPLW-85Z-N is comprised of:

- **9840D** that indicates the tape drive model number
- **FI** indicates a FICON interface
- **DPLW** indicates the drive has dual ports (DP) that are long wavelength (LW)
- **85** indicates the library model (SL8500)
- **Z** indicates that the drive complies with ROHS requirements
- **N** indicates a Sun part number copied to the Oracle price list

Note: The SL8500 number includes the port(s) and the type of transceiver (the example was SPSW). Numbers for 9310, L180, L700, and L1400 libraries do not include

such a designation. You must order a Conversion Bill to obtain the appropriate number and type of transceiver.

Use these tables to determine the part numbers

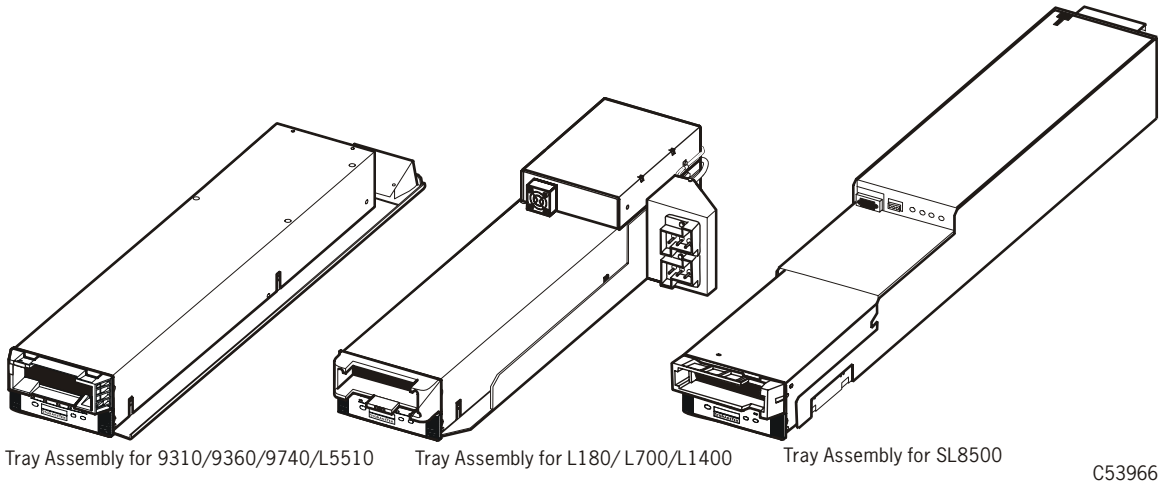
- "Tape Drive Order Numbers for Libraries" on page 5-3
- "Desktop and Rack Mount Tape Drive" on page 5-9
- "Cable Order Numbers" on page 5-11
- "Conversion Bills/Kits" on page 5-17
- "Ordering Cartridges and Labels" on page 5-20

Use conversion bills to obtain the necessary parts to:

- Add a second drive to a rack chassis
- Change the type of SFP module in the drive
- Transfer a drive from one library model to a different library model

Note: The following figure shows three different drive trays. If you purchased drives for a 9310 library (the image on the left) but you upgrade to an SL8500 library, use a conversion bill to modify your existing drive to work in the new library (the image on the right).

Figure 5-1. Library Attached Tape Drive



Tape Drive Order Numbers for Libraries

Use this section to determine the order numbers for the purchase of an initial quantity of drives with a new library, to increase the number of drives in your library, or to replace existing drives with newer generation drives:

- "T9840 Library Attached Tape Drives"
- "T9940 Library Attached Tape Drives" on page 5-7

Table 5-1. Library Configuration Summary

Library	Description
L180	Holds from 84 to 174 cartridges and up to six T9x40 tape drives
L700	Holds from 216 to 678 cartridges and up to 12 T9x40 tape drives
L700e	Holds from 300 to 1,344 cartridges and up to 24 T9x40 tape drives when two libraries are connected by a pass-thru port (PTP)
L1400M	Holds from 300 to 1,344 cartridges and up to 24 T9x40 tape drives
SL3000	Holds from 200 to 4,500 cartridges and up to 56 T9840C/D tape drives
SL8500	A single SL8500 holds up to 10,000 cartridges and up to 64 T9x40 tape drives
9310[1]	A single 9310 holds up to 6,000 cartridges with up to 80 T9x40 tape drives on four 20-drive walls. **Note:** This library requires an external drive cabinet on each drive wall. Tape drives are installed in the drive cabinet. There are two cabinet models: 9741001 and 9741E01.

T9840 Library Attached Tape Drives

- Table 5-2, "T9840D Library Configuration (New) Marketing PNs" on page 5-4
- Table 5-3, "T9840C (Used) ROHS Compliant Marketing PNs" on page 5-5
- Table 5-4, "T9840C (Used) Non-ROHS Marketing PNs" on page 5-6
- Table 5-5, "T9840B (Used) Non-ROHS Marketing PNs" on page 5-6

Table 5-2. T9840D Library Configuration (New) Marketing PNs

Description	Marketing PN
9310 Library	
T9840D, FICON, 9310[1], 9741[2],-9741E	9840D-FI-9310Z-N[5]
Single port long wave	X984/T10K-2GB-LW-N
Single port short wave	X984/T10K-2GB-SW-N
Dual port long wave	(2x) X984/T10K-2GB-LW-N
Dual port mixed wave	X984/T10K-2GB-LW-N and X984/T10K-2GB-SW-N
Dual port short wave	(2x) X984/T10K-2GB-SW-N
T9840D, Fibre Channel, 9310[1], 9741[2],-9741E	9840D-FC-9310Z-N[5]
Note: You must also order an SFP conversion kit. See the X984/T10K numbers listed above for the FICON drive.	
L180/700e/1400M Library	
T9840D, FICON, L180/L700/L1400[1]	9840D-FI-L1400Z-N[5]
T9840D, Fibre Channel, L700/L1400[1]	9840D-FC-L1400Z-N
Note: You must order an SFP conversion kit for FICON or Fibre Channel drives. See the X984/T10K numbers in the 9310 section above for the T9840D, FICON drive.	
SL3000 Library	
T9840D FICON dual-port long-wave[4], SL3000	9840D-FI-S30-2PL-N[5]
T9840D, Fibre Channel dual-port short-wave[3], SL3000	9840D-FC-S30-2PS-N[5]
SL8500 Library	
T9840D, FICON dual-port long-wave[4], SL8500	9840D-FIDPLW-85Z-N[5]
T9840D, Fibre Channel dual-port short-wave[3]	9840D-FCDPSW-85Z-N[5]

1. Interface transceivers (SFP modules) do not ship with the tape drive for the identified library. A complete order consists or a tape drive number plus a port conversion kit (a number beginning with an X).
2. 9741 cabinet with the louvered rear door requires EMI pad (FB 101201) to operate FC/FICON drives.
3. Short wave (SW) ports require 50/125 micron cables.
4. Long wave (LW) ports require 9/125 micron cables.
5. Port conversion kits are available to change the drive to SW, LW, or mixed port wavelength (MW). See "T9x40 Common Conversion Bills (ROHS Compliant)" on page 5-18.

Table 5-3. T9840C (Used) ROHS Compliant Marketing PNs

Description	Marketing PN
Library Attached:	
ESCON, 9310/9740/L5500, 9741[1]-9741E drive cabinets	Y9840C-ES-9310Z-N
ESCON, L180/L700/L1400	Y9840C-ES-L700Z-N
ESCON, SL8500	Y9840C-ES-SL85Z-N
Fibre Channel, 2Gb, 9310/9740/L5500, 9741[1]-9741E drive cabinets	Y9840C-FC-9310Z-N
Fibre Channel, 2Gb, L180/L700/L1400	Y9840C-FC-L700Z-N
Fibre Channel, 2Gb, SL8500	Y9840C-FC-SL85Z-N
FICON, 9310/9740/L5500, 9741[1]-9741E drive cabinets	Y9840C-FI-9310Z-N
FICON, L180/L700/L1400	Y9840C-FI-L700Z-N
FICON, SL8500, SPSW (single-port short-wave[2])	Y9840C-FIS85-1PS-N
FICON, SL8500, DPSW (dual-port short-wave[2])	Y9840C-FIS85-2PS-N
FICON, SL8500, SPLW (single-port long-wave[3])	Y9840C-FIS85-1PL-N
FICON, SL8500, DPLW (dual-port long-wave[3])	Y9840C-FIS85-2PL-N
FICON, SL8500, DPMW (dual-port mixed-wave[2,3])	Y9840C-FIS85-2PM-N

1. 9741 cabinet with louvered rear door requires EMI pad (FB 101201) to operate FC/FICON drives.
2. Short wave ports require 50/125 micron cables.
3. Long wave ports require 9/125 micron cables.

