

Sun StorEdge™ L9 Tape Autoloader

Just the Facts



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Positioning



Figure 1. Sun StorEdge™ L9 autoloader

Introduction

Designed for backup of workstations and workgroup servers, the Sun StorEdge™ L9 tape autoloader offers an excellent first automation piece for system users. By integrating a week's worth of backup into a small library, this autoloader helps take the manual labor out of backup and produce a more reliable backup strategy. Additionally, customers can utilize the Sun StorEdge L9 autoloader as a boot device for large servers for dedicated OS restore.

Drive Type	Capacity (native)	Transfer Rate (native)	List Price*
DLT8000	360 GB	6 MB/sec.	\$7,500.00
LTO bundled with VERITAS NetBackup BusinessServer or Solstice Backup software	900 GB	15 MB/sec.	\$10,195.00

* Prices are given in U.S. Dollars and are subject to change.

The Sun StorEdge L9 tape autoloader is a desktop unit consisting of one LTO or DLT8000 tape drive, nine slots for storing cartridges, and a robotic system to manipulate the data cartridges from the slots to the drive and back again. The data cartridges are stored in a six-slot removable magazine with three easily accessible cartridges fixed in the rear of the unit. The autoloader can be rackmounted by purchasing an optional rackmount kit and removing the skin. Two Sun StorEdge L9 tape autoloaders can be rackmounted side-by-side in a 6U EIA space. A high-voltage differential fast/wide SCSI-2 interface provides access to the Sun StorEdge L9 tape autoloader from the host Sun™ server(s). An easy-to-read



LCD front panel displays drive and cartridge status, configuration, customization, and usage monitoring. The Sun StorEdge L9 tape autoloader comes standard with a barcode reader for easy management of tape cartridges. An optional remote management control (RMC) card allows for remote management of the Sun StorEdge L9 tape autoloader via the web.

The Sun StorEdge L9 tape autoloader can be used with VERITAS NetBackup or Solstice Backup™ software, as well as many other storage management software applications. (Note: The LTO version of the Sun StorEdge L9 autoloader is currently bundled with backup software.)

The Sun StorEdge L9 tape autoloader with DLT8000 is read compatible with DLT4000 and read/write compatible with DLT7000 formats.

Storage Management Systems

Today, autoloaders are sold to perform backup and archival tasks. With increasing numbers of autoloaders and tape technologies and a high demand for backup and archival solutions in all environments, automated tape backup solutions have a number of requirements:

- **Reliability:** Accurate storage and retrieval of data that has been backed up and archived
- **System availability:** Many organizations run 24 hours a day, 7 days a week. In these environments, it is imperative for data that has been backed up to be available on demand.
- **Management of large amounts of data:** Users are generating more data than ever before. Organizations need a method for organizing data (through activity) such that data reliability is maintained.
- **Simplified administration:** Monitoring tapes can be a daunting and challenging task.
- **Integration:** Hardware and software must fit seamlessly into existing customer server and client environments.
- **Capacity to match growing customer storage needs:** Customers are doubling their onsite managed storage every year. As a result, their backup needs are also increasing rapidly.
- **Ability to backup a week's worth of data:** Customers require their automation to handle a full backup on the weekend and incremental backups every night of the week. This allows customers to keep a week's worth of unattended backups in the unit, only changing tapes once a week.

Choosing a Storage Solution

There are many factors to consider in choosing a storage solution, beginning with an evaluation of the computing environment:

- **Performance:** Performance is the speed of transfer of data to the backup system and how fast data backups can be completed. System and media performance must be compatible. To reduce the backup window, customers simply add additional drives.
- **Capacity:** Capacity is the amount of data that can be stored. Compression algorithms, which increase media capacity and data transfer rate, are available for several technologies.
- **Economics:** The economics of a storage solutions are measured in the cost per unit of storage in gigabytes, the cost and time it takes to transfer data (cost per hour per GB or TB), and the capital cost for equipment or hardware.
- **Availability of robotic mechanisms:** Robotic mechanisms that can handle multiple cartridges increase storage capacity and offer unattended operation.



- **Media stability:** Storage media stability determines the length of time data is readable from stored files.
- **Standards:** Standard form factors and formats helps ensure backward compatibility between older files and current drives.

Product Family Placement

Because the optimal choice of a secondary storage system depends on customer requirements and sensitivities, Sun offers a family of solutions to help customers make the best choice for their specific requirements and sensitivities. Sun's tape offerings include the following (note that all capacities listed are native):

- Sun StorEdge L9 tape autoloader (360-GB DLT8000 and 900-GB LTO library)
- Sun StorEdge L20 tape library (800-GB to 2.4-TB DLT8000 or 2.6-TB LTO library)
- Sun StorEdge L1000 tape library (1.2-TB DLT8000 library)
- Sun StorEdge L180 tape library (3.48-TB 9840, 6.96-TB DLT8000, 17.4-TB LTO or multimedia library)
- Sun StorEdge L700 tape library (13.8-TB 9840, 27.6-TB DLT, 67.8-TB LTO or multimedia library)
- Sun StorEdge L6000 tape library (120-TB/LSM, 2880-TB/ACS 9840B to 360-TB/LSM, 8640-TB/ACS 9940A library, or multimedia)

Availability

The Sun StorEdge L9 tape autoloader with DLT8000 and LTO technology is currently available.



Selling Highlights

Market Value Proposition

The Sun StorEdge™ L9 tape autoloader provides Sun customers with more backup capacity than a single tape drive. An autoloader is an entry-level automation product, allowing for automated, unattended backup in non-mission critical environments, or for use as a boot device for larger servers. Customers are able to keep a week's worth of unattended backups in the unit, only changing tapes on Saturdays.

Target Users and Markets

The Sun StorEdge L9 tape autoloader is targeted at workgroup and departmental data storage as well as the remote office. This autoloader can be used to backup small to medium databases, and workgroup, departmental, and remote office servers. This library is ideal for:

- Remote offices that require local backup of files, including regional insurance, retail, financial, medical, and sales offices.
- Workstation applications requiring a great deal of storage including designers, architects, and engineers who need to backup their creations nightly.
- Departments within the government and educational institutions so that they can secure the latest technology at an entry-level price, as well as provide for the security of their departmental/individual data.
- Use as an external boot device for high-end servers.
- First automation solution when moving from an individual drive.

Applications

- Workstations or workgroup servers with databases up to 120 GB for the DLT8000 version and 300 GB for the LTO version. (Backup solutions should have three to five times the amount of backup capacity as on-line storage.) Sun supports up to two Sun StorEdge L9 tape autoloaders per host adapter for the DLT8000 version and one autoloader for the LTO version.
- Archival
- Hierarchical storage management (HSM)

Key Messages

- **Part of a complete tape backup solution fully supported by Sun:** Combined with Sun workstations, workgroup servers and software such as VERITAS NetBackup and Solstice Backup™ software, the Sun StorEdge L9 tape autoloader contributes toward a complete tape backup solution.
- **Outstanding quality:** Sun has an extremely rigorous qualification testing and design collaboration process.
- **Full line:** With the introduction of LTO, Sun offers a full line of price and performance in the Sun StorEdge L9 tape autoloader.



- **One-stop shopping:** Besides hardware and software, Sun offers maintenance (via a SunSpectrumSM program contract) for the Sun StorEdge L9 tape autoloader (worldwide). Sun also sells the media that is used in the autoloader.
- **Investment protection:** The DLT8000 tape drive inside the Sun StorEdge L9 tape autoloader is read and write compatible with previous generation DLT tape media from DLT4000 through DLT7000 formats.
- **Solution flexibility:** The Sun StorEdge L9 tape autoloader is available in a desktop configuration with a rackmount option. The rackmount option offers a compact footprint along with low cost for the density of capacity available. Two Sun StorEdge L9 tape autoloaders can sit side by side in a standard 19-inch rack, providing 1.8 TB (LTO) of native capacity. This is up to double the capacity some other autoloaders offer in the same space.
- **Manageability:** The Sun StorEdge L9 tape autoloader can be managed locally via the LCD screen on the front panel. From this panel, a customer gets library and drive status, moves cartridges, test phases of robotics operations and accesses status reports, as well as media information. The Sun StorEdge L9 tape autoloader comes standard with a barcode reader that facilitates fast and reliable tape cartridge management. An optional remote management control (RMC) card allows for remote management of the unit via the web.
- **Ease of setup/ease of use:** The Sun StorEdge L9 tape autoloader is extremely easy to setup; automatic tape swapping saves time, prevents errors, and provides quick access to data.