Table 5-4. T9840C (Used) *Non-ROHS* Marketing PNs

Description	Marketing PN
Library Attached:	
ESCON, 9310/9740/L5500, 9741[1]-9741E drive cabinets	Y9840C-ES-9310-N
ESCON, L180/L700/L1400	Y9840C-ES-L700-N
ESCON, SL8500	Y9840C-ES-SL85-N
Fibre Channel, 2Gb, 9310/9740/L5500, 9741[1]-9741E drive cabinets	Y9840C-FC-9310-N
Fibre Channel, 2Gb, L180/L700/L1400	Y9840C-FC-L700-N
Fibre Channel, 2Gb, SL8500	Y9840C-FC-SL85-N
FICON, 9310/9740/L5500, 9741[1]-9741E drive cabinets	Y9840C-FI-9310-N
FICON, L180/L700/L1400	Y9840C-FI-L700-N
FICON, SL8500, SPSW (single-port short-wave[2])	Y9840CFI-S85-1PS-N
FICON, SL8500, DPSW (dual-port short-wave[2])	Y9840CFI-S85-2PS-N
FICON, SL8500, SPLW (single-port long-wave[3])	Y9840CFI-S85-1PL-N
FICON, SL8500, DPLW (dual-port long-wave[3])	Y9840CFI-S85-2PL-N
FICON, SL8500, DPMW (dual-port mixed-wave[2,3])	Y9840CFI-S85-2PM-N

1. 9741 cabinet with louvered rear door requires EMI pad (FB 101201) to operate FC/FICON drives.
2. Short wave ports require 50/125 micron cables.
3. Long wave ports require 9/125 micron cables.

Table 5-5. T9840B (Used) *Non-ROHS* Marketing PNs

Description	Marketing PN
Library Attached:	
ESCON, 9310/9740/L5500, 9741[1]-9741E drive cabinets	Y9840B-ES-9741X-N
ESCON, L180/L700/L1400	Y9840B-ES-L700-N
ESCON, SL8500	Y9840B-ES-SL8500-N
Fibre Channel, 2Gb, 9310/9740/L5500, 9741[1]-9741E drive cabinets	Y9840B-FC-9741X-N
Fibre Channel, 2Gb, SL8500	Y9840B-FC-SL8500-N
FICON, 9310/9740/L5500, 9741[1]-9741E drive cabinets	Y9840B-FI-9741X-N
FICON, L180/L700/L1400	Y9840B-FI-L700-N
FICON, SL8500, DPLW (dual-port long-wave[3])	Y9840B-FI-S85-2PL-N

1. 9741 cabinet with louvered rear door requires EMI pad (FB 101201) to operate FC/FICON drives.
2. Short wave ports require 50/125 micron cables.
3. Long wave ports require 9/125 micron cables.

T9940 Library Attached Tape Drives

Table 5-6. T9940B (Used) ROHS Compliant Marketing PNs

Description	Marketing PN
Library Attached:	
ESCON, 9310/9740[3]/L5500, 9741-9741E drive cabinets[5]	Y9940B-ES-9310Z-N
ESCON, L180[4]/L700/L1400[5]	Y9940B-ES-L700Z-N
ESCON, SL8500	Y9940B-ES-SL85Z-N
Fibre Channel, 2Gb, 9310/9740[3]/L5500, 9741-9741E drive cabinets	Y9940B-FC-9310Z-N
Fibre Channel, 2Gb, L180[4]/L700/L1400	Y9940B-FC-L700Z-N
Fibre Channel, 2Gb, SL8500	Y9940B-FC-SL85Z-N
FICON, 9310/9740[3]/L5500, 9741-9741E drive cabinets [5]	Y9940B-FI-9310Z-N
Single port long wave	X98/T10K-2GB-LW-N
Single port short wave	X98/T10K-2GB-SW-N
Dual port long wave	(2x) X98/T10K-2GB-LW-N
Dual port mixed	X98/T10K-2GB-LW-N and X98/T10K-2GB-SW-N
Dual port short wave	(2x) X98/T10K-2GB-SW-N
FICON, L180[4]/L700/L1400 [5]	Y9940B-FI-L700Z-N
FICON, SL8500, SPSW (single-port short-wave[1])	Y9940B-FI1PS-S85-N
FICON, SL8500, DPSW (dual-port short-wave[1])	Y9940B-FI2PS-S85-N
FICON, SL8500, SPLW (single-port long-wave[2])	Y9940B-FI1PL-S85-N
FICON, SL8500, DPLW (dual-port long-wave[2])	Y9940B-FI2PL-S85-N
FICON, SL8500, DPMW (dual-port mixed-wave[1,2])	Y9940B-FI2PM-S85-N

1. Short wave ports require 50/125 micron fiber optic cables.
2. Long wave ports require 9/125 micron fiber optic cables.
3. 9740 library requires serial (RS-423/RS-232) control path to operate T9940B drives.
4. L180 library drive bay requires an expanded rear door to accept T9940B drives.
5. You must also order an SFP kit - see the X98/T10K numbers listed under FICON for the 9310.

Table 5-7. T9940B (Used) *Non-ROHS* Marketing PNs

Description	Marketing PN
Library Attached:	
ESCON, 9310/9740[3]/L5500, 9741-9741E drive cabinets	Y9940B-ES-9310-N
ESCON, L180[4]/L700/L1400	Y9940B-ES-L700-N
ESCON, SL8500	Y9940B-ES-SL85-N
Fibre Channel, 2Gb, 9310/9740[3]/L5500, 9741-9741E drive cabinets	Y9940B-FC-9310-N
Fibre Channel, 2Gb, L180[4]/L700/L1400	Y9940B-FC-L700-N
Fibre Channel, 2Gb, SL8500	Y9940B-FC-SL85-N
FICON, 9310/9740[3]/L5500[5], 9741-9741E drive cabinets	Y9940B-FI-9310-N
FICON, L180[4]/L700/L1400[5]	Y9940B-FI-L700-N
FICON, SL8500, SPSW (single-port short-wave[1])	Y9940BFI-1PS-S85-N
FICON, SL8500, DPSW (dual-port short-wave[1])	Y9940BFI-2PS-S85-N
FICON, SL8500, SPLW (single-port long-wave[2])	Y9940BFI-1PL-S85-N
FICON, SL8500, DPLW (dual-port long-wave[2])	Y9940BFI-2PL-S85-N
FICON, SL8500, DPMW (dual-port mixed-wave[1,2])	Y9940BFI-2PM-S85-N

1. Short wave ports require 50/125 micron fiber optic cables.
2. Long wave ports require 9/125 micron fiber optic cables.
3. 9740 library requires serial (RS-423/RS-232) control path to operate T9940B drives.
4. L180 library drive bay requires an expanded rear door to accept T9940B drives.
5. You must also order an SFP kit. See the Y9x40 numbers listed in Table 5-6 on page 5-7.

Table 5-8. T9940A (Used) *Non-ROHS* Marketing PNs

Description	Marketing PN
Library Attached:	
ESCON, 9310, 9741E drive cabinet	Y9940A-ES-9741E-N
Fibre Channel, 1Gb, 9741E drive cabinet	Y9940A-FC-9741E-N

Desktop and Rack Mount Tape Drive

Use this section to determine the order numbers for the purchase of T9840 or T9940 desktop and rack mount drives:

- "T9840 Rack Mount and Desktop Drives"
- "T9940 Rack Mount Drives" on page 5-10

T9840 Rack Mount and Desktop Drives

Note: Conversion kits are available to add a second drive ("T9840D Rackmount Conversion Bills" on page 5-18) or to change the port type ("T9x40 Common Conversion Bills (ROHS Compliant)" on page 5-18). Both drive ports must be either short wavelength (SW) or long wavelength (LW).

Table 5-9. T9840 Non-library Drives (Sheet 1 of 2)

Description	Marketing Part Number
Rack Mount: T9840D (New)	
FICON, single drive, DPLW (dual-port long-wave[1])	9840D-FIDPLW1RKZ-N
Fibre Channel, single drive, DPSW (dual-port short-wave[2])	9840D-FCDPSW1RKZ-N
Rack Mount: T9840C (Used) ROHS Compliant	
ESCON, single drive	Y9840C-ES-RK1Z-N
ESCON, dual drive	Y9840C-ES-RK2Z-N
Fibre Channel, 2Gb, single drive	Y9840C-FC-RK1Z-N
Fibre Channel, 2Gb, dual drive	Y9840C-FC-RK2Z-N
FICON, single drive, DPLW (dual-port long-wave[1])	Y9840C-FIRK1-2PL-N
FICON, dual drive, DPLW (dual-port long-wave[1])	Y9840C-FIRK2-2PL-N
FICON, single drive, DPSW (dual-port short-wave[2])	Y9840C-FIRK1-2PS-N
FICON, dual drive, DPSW (dual-port short-wave[2])	Y9840C-FIRK2-2PS-N
Rack Mount: T9840C (Used) *Non-ROHS*	
ESCON, single drive	Y9840C-ES-RK1-N
ESCON, dual drive	Y9840C-ES-RK2-N
Fibre Channel, 2Gb, single drive	Y9840C-FC-RK1-N
Fibre Channel, 2Gb, dual drive	Y9840C-FC-RK2-N
FICON, single drive, DPSW (dual-port short-wave[2])	Y9840CFI-RK1-2PS-N
FICON, dual drive, DPSW (dual-port short-wave[2])	Y9840CFI-RK2-2PS-N

1. Long wave ports require 9/125 micron fiber optic cables.
2. Short wave ports require 50/125 micron fiber optic cables.

Table 5-9. T9840 Non-library Drives (Sheet 2 of 2)

Description	Marketing Part Number
FICON, single drive, DPLW (dual-port long-wave[1])	Y9840CFI-RK1-2PL-N
FICON, dual drive, DPLW (dual-port long-wave[1])	Y9840CFI-RK2-2PL-N
Desktop: T9840B (Used) ***Non-ROHS***	
Fibre Channel, 2Gb	Y9840B-FC-DESK-N
Rack Mount: T9840B (Used) ***Non-ROHS***	
ESCON, single drive	Y9840B-ES-RK-1DR-N
ESCON, dual drive	Y9840B-ES-RK-2DR-N
Fibre Channel, 2Gb, single drive	Y9840B-FC-RK-1DR-N
Fibre Channel, 2Gb, dual drive	Y9840B-FC-RK-2DR-N

1. Long wave ports require 9/125 micron fiber optic cables.
2. Short wave ports require 50/125 micron fiber optic cables.

T9940 Rack Mount Drives

Table 5-10. T9940 Non-library Drives

Description	Marketing Part Number
Rack Mount: T9940B (Used) ROHS Compliant	
Fibre Channel, 2Gb, dual drive, shipboard ruggedized	Y9940B-FC-RK-SHZ-N
Rack Mount: T9940B (Used) ***Non-ROHS***	
Fibre Channel, 2Gb, dual drive, shipboard ruggedized	Y9940B-FC-RK-SH-N

1. Short wave ports require 50/125 micron fiber optic cables.
2. Long wave ports require 9/125 micron fiber optic cables.

Cable Order Numbers

If you have answers to the following questions, the task of ordering cables becomes much easier:

What host interface is used?	❑ FICON ❑ ESCON ❑ Fibre Channel ❑ SCSI (used equipment only)
If FICON or Fibre Channel, how many drive ports will be connected to the host?	❑ 1 port ❑ 2 port[1]
If FICON or Fibre Channel; what type of interface transceiver is being used?	❑ Long wavelength[2] ❑ Short wavelength[3]
If FICON or Fibre Channel; what type of cable is required?	❑ Single mode ❑ Multimode[4]
What type of connector is present on the FICON or Fibre Channel tape drive?	❑ LC ❑ SC (T9840A or T9940A)
What type of connector is present on the non-tape drive end of the cable?	❑ ESCON duplex ❑ ST ❑ MT-RJ ❑ LC ❑ SC
What length of cable is required?	

1. A separate cable is required for each tape drive port.
2. Long wavelength ports require single-mode (9 micron fiber) FC/FICON cables.
3. Short wavelength ports require multimode FC/FICON cables.
4. Drives using a short wavelength transceiver that are mounted in an SL8500 drive tray or a rack chassis require the use of a 50 micron multimode FC/FICON cable.

Order numbers are listed for the following cable types:

- "ESCON Cable Order Numbers" on page 5-12
- "Single Mode FC/FICON (LC, long wave) Cables" on page 5-13
- "Multimode FC/FICON (LC, short wave) Cables" on page 5-15
- "Multimode FC Cables (Type SC, 1-Gb)" on page 5-16 (T9840A or T9940A)

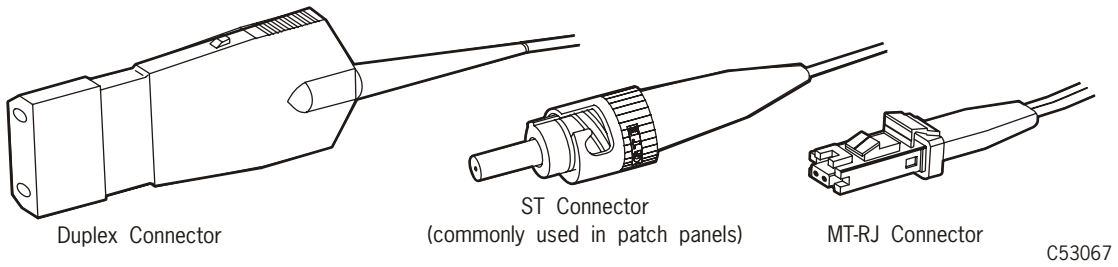
ESCON Cable Order Numbers

The following ESCON fiber optic cables connect T9x40 ESCON drives to the first component in the interface infrastructure. The 62.5/125 Micron cables are orange in color, and have a Duplex connector at the drive end. The other end could have a Duplex, ST, or MT-RJ connector (see Figure 5-2).

You must include their length in maximum channel distance calculations.

Note: Maximum total non-repeated distance for an ESCON T9x40 tape drive over 62.5-micron multimode cables is 3.00 km (1.86 mile).

Figure 5-2. ESCON Cable Connectors



	Description (Sheet 1 of 2)	Marketing PN[1]	Quantity
	Duplex to Duplex, 62.5/125 Micron:		
❑	13 m (42 ft) Duplex, Plenum	CABLE10800285-Z	_____
❑	31 m (100 ft) Duplex, Plenum	CABLE10800286-Z	_____
❑	61 m (200 ft Duplex, Plenum	CABLE10800287-Z	_____
❑	107 m (350 ft) Duplex, Plenum	CABLE10800288-Z	_____
❑	13 m (42 ft) Duplex, Riser	CABLE10800289-Z	_____
❑	31 m (100 ft) Duplex, Riser	CABLE10800290-Z	_____
❑	61 m (200 ft Duplex, Riser	CABLE10800291-Z	_____
❑	107 m (350 ft) Duplex, Riser	CABLE10800292-Z	_____
	Duplex to MT-RJ, 62.5/125 Micron:		
❑	13 m (42 ft) Duplex - MT-RJ, Plenum	CABLE10800327-Z	_____
❑	31 m (100 ft) Duplex - MT-RJ, Plenum	CABLE10800328-Z	_____
❑	61 m (200 ft Duplex - MT-RJ, Plenum	CABLE10800329-Z	_____
❑	13 m (42 ft) Duplex - MT-RJ, Riser	CABLE10800324-Z	_____
❑	31 m (100 ft) Duplex - MT-RJ, Riser	CABLE10800325-Z	_____
❑	61 m (200 ft Duplex - MT-RJ, Riser	CABLE10800326-Z	_____

1. Suffix "-Z" indicates ROHS-compliant component.

	Description (Sheet 2 of 2)	Marketing PN[1]	Quantity
	Duplex to **ST, 62.5/125 Micron:**		
❑	3 m (10 ft) Duplex, Plenum	CABLE10800081	_____
❑	7 m (22 ft) Duplex, Plenum	CABLE10800082	_____
❑	13 m (42 ft) Duplex, Plenum	CABLE10800083	_____
❑	22 m (72 ft Duplex, Plenum	CABLE10800084	_____
❑	31 m (100 ft) Duplex, Plenum	CABLE10800085 CABLE10800293-Z	_____
❑	46 m (150 ft) Duplex, Plenum	CABLE10800086	_____
❑	61 m (200 ft Duplex, Plenum	CABLE10800087	_____
❑	77 m (250 ft Duplex, Plenum	CABLE10800088	_____
❑	92 m (300 ft) Duplex, Plenum	CABLE10800089	_____
❑	107 m (350 ft) Duplex, Plenum	CABLE10800090	_____
❑	122 m (400 ft Duplex, Plenum	CABLE10800091	_____
❑	3 m (10 ft) Duplex, Riser	CABLE10800070	_____
❑	7 m (22 ft) Duplex, Riser	CABLE10800071	_____
❑	13 m (42 ft) Duplex, Riser	CABLE10800072	_____
❑	22 m (72 ft Duplex, Riser	CABLE10800073	_____
❑	31 m (100 ft) Duplex, Riser	CABLE10800074	_____
❑	46 m (150 ft) Duplex, Riser	CABLE10800075	_____
❑	61 m (200 ft Duplex, Riser	CABLE10800076	_____
❑	77 m (250 ft Duplex, Riser	CABLE10800077	_____
❑	92 m (300 ft) Duplex, Riser	CABLE10800078	_____
❑	107 m (350 ft) Duplex, Riser	CABLE10800079	_____
❑	122 m (400 ft Duplex, Riser	CABLE10800080	_____

1. Suffix "-Z" indicates ROHS-compliant component.

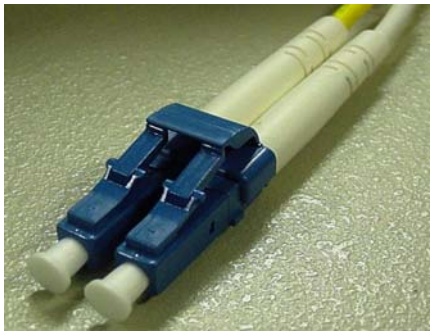
Single Mode FC/FICON (LC, long wave) Cables

Single mode fiber optic cables are used with T9x40B/C/D FICON drives configured with a long-wave SFP module. The cables are yellow in color with blue LC connectors at the drive end (Figure 5-3 on page 5-14). You must include their length in maximum channel distance calculations.

- Maximum total non-repeated distance for a 1310 nm, 9 micron (long-wave) single mode cable is 10 km (6.21 mi).

- Single Mode cable maximum distances can be extended through an RPQ to 20 km (12.4 mi) for a 100 MB/s channel, or to 12 km (7.46 mi) for a 200 MB/s channel.

Figure 5-3. LC Single Mode Cable Connector



	Description	Marketing PN[1]	Quantity
	LC to **LC, 9/125 Micron:**		
❑	3 m (9.8 ft) Duplex, Riser	CABLE.10800302-Z	_____
❑	10 m (32.8 ft) Duplex, Riser	CABLE10800331-Z	_____
❑	22 m (72.1 ft) Duplex, Riser	CABLE10800184	_____
❑	50 m (164 ft) Duplex, Riser	CABLE10800333-Z	_____
❑	100 m (328 ft) Duplex, Riser	CABLE10800306-Z	_____
❑	10 m (32.8 ft) Duplex, Plenum	CABLE10800330-Z	_____
❑	50 m (164 ft) Duplex, Plenum	CABLE10800332-Z	_____
❑	100 m (328 ft) Duplex, Plenum	CABLE10800305-Z	_____
	LC to **SC, 9/125 Micron:**		
❑	10 m (32.8 ft) Duplex, Riser	CABLE10800335-Z	_____
❑	22 m (72.1 ft) Duplex, Riser	CABLE10800347-Z	_____
❑	50 m (164 ft) Duplex, Riser	CABLE10800337-Z	_____
❑	100 m (328 ft) Duplex, Riser	CABLE10800304-Z	_____
❑	10 m (32.8 ft) Duplex, Plenum	CABLE10800334-Z	_____
❑	50 m (164 ft) Duplex, Plenum	CABLE10800336-Z	_____
❑	100 m (328 ft) Duplex, Plenum	CABLE10800303-Z	_____

1. Suffix "-Z" indicates ROHS-compliant component.

Multimode FC/FICON (LC, short wave) Cables

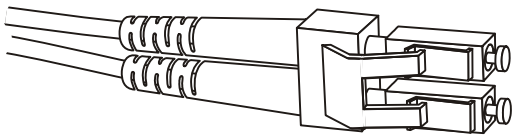
The following multimode fiber optic cables are applicable to T9x40B/C/D FC drives, and T9x40B/C/D FICON drives configured with short-wave SFP modules. They connect the drive to the first component in the interface infrastructure. These cables are orange in color, and have LC connectors at the drive end.

Total non-repeated distance for a 850 nm, 50 micron (short-wave) multimode cable is:

- 300 m (984 ft) **maximum** on a 200 MB/s (2 Gb) channel
- 500 m (1640 ft) **maximum** on a 100 MB/s (1 Gb) channel

You must include their length in maximum channel distance calculations.

Figure 5-4. LC Cable Connector



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	Description (Sheet 1 of 2)	Marketing PN[1]	Quantity
	LC to **LC, 50/125 Micron:**		
❑	10 m (32.8 ft) Duplex, Riser	CABLE10800310-Z	_____
❑	50 m (164 ft) Duplex, Riser	CABLE10800311-Z	_____
❑	100 m (328 ft) Duplex, Riser	CABLE10800312-Z	_____
❑	10 m (32.8 ft) Duplex, Plenum	CABLE10800313-Z	_____
❑	50 m (164 ft) Duplex, Plenum	CABLE10800314-Z	_____
❑	100 m (328 ft) Duplex, Plenum	CABLE10800315-Z	_____
	LC to **SC, 50/125 Micron:**		
❑	10 m (32.8 ft) Duplex, Riser	CABLE10800317-Z	_____
❑	50 m (164 ft) Duplex, Riser	CABLE10800318-Z	_____
❑	100 m (328 ft) Duplex, Riser	CABLE10800319-Z	_____
❑	10 m (32.8 ft) Duplex, Plenum	CABLE10800320-Z	_____
❑	50 m (164 ft) Duplex, Plenum	CABLE10800321-Z	_____
❑	100 m (328 ft) Duplex, Plenum	CABLE10800322-Z	_____

1. Suffix "-Z" indicates ROHS-compliant component.

	Description (Sheet 2 of 2)	Marketing PN[1]	Quantity
❑	**Adapter Kit, LC to SC Cabling**. • LC to SC 2m (6.6 ft) Duplex • SC Duplex coupler	CABLE315447901-Z CABLE10800343-Z CABLE10800344-Z	_____
	LC to **ST, 50/125 Micron:**		
❑	10 m (32.8 ft) Duplex, Riser	CABLE10800323-Z	_____

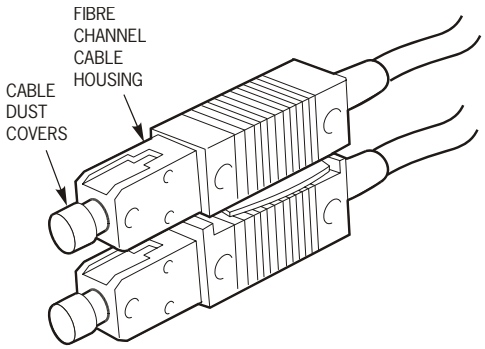
1. Suffix "-Z" indicates ROHS-compliant component.

Multimode FC Cables (Type SC, 1-Gb)

The following multimode fiber optic cables connect T9x40A FC drives to the first component in the interface infrastructure. The cables are orange in color, and have SC connectors at both ends. Total non-repeated distance for a 850 nm, 50 micron (short-wave) multimode cable is 500 m (1640 ft) **maximum** on a 100 MB/s (1 Gb) channel

You must include their length in maximum channel distance calculations.

Figure 5-5. SC Cable Connector



	Description	Marketing PN[1]	Quantity
	SC to **SC, 50/125 Micron:**		
❑	0.25 m (0.8 ft) Duplex, Plenum	CABLE10800301-Z	_____
❑	10 m (32.8 ft) Duplex, Plenum	CABLE10800294-Z	_____
❑	50 m (164 ft) Duplex, Plenum	CABLE10800295-Z	_____
❑	100 m (328 ft) Duplex, Plenum	CABLE10800296-Z	_____
❑	250 m (820 ft) Duplex, Plenum	CABLE10800129	_____
❑	500 m (1640 ft) Duplex, Plenum	CABLE10800130	_____

	Description	Marketing PN[1]	Quantity
❑	10 m (6.6 ft) Duplex, Riser	CABLE10800297-Z	_____
❑	30 m (98.4 ft) Duplex, Riser	CABLE10800136	_____
❑	50 m (164 ft) Duplex, Riser	CABLE10800298-Z	_____
❑	100 m (328 ft) Duplex, Riser	CABLE10800299-Z	_____
❑	250 m (820 ft) Duplex, Riser	CABLE10800139	_____
❑	500 m (1640 ft) Duplex, Riser	CABLE10800140	_____
❑	SC Duplex coupler	CABLE10800344-Z	_____

1. Suffix "-Z" indicates ROHS-compliant component.

Conversion Bills/Kits

Conversion bills (CBs) provide instructions and applicable material that allow the:

- Addition of a second drive to a rack chassis
- Transfer of drives from one library type to a different library type
- Modification of the number or type of interface transceiver
- Transfer of drives from one library drive cabinet type to a different library drive cabinet type

Several tables list the conversion bill part numbers:

- Table 5-11 on page 5-18 lists the T9840 drive tray conversions
- Table 5-12 on page 5-18 lists T9840D conversions
- Table 5-13 on page 5-18 lists ROHS compliant CBs available for T9840 conversions
- Table 5-14 on page 5-19 lists CBs available for T9940 conversions

Table 5-11. T9840 Drive Tray Conversion Kits

Drive Interface	Drive Model	From:	To:	Marketing PN
ESCON	T9840B	L180/L700/L1400, L5500, 9740, 9310	SL8500	9840B-LEGSL3SL85-N
	T9840C	L180/L700/L1400, L5500, 9740, 9310	SL8500	9840C-LEGSL3SL85-N
	T9840D	L180/L700/L1400, L5500, 9310	SL8500	9840D-LEGSL3SL85-N
	T9840C/D	L180/L700/L1400, 9740 [1], 9310, L5500	SL3000 [2]	9840CD-ES-SL3-Z-N
Fibre Channel or FICON	T9840B	L180/L700/L1400, L5500, 9740, 9310	SL8500	9840B-LEGSL3SL85-N
	T9840C	L180/L700/L1400, L5500, 9740, 9310, SL3000	SL8500	9840C-LEGSL3SL85-N
	T9840D	L180/L700/L1400, L5500, 9310, SL3000	SL8500	9840D-LEGSL3SL85-N
	T9840C/D	L180/L700/L1400, L5500, 9310	SL3000 [2]	9840CD-FCFI-SL3-N
	T9840C/D	SL8500	SL3000 [2]	9840C/D-S85/S30Z-N

1. 9740 library does not apply to the T9840D tape drive.
2. The SL3000 library provides support for T9840C and T9840D tape drives.

Table 5-12. T9840D Rackmount Conversion Bills

Interface	Description	Marketing P/N
T9840D		
Fibre Channel or FICON	T9840D, LW, RACKMT, 1X to 2X	X9840D-LW1-2RACK-N
	T9840D, SW, RACKMT, 1X to 2X	X9840D-SW1-2RACK-N

Note: Both drives in the rack chassis must have the same interface.

The conversion bills in the following table are used with many of the T9x40 tape drive models and library configurations. Drive part numbers for the 9310 library and L180/L700/L1400 do not include the SFP module. You must order a port conversion bill and the drive part number.

Table 5-13. T9x40 Common Conversion Bills (ROHS Compliant)

Description	Marketing PN
New:	
SFP Modules [1] (transceivers) for T9840C or T9840D	
T9840/T10K 2 Gbit, 1 SFP, SW, cable kit	X984/T10K-2GB -SW-N
T9840/T10K 2 Gbit, 1 SFP, LW, cable kit	X984/T10K-2GB -LW-N

1. T9840C Fibre Channel drives use fixed transceivers (SFF)
   T9840C FICON drives use pluggable transceivers (SFP)
   T9840D Fibre Channel/FICON drives use pluggable transceivers (SFP)
   T9940B Fibre Channel drives use fixed transceivers (SFF)
   T9940B FICON drives use pluggable transceivers (SFP).

Table 5-14. T9940 Conversion Bills

Interface	Description	From:	To:	Marketing PN
ESCON	T9940B, ESCON, L700/9741/E - SL8500	L180/L700/L1400, L5500, 9740, 9310	SL8500	9940B-ES-SL85Z-N
	T9940B, 9310 - L700/ L1400	L5500, 9740, 9310	L180/L700/ L1400	9940B-9310-L700-N
Fibre Channel [1]	T9940B, FC, L5500 - SL8500	L180/L700/L1400, L5500, 9740, 9310	SL8500	9940B-FC-L55-S85-N
	T9940B, 9310 - L700/ L1400	L5500, 9740, 9310	L180/L700/ L1400	9940B-9310-L700-N
FICON [2]	T9940B FICON, SPLW - SL8500	L180/L700/L1400, L5500, 9740, 9310	SL8500	9940B-FI-LW-SL85-N [3, 5]
	T9940B FICON, SPSW - SL8500	L180/L700/L1400, L5500, 9740, 9310	SL8500	9940B-FI-SW-SL85-N [4, 5]
	T9940B, 9310 - L700/ L1400	L5500, 9740, 9310	L180/L700/ L1400	9940B-9310-L700-N

1. T9940B Fibre Channel drives use fixed transceivers (SFF).
2. T9940B FICON drives use pluggable transceivers (SFP modules).
3. Single port long wavelength.
4. Single port short wavelength.
5. For dual port configurations, order the appropriate SFP module, see Table 5-13 on page 5-18.

Ordering Cartridges and Labels

Ordering cartridges is easy.

- Call 1.877.STK.TAPE to order media from your local reseller or to obtain media pre-sales support.
- Local support e-mail addresses:
  - us.mediaorders@sun.com
  - EMEA.mediaorders@sun.com
  - LA.mediaorders@sun.com

See the tape media area on the corporate web site for additional information.

http://www.oracle.com/us/products/servers-storage/storage/tape-storage/029157.htm

Note: The different VolSafe cartridges are NOT interchangeable. Make sure to specify the required proper density 9840 VolSafe cartridge when ordering (see Table 1-1 on page 1-4 for additional information).

Table 5-15. VolSafe Cartridge Summary

Drive Model	Identification Color	Description
T9840A/B	Yellow	20-GB 9840 VolSafe cartridges can be read and written with T9840A/B drives.
T9840C	Green	40-GB 9840C VolSafe cartridges can be read and written with a T9840C drive. The T9840C can only read a T9840A/B VolSafe.
T9840D	Purple	75-GB 9840D VolSafe cartridges can be read and written with a T9840D drives The T9840D can only read a T9840A/B VolSafe cartridge or a T9840C VolSafe cartridge.
T9940B	Yellow	200-GB 9940 VolSafe cartridges are required for use with T9940B drives[1].

1. The T9940A tape drive is not VolSafe capable.

Note: The T9840D requires that you use a unique cleaning cartridge designated with a Y media ID label. The T9840A/B/C drives use a different cleaning cartridge designated with a U media ID label.

Specifications

A

This appendix provides specifications for "T9840" and "T9940" on page A-9.

T9840

The following information is provided for T9840 tape drives:

- Power specifications
- Performance specifications
- Environmental requirements
- Physical specifications
- Library attachments

Power Specifications

Table A-1 lists the power specifications for the T9840 Tape Drive.

Table A-1. T9840 Tape Drive Power Specifications

Characteristics	Value			
Input voltage	88 to 264 VAC			
Input frequency	48 to 63 Hz			
Power consumption	T9840D:	Fibre Channel	FICON	ESCON
	Write	62 W	62 W	55 W
	Read	58 W	58 W	*
	Idle tape loaded	44 W	43 W	37 W
	Idle no tape loaded	36 W	36 W	29 W
	Rewind	56 W	56 W	48 W
	Load/unload peak	70 W	70 W	70 W
	T9840C 65 W - write 45 W - Idle tape loaded 38 W - Idle no tape loaded			
Power dissipation	280 Btu/hr			
Power factor	0.95 minimum			
* Not specified.				

Performance Specification

This section describes tape drive and data cartridge performance specifications.

Tape Drive

Table A-2 lists the performance specifications of the T9840 tape drive.

Table A-2. T9840 Tape Drive Performance Specifications

Characteristics	Values			
	T9840A	**T9840B**	**T9840C**	**T9840D**
Capacity and Performance				
Capacity, native	20 GB	20 GB	40 GB[1]	75 GB[1]
Data buffer size	8 MB	32 MB	64 MB	64 MB
Tape speed, read/write	2 m/s	4 m/s	3.295 m/s	3.4 m/s
Maximum block size	256K	256K	256K	256K
Performance, native (head-to-tape)				
(uncompressed)	10 MB/s	19 MB/s	30 MB/s	30 MB/s
(compressed, maximum)	35 MB/s	60 MB/s	60 MB/s	60 MB/s[2]
Burst (FC & FICON)	100 MB/s	200 MB/s	200 MB/s	200 MB/s
Burst (ESCON)	17 MB/s	17 MB/s	17 MB/s	17 MB/s
Interface data				
Fibre Channel	1 Gb	2 Gb	2 Gb	2 Gb
Ultra-SCSI HVD	40 MB/s	40 MB/s	NA	NA
ESCON	17 MB/s	17 MB/s	17 MB/s	17 MB/s
FICON	NA	2 Gb	2 Gb	2 Gb
Access times				
Tape load and thread to ready	7 sec	7 sec	6.5 sec	8.5 sec
File access, first (average)	8 sec	8 sec	8 sec	8 sec
Rewind (maximum/average)	16/8 sec	16/8 sec	16/8 sec	16/8 sec
Unload	8 sec	8 sec	11.5 sec	12.5 sec
Reliability				
Mean time between failure (MBTF)				
Power on @ 100% duty cycle	290,000 hr	290,000 hr	290,000 hr	290,000 hr
Tape load @ 10/day (100K loads)	240,000 hr	240,000 hr	240,000 hr	240,000 hr
Tape path motion (TPM) @ 70% duty cycle	216,000 hr	216,000 hr	216,000 hr	216,000 hr
Head life @ 70% TPM duty cycle	5 years	5 years	5 years	5 years
Uncorrected bit error rate	1×10^{-18}	1×10^{-18}	1×10^{-18}	1×10^{-18}
Undetected bit error rate	1×10^{-33}	1×10^{-33}	1×10^{-33}	1×10^{-33}

1. VR[2] is a trademark of Overland Storage.
   VR[2] technology is used to achieve T9840C/D capacity and performance.
2. Fibre Channel (FC) write and 55 MB/s FICON write

Data Cartridge

Table A-3 lists the physical and performance specifications of the 9840 data cartridge.

Table A-3. 9840 Data Cartridge Performance Specifications

Characteristic	Value
Cartridge physical data	
Drive compatibility	T9840A, T9840B, T9840C and T9840D
Form factor	1/2 in. cartridge, 3490/3490E
Width	109 cm (4.29 in.)
Length	125 cm (4.92 in.)
Height	2.54 cm (1.00 in.)
Weight	262 g (9.17 oz)
Drop strength	1.00 m (39.4 in.)
Tape media data	
Capacity, native (uncompressed)	20 GB - T9840A/B 40 GB[1] - T9840C 75 GB[1] - T9840D VR²
Tracks	288 (T9840A/B/C), 576 (T9840D)
Track-following servo	Factory pre-recorded **CAUTION: Bulk-erase will destroy pre-recorded servo tracks. DO NOT DEGAUSS 9840 CARTRIDGES.**
Formulation	Advanced metal particle (AMP)
Physical thickness	9 microns (µm)
Physical length	271 m (889 ft)
Recordable length (including MIR)	251 m (823 ft)
Reliability	
Archival life	15 - 30 years
Short-length durability	80,000 write/read passes minimum
Long-life durability	361 full file writes
Load/unloads	10,000 minimum
Uncorrected bit error rate	1×10^{-18}
Permanent errors	Zero

1. VR² is a trademark of Overland Storage.
   VR² technology is used to achieve T9840C/D capacity.

Environmental Requirements

This section describes environmental requirements for the drive, power supply, and cartridges for T9840 tape drives.

Airborne Contamination

Tape drives and media are subject to damage from airborne particulates (0.3 microns and smaller). The operating environment should strive to adhere to the requirements of a Class 100,000 clean room and the ISO 14644-1 Class 8 or 9 environment. See the *Data Center Site Planning Guide* for additional information regarding gasses and other contaminants.

http://dlc.sun.com/pdf/805-5863-13/805-5863-13.pdf

Tape Drive and Power Supply

Table A-4 lists the environmental requirements for the tape drive and the power supply for T9840 tape drives.

Table A-4. T9840 Environmental Requirements

Temperature	
Operating	15° to 32°C (59° to 90°F)
Storage	10° to 40°C (50° to 104°F)
Shipping	-40° to 60°C (-40° to 140°F)
Relative Humidity, Non-Condensing	
Operating	20% to 80%
Storage	10% to 95%
Shipping	10% to 95%
Wet Bulb Maximum	
Operating	26°C (79°F)
Storage	26°C (79°F)
Storage	26°C (79°F)
Altitude	
Operating	0 to 3.05 km (0 to 10,000 ft)
Storage	0 to 3.05 km (0 to 10,000 ft)
Shipping	0 to 15.24 km (0 to 50,000 ft)
Air Flow Requirement (Operating Heat Output)	
Drive and power supply operating	73.2 Calories/hr (290.2 Btu/hr)

Data Cartridges

Table A-5 lists the environmental requirements for 9840 data cartridges.

Table A-5. 9840 Data Cartridge Environmental Requirements

Temperature	
Operating[1]	15° to 32°C (59° to 90°F)
Storage (up to four weeks)	5° to 32°C (41° to 90°F)
Storage (archive)	15° to 26°C (59° to 77°F)
Shipping (unrecorded)[2]	-23° to 49°C (-10° to 120°F)
Shipping (recorded)[2]	4° to 40°C (40° to 104°F)
Relative Humidity, Non-Condensing	
Operating[1]	20% to 80%
Storage (up to four weeks)	5% to 80%
Storage (archive)	40% to 60%
Shipping (unrecorded)[2]	5% to 80%
Shipping (recorded)[2]	5% to 80%
Wet Bulb Maximum	
Operating[1]	26°C (79°F)
Storage (non-archive)	26°C (79°F)
Storage (archive)	26°C (79°F)
Shipping (unrecorded)[2]	26°C (79°F)
Shipping (recorded)[2]	26°C (79°F)

1. The conditioning time before use is 24 hours (48 hours preferred).
2. The shipping environment must not exceed the limit of the storage environment, archive or non-archive, for longer than 10 days.

Physical Specifications

This section lists the physical specifications for T9840 tape drives in three configurations– library-attached, desktop, and rack-mount.

Library-attached Configuration

The T9840 tape drive fits inside these StorageTek libraries or cabinets:

- 9741/9741E drive cabinet that attaches to 9310, 9740, and L5500 libraries
- 9710 libraries (T9840A/B only) [end of support 12/31/2007]
- 9738 libraries (T9840A only) [end of support 12/31/2007]
- L180 and L700x/L1400x libraries
- SL3000 modular library system
- SL8500 modular library system

Refer to the appropriate library System Assurance Guide for the physical dimensions and weights of the library and frame.

Table A-6 lists the weights of the library tape drives and accessories, including trays, power supplies, and cables.

Table A-6. T9840 Tape Drive Library-attached Weights

Library	Drive and Accessory Weights
9310/9740/L5500	7.7 kg (17 lb)
9710(T9840A/B only)	10.4 kg (23 lb)
9738 (T9840A only)	7.5 kg (16.5 lb)
L180/L700x/L1400x	7.4 kg (16.3 lb)
SL3000	9.53 kg (21 lb)
SL8500	8.85 kg (19.5 lb)

Desktop Configuration

The T9840 desktop configuration is a single enclosed assembly. Table A-7 lists the physical specifications for a desktop installation.

Table A-7. T9840 Tape Drive Desktop Physical Specifications

Dimensions and weight of manual-load drive (T9840A/B)	230 mm (9.1 in.) wide 160 mm (6.5 in.) high 483 mm (19 in.) deep plus 76 mm (3 in.) for cables 9.3 kg (20.5 lb)
Dimensions and weight of CSL drive (T9840A only)	483 mm (19 in.) wide 197 mm (7.7 in.) high 630 mm (24.8 in.) deep plus 76 mm (3 in.) for cables 23 kg (50 lb)

Rack Mount Configuration

Table A-8 lists the physical specifications for the T9840 rack mount configuration.

Table A-8. T9840 Tape Drive Rack Mount Physical Specifications

Dimensions	
Width	
Face plate	483 mm (19.0 in.)
Chassis	446 mm (17.56 in.)
Height	178 mm (7.0 in.)
Depth [1]	641 mm (25.25 in.)
Weight	
Single-drive tray	14.5 kg (32 lb)
Dual-drive tray	20.4 kg (45 lb)
CSL tray	18.0 kg (39 lb)

1. Includes 102 mm (4.0 in.) cable bend radius allowance at chassis rear

Library Attachments

Table A-9 lists the libraries to which T9840 tape drives can attach. To order the correct accessories to install the T9840 tape drives in a library environment, refer to the system assurance guide for the library.

Table A-9. T9840 Tape Drive Library Attachments

Library	Maximum Number of Cartridges	Maximum Number of Drives	System Assurance Guide
9310 PowderHorn	Approx. 6,000	80	*Nearline Enterprise 9310/4410/9360 LSM System Assurance Guide*, ML6500
9710 TimberWolf [1]	588	10	*9710 Library Storage Module System Assurance Guide*, part number MR0012
9738 TimberWolf [2]	30	3	*TimberWolf 9738 Library System Assurance Guide*, MT5006
9740 TimberWolf [3,4]	494	10	*TimberWolf 9740 Library Storage Module System Assurance Guide*, MT5001
L180	Approx. 180	6	*L180/L700x/L1400x Tape Libraries Ordering and Configuration Guide*, MT9112
L700x/L1400x	Approx. 700	12	*L180/L700x/L1400x Tape Libraries Ordering and Configuration Guide*, MT9112
L5500 Automated Cartridge System (ACS)[3]	Maximum 2000/3500 [5]	80[6]	*L5500 Automated Cartridge System System Assurance Guide*, MT9142
SL3000	4,500	56[7]	*SL3000 Modular Library System Systems Assurance Guide*, 316194101
SL8500	10,088 [8]	64	*SL8500 Modular Library System System Assurance Guide*, MT9229

1. T9840A/B only.
2. T9840A only.
3. T9840A/B/C only.
4. T9940A/B only.
5. There are two mixed-media configurations in the L5500 ACS.
6. Total number of mixed drives, including the Linear Tape Open (LTO) Ultrium Drives. The LTO required, associated PLM unit blocks three T9x40 power supply slots; therefore, in a mixed drive cabinet, a maximum 17 drive slots are available for T9x40 drives.
7. T9840C/D only.
8. Basic library holds 1,448 cartridges; and, the library can hold 10,088 cartridges when five storage expansion modules are installed.

T9940

The next pages provide the following information for T9940 tape drives:

- Physical specifications
- Power specifications
- Performance specifications
- Environmental requirements
- Library attachments

Note: The specifications in this appendix can change. For current information, contact your sales representative.

Physical Specifications

This section lists the physical specifications of T9940 tape drives, in rack mount and library attached configurations.

Rack-mount Configuration

The rack mount configuration of the T9940 tape drive consists of two drives, mounted on shock absorbers, and two power supplies contained within a rack mount tray.

Table A-10 lists the physical specifications of the T9940 rack mount configuration.

Table A-10. T9940 Tape Drive Rack Mount Physical Specifications

Dimensions	483 mm (19.0 in.) wide 267 mm (10.5 in.) high 635 mm (25.0 in.) deep plus 7.6 cm (3 in.) for cables
Weight	36.5 kg (80.5 lb)

Library-Attached Configuration

The library-attached configuration of the T9940 tape drive mounts on trays that fit inside:

- An 9741 (expanded) or 9741E drive cabinet that attaches to StorageTek 9310, 9360, 9740, and L5500 libraries
- The StorageTek L180/L700x/L1400x library
- The StorageTek StreamLine SL8500 modular library system

Refer to the appropriate library System Assurance Guide for the physical dimensions and weights of the library and cabinet.

Table A-11 lists the weights of the library tape drives and accessories, including trays, power supplies, and cables.

Table A-11. T9940 Tape Drive Library attached Weights

Library	Weight, Drive plus Library Tray (SCSI)
9310/9740/L5500	9.1 kg (20 lb)
L180/L700x/L1400x	9.6 kg (21.2 lb)
SL8500	10.4 kg (24.0 lb)

Power Specifications

Table A-12 lists the power specifications of the T9940 tape drive.

Table A-12. T9940 Tape Drive Power Specifications

Characteristics	Value
Input voltage	100 to 240 VAC
Input frequency	50 to 60 Hz
Power consumption	82 Watts
Power dissipation	280 Btu/hr
Power factor	0.96 minimum

Performance Specifications

This section describes tape drive and data cartridge performance.

Tape Drive

Table A-13 lists performance specifications of the T9940 tape drive.

Table A-13. T9940 Tape Drive Performance Specifications

Characteristic	Value	
	T9940A	**T9940B**
Capacity and Performance		
Capacity, native	60 GB	200 GB[1]
		VR²
Data buffer size	16 MB	64 MB
Tape speed, read/write	2 m/sec	3.4 m/sec
Performance, native (head-to-tape)		
(uncompressed)	10 MB/sec	30 MB/sec[1]
(compressed, maximum)	35 MB/sec	70 MB/sec
Burst (FC / FICON)	100 MB/sec	200 MB/sec
Burst (ESCON)	17 MB/sec	17 MB/sec
Interface data		
Fibre Channel	1 Gb	2 Gb
Ultra-SCSI HVD	40 MB/sec	N/A
ESCON	20 MB/sec	20 MB/sec
FICON	NA	2 Gb
Access times		
Tape load and thread to ready	18 sec	18 sec
File access, first (average)	59 sec	59 sec
Rewind (maximum/average)	90/45 sec	90/45 sec
Unload	18 sec	18 sec
Reliability		
Mean time between failure (MBTF)		
Power on @ 100% duty cycle	290,000 hr	290,000 hr
Tape load @ 10/day (100K loads)	240,000 hr	240,000 hr
Tape path motion (TPM) @ 70% duty cycle	196,000 hr	196,000 hr
Head life @ 70% TPM duty cycle	8.5 yr.	8.5 yr.
Uncorrected bit error rate	1×10^{-18}	1×10^{-18}
Undetected bit error rate	1×10^{-33}	1×10^{-33}

1. VR² is a trademark of Overland Storage.
   VR² technology is used to achieve T9940B capacity and performance.

Data Cartridge

Table A-14 lists physical and performance specifications of the 9940 data cartridge.

Table A-14. 9940 Data Cartridge Specifications

Characteristic	Value
Cartridge physical data	
Drive compatibility	T9940A, T9940B
Form factor	1/2 in. cartridge, 3490/3490E
Width	109 cm (4.29 in.)
Length	125 cm (4.92 in.)
Height	25.4 cm (1.00 in.)
Weight	262 g (9.17 oz)
Drop strength	1.00 m (39.4 in.)
Tape media data	
Capacity, native (uncompressed)	60 GB (Low density, T9940A) 200 GB[1] (High density, T9940B)
Tracks	288 (Low density, T9940A) 576 (High density, T9940B)
Track-following servo	Factory pre-recorded **CAUTION: Bulk-erase will destroy pre-recorded servo tracks. DO NOT DEGAUSS T9940 CARTRIDGES.**
Formulation	Advanced metal particle (AMP)
Physical thickness	9 microns (µm)
Physical length	700 m (2,296 ft)
Recordable length (including MIR)	650 m (2,134 ft)
Reliability	
Archival life	15 - 30 years
Short-length durability	80,000 write/read passes minimum
Long-life durability	3,000 write/read passes minimum
Load/unloads	10,000 minimum
Uncorrected bit error rate	1×10^{-18}
Permanent errors	Zero

1. VR² is a trademark of Overland Storage.
   VR² technology is used to achieve T9940B capacity.

Environmental Requirements

This section describes environmental requirements for the tape drive, power supply, and cartridges for T9940 tape drives.

Tape Drive and Power Supply

Table A-15 lists the environmental requirements for the tape drive and the power supply for T9940 tape drives.

Table A-15. T9940 Environmental Requirements

Temperature	
Operating	15° to 32°C (60° to 90°F)
Storage	10° to 40°C (50° to 104°F)
Shipping	-40° to 60°C (-40° to 140°F)
Relative Humidity, Non-Condensing	
Operating	20% to 80%
Storage	10% to 95%
Shipping	10% to 95%
Wet Bulb Maximum	
Operating	29°C (84°F)
Storage	35°C (95°F)
Storage	35°C (95°F)
Altitude	
Operating	0 to 3.05 km (0 to 10,000 ft)
Storage	0 to 3.05 km (0 to 10,000 ft)
Shipping	0 to 15.24 km (0 to 50,000 ft)
Air Flow Requirements	
Maximum media temperature	49°C (120°F)
Maximum chip T_j	90°C (194°F) unless otherwise specified for a particular component

Cartridges

Table A-16 lists the environmental requirements for 9940 cartridges.

Table A-16. 9940 Cartridge Environmental Requirements

Temperature	
Operating[1]	15° to 32°C (60° to 90°F)
Storage (up to four weeks)	5° to 32°C (41° to 90°F)
Storage (archival)	18° to 26°C (65° to 79°F)
Shipping[2]	4° to 40°C (40° to 104°F)
Relative Humidity, Non-Condensing	
Operating[1]	20% to 80%
Storage (up to four weeks)	5% to 80%
Storage (archival)	40% to 60%
Shipping[2]	5% to 80%
Wet Bulb Maximum	
Operating[1]	26°C (78.8°F)
Storage (non-archive)	26°C (78.8°F)
Storage (archival)	26°C (78.8°F)
Shipping[2]	26°C (78.8°F) with no condensation

1. The conditioning time before use is 24 hours.
2. The shipping environment must not exceed the limit of the storage environment, archive or non-archive, for longer than 10 days.

Library Attachments

Table A-17 lists the libraries to which T9940 tape drives can attach. To order the correct accessories to install T9940 tape drives in a library environment, refer to the system assurance guide for the library.

Table A-17. T9940 Tape Drive Library Attachments

Product	Maximum Number of Cartridges	Maximum Number of Drives	System Assurance Guide
9310 PowderHorn	Approx. 6,000	80	*Nearline Enterprise 9310/4410/9360 LSM System Assurance Guide*, ML6500
9740 TimberWolf	494	10	*TimberWolf 9740 Library Storage Module System Assurance Guide*, MT5001
L180	Approx. 180	6	*L180/L700x/L1400x Tape Libraries Ordering and Configuration Guide*, MT9112
L700x/L1400x	Approx. 700	12	*L180/L700x/L1400x Tape Libraries Ordering and Configuration Guide*, MT9112
L5500 ACS	Maximum 2000/3500[1]	80[2]	*L5500 Automated Cartridge System System Assurance Guide*, MT9142
SL8500	10,088[3]	64	*System Assurance Guide*, MT9229

1. There are two mixed-media configurations in the L5500 ACS.
2. Total number of mixed drives, including the LTO Ultrium Drives. The LTO required, associated PLM unit blocks three T9x40 power supply slots; therefore, in a mixed drive cabinet, a maximum of 17 drive slots are available for T9x40 drives.
3. Basic library holds 1,448 cartridges; and, the library can hold 10,088 cartridges when five storage expansion modules are installed.

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Glossary

This glossary defines new or special terms and abbreviations used in *this guide*. For definitions about other 9840/T9840/T9940 drive subsystem terms, or terms about other StorageTek products, refer to the glossary in the appropriate manuals.

Many of the definitions are taken from the *IBM Dictionary of Computing*. The following letters in parentheses following the definition indicate the source of the definition:

(A) *The American National Standard Dictionary for Information Systems, ANSI* X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI).

(E) The ANSI/Electronic Industries Association (EIA) Standard-440-A, *Fiber Optic Terminology*.

(I) The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and International Electrotechnical Commission (ISO/IEC/JTC1/SC1).

(IBM) *The IBM Dictionary of Computing*, copyright 1994.

(T) Draft international standards committee drafts, and working papers being developed by the ISO/IEC/JTC1/SC1.

A

access time The mean time in seconds from the load ready position to a distance being approximately half way from COT (center of tape) to either EOT (end of tape).

ACSLS *See* automated cartridge system library software.

adapter Hardware used to join different connector types.

ANSI American National Standards Institute.

Arbitrated Loop One topology used in Fibre Channel that provides multiple connections for devices that share a single loop, over which only two devices can communicate at once.

Arbitrated Loop Physical Address (AL_PA) A one-byte value that identifies a port in an arbitrated loop topology.

Automated Cartridge System Library Software (ACSLS) UNIX-based software that allows multiple computing platforms to access a Nearline automated cartridge system (ACS).

B

Bit (1) A unit of information equal to a 1 or a 0. (2) Either of the digits 0 or 1 when used in the binary numeration system. (T)

British thermal unit (Btu) A standard measure of a device's heat output. The amount of heat required to raise one pound of water one degree Fahrenheit.

Btu *See* British thermal unit.

Byte (1) A string that consists of a number of bits, treated as a unit, and representing a character. (T) (2) A number of bits, treated as a unit, and representing a character.

C

Calorie The amount of heat required to raise one kilogram of water one degree Celsius. Equal to 3.968 Btu.

cartridge A storage device that consists of magnetic tape on supply and take up reels, in a protective housing. (IBM).

Cartridge Scratch Loader (CSL) In the 9840 tape drive, a device attached to the 9840 drive which automatically feeds cartridges to the drive. Cartridges are manually placed in an input bin, and

after use, are deposited automatically in an output bin.

cleaning cartridge A cartridge containing special material used to clean the tape path in a transport.

Client System Component (CSC) Software that provides an interface between the client computing system's operating system and the StorageTek library software, such as ACSLS, HSC, or LibraryStation.

connector An electrical part used to join two or more other electrical parts. (IBM)

CSC *See* Client System Component.

CSE *See* Customer Services Engineer.

CSL *See* Cartridge Scratch Loader.

Customer Services Engineer (CSE) A StorageTek employee trained to install, maintain, and repair StorageTek equipment.

configuration The manner in which the hardware and software of an information processing system are organized and interconnected. (T)

D

daisy chain A method of device interconnection for determining interrupt priority by connecting the interrupt sources serially.

data migration The orderly movement of data from one storage medium to another.

differential A SCSI bus alternative with a maximum cable length of 25 meters (82 feet).

E

Enterprise Systems Connection (ESCON) A set of IBM products and services that provide a dynamically-connected environment within an enterprise. (IBM)

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)

equipment rack A free-standing cabinet or framework that holds electronic equipment.

ESCON *See* Enterprise Systems Connection.

F

fabric The FC topology that is similar to a telephone switch in that the initiator of a "call" to the receiving port simply provides the receiver with the port address, and the fabric routes the transmission to the proper port. A fabric differs from a point-to-point or arbitrated loop topology in that it provides for interconnections between ports without having a point-to-point connection. The fabric also serves as a media type converter.

FC *See* Fibre Channel

FIB Format identifier block. A FIB is required to identify tapes written by a T9840C or T9840D tape drive. The T9840C has a unique FIB, and the T9840D has a unique FIB. Earlier generation drives detect the FIB (T9840A/B identify the FIB for tapes written by either a T9840C or T9840D while the T9840C detects the FIB for tapes written by a T9840D).

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)

Fibre Channel (FC) The ANSI standard that defines an ultra high-speed, content independent, multi-level data transmission interface that can support multiple protocols simultaneously, support 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 *See* Fibre Connection.

field replaceable unit (FRU) An assembly that is replaced in its entirety when any of its components fails. (IBM)

firmware An ordered set of instructions and data stored in a way that is functionally independent of main storage; for example, microprograms stored in a ROM. (T)

FRU *See* field replaceable unit.

frame A cabinet that holds an array of tape drives for attachment to a library.

G

GB *See* Gigabyte.

Gb Gigabit, equal to 10^9 bits.

GBIC *See* Gigabit Interface Converter

gigabit (Gb) One billion (10^9) bits.

Gigabit Interface Converter (GBIC) An adapter that connects a fiber-optic or copper-wire cable to a Fibre Channel hub or switch.

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

H

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

HBA *See* host bus adaptor

host The primary computer on a network, with which other computers interact.

host bus adapter (HBA) A circuit installed in a multi-platform host or device that interfaces between the device and the bus.

host interface Interface between a network and host computer. (T)

Host Software Component (HSC) The StorageTek software that provides client volume location information through its Control Data Set (CDS) and provides the interface to the Nearline ACS hardware and client operator console.

HSC *See* Host Software Component

hub A piece of hardware, separate from the actual FC interface accessible on the backplane of a device, which houses the port bypass circuitry for configurations of 8 to 16 ports per hub. Hubs may be cascaded to support larger configurations, and can usually support a mix of both electrical and optical media ports in the same hub.

I

IBM International Business Machines, Inc.

ID Identifier or identification.

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 a internet environment. (IBM)

Internet Protocol (IP) v4 address A four-byte value that identifies a device and makes it accessible through a network. The format of an IPv4 address is a 32-bit numeric value written as four numbers separated by periods. Each number can be from 0 to 255. For example, 129.80.145.23.

Internet Protocol (IP) v6 address The next generation Internet protocol. It provides a much larger address space then IPv4. This is based upon the definition of a 128-bit address - IPv4 used a 32-bit address. The format of an IPv6 address is eight fields of four hexadecimal characters separated by colons (for example: 2001:0db8:85a3:0000:0000:8a2e:0370:7334).

L

LCU *See* library control unit.

library (1) A library is composed of one or more automated cartridge systems (ACSs), attached transports (such as cartridge drives or controller transport units), volumes placed into the ACSs, host software that controls and manages the ACSs and associated volumes, and the library control data sets that describe the state of the ACSs. (2) A robotic system that stores, moves, mounts, and dismounts cartridges that are used in data read or write operations. (3) A hardware component in a tape automation system.

library control unit (LCU) The portion of an automated library that controls the choosing, mounting, dismounting, and replacing of cartridges.

library management unit (LMU) The portion of an automated cartridge system that controls the library storage module and communicates with the Host Software Component.

LibraryStation Software that allows an MVS system to be used as a library control server.

library storage module (LSM) A housing that contains cartridges and a robot that moves the tapes between storage cells and the attached transports. Synonymous with tape library.

LMU *See* library management unit.

load time The time from when a cartridge is first put into the loader and the instruction is given to load the cartridge to when the drive becomes ready. This includes the lowering of the elevator, engaging the tape and read/write head, successfully reading of the MIR, successfully read of the FIB (if needed), and then moving the tape to the nearest location of where first data would normally be located on tape.

long wave Fiber optics transmission using 1310 nm wavelength laser.

LSM *See* library storage module.

M

megabyte (MB) Megabytes or 1,000,000 bytes for disk or tape storage, but 1,048,576 (2^{20}) bytes of memory capacity.

migration *See* data migration.

multimode An optical fiber designed to carry multiple signals, distinguished by frequency or phase, at the same time.

Multiple Virtual Storage (MVS) IBM's Multiple Virtual Storage, consisting of MVS/System Product Version 1 and the MVS/370 Data Facility Product operating on a System/370 processor. (IBM)

MVS See Multiple Virtual Storage

N

NCS *See* Nearline Control Solution.

Nearline A registered trademark of StorageTek, this term is used in association with StorageTek's family of tape-library information storage and retrieval products.

Nearline Control Solution (NCS) An MVS-based Nearline software product that supports multiple MVS images sharing a library complex.

O

operating system Software that controls the execution of program and that may provide services such as resource allocation, scheduling, input/output control, and data management. Although operating systems are predominately software, partial hardware implementations are possible. (T)

Orders Management A StorageTek office that processes orders.

R

rack *See* equipment rack.

Removable Media Library Software (RMLS) StorageTek software that runs on each iSeries host or LPAR, and provides robotic control via ACSLS to StorageTek libraries.

RMLS *See* Removable Media Library Software.

S

SCSI *See* small computer system interface.

Shared Services Center A StorageTek office that processes orders.

short wave iber optics transmission using 850 nm wavelength laser.

single mode Fiber with a relatively narrow diameter, through which only one mode will communicate. Single mode fiber carries higher bandwidth than multimode fiber, but requires a light source with a narrow spectral width.

small computer system interface (SCSI) An ANSI standard for controlling peripheral devices by one or more hosts.

software All or part of the programs, procedures, rules, and associated documentation of a data processing system. Software is an intellectual creation that is independent of the medium on which it is recorded. (T)

StreamLine™ SL8500 Modular Library System An automated tape library comprised of:

- Customer interface module
- Robotics interface module
- Drive and electronics module
- Storage expansion module (optional)

switch (1) A device or programming technique for making a selection; for example, a toggle, a conditional jump. (A) (2) In Fibre Channel technology, a device that connects Fibre Channel devices together in a fabric.

System Assurance The exchange of information among product-installation team members to promote an error-free installation and contribute to customer satisfaction.

T

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

V

VOLSER *See* volume serial number.

volume serial number A number in a volume label assigned when a volume is prepared for use in

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