Software Support

The Sun StorEdge L9 tape autoloader is supported by VERITAS NetBackup, Solstice Backup software, and other storage management software applications.

Features and Benefits

Feature	Benefit
• Low price point	• Entry into tape automation
• Reliability	• No scheduled maintenance
• Intuitive front panel menu	• Easy to manage
• Standard bar code reader	• Easy to manage
• Removable magazine	• Easy to manage, offsite storage
• Optional remote management control (RMC) card	• Easy to manage
• DLT8000 read/write compatible with DLT7000, and read compatible with DLT4000	• Investment protection
• Rackmountable	• Flexible configuration
• Ease of use	• Short time to first back up



Technical Overview

Technology Overview

The Sun StorEdge™ L9 tape autoloader includes a number of features that make it especially well-suited to backup of workstations and workgroup servers. They include:

- Highly reliable automated storage robotics
- Front panel management for autoloader operations, status, and diagnostics
- Barcode reader for identification and management of tape media
- Highly accessible cartridges via a removable magazine
- Differential SCSI with up to 25-meter cable connector (DLT8000, LTO)
- Flexible footprint — desktop and optional rackmount
- Optional remote management control (RMC) card

Highly Reliable Robotics Technology

The Sun StorEdge L9 tape autoloader robotics are designed, built, and tested for extreme durability. The library has an MSBF of 1,000,000 swaps. Other features include the following:

- Third-generation automated storage product
- The Sun StorEdge L9 tape autoloader employs industry-leading and field-proven technologies

DLT Technology Overview

Digital linear tape technology uses multichannel linear serpentine recording. Linear serpentine technology uses a multichannel tape. The tape carries data in parallel channels that run past a single stationary head. Each of the channels passes over its own write element within the head. The use of four channels with the DLT8000 essentially doubles data transfer rates compared to the DLT4000 (two channels).

Media and read/write head durability further distinguishes digital linear tape technology from other offerings. Digital linear tape implements a simple tape path and operates at a low constant tension, with the tape head being stationary, minimizing wear and tear on both tape and heads. In contrast, helical scan technology utilizes a read/write head positioned on a rotating drum. The drum lays data down diagonally across a slow moving tape. Because the tape is wrapped around the rotating drum, tape and head life are usually lower.

Future digital linear tape products will easily grow in capacity by increasing bit density. Performance improvements occur through the addition of new heads and channels, or by increasing the tape speed. Future digital linear tape drives and media will have the same form factor, so will be compatible with today's Sun StorEdge L9 tape autoloader. DLT tape offers several advanced features, such as full SCSI-2 command set implementation, built-in diagnostics, and a high native data transfer rate of 6 MB/second (DLT8000). The current DLT8000 tapes have a native capacity of 40 GB. The digital linear tape cost per MB is comparable to 8-mm technology. As DLT tape technology is evolving to even higher capacity



tapes and transfer rates, it is a suitable option for enterprise environments where storage needs are increasing rapidly.

LTO Ultrium Overview

HP, IBM, and Seagate jointly conceived and developed Linear Tape Open (LTO) technology. Ultrium is an open format, endorsed by multiple vendors and licensees and is backed by an independent compliance verification program. Ultrium is one of two formats under the LTO standard.

As these three LTO technology partners develop data protection technologies based on optical magnetic, magneto-optical, and solid state technology, the range of data protection alternatives is increasing. The decision by these technology partners to develop a new tape technology is based on an analysis of current and future data protection options that shows that tape remains unrivaled in terms of cost and capacity. LTO drive technology combines low cost, high storage transfer rate, and reliability of tape.

Benefits of LTO Ultrium

- **Open standards are better:** LTO removes the disadvantages of the proprietary nature of the existing formats such as DLT, AIT and SDLT. Compliance with the Ultrium format helps ensure media interchange between different vendors' Ultrium products.
- **Product leadership:** LTO Ultrium offers customers the ability to significantly increase capacity and performance today. And with a proven four-generation roadmap, customers can be confident that the technology's capacity and performance will continue to grow as their needs grow, while maintaining compatibility with today's LTO products.
- **Based on best-of-breed technologies:** LTO Ultrium may be a new format, but it is based on well known, proven technologies. Customers can feel confident the technology's reliability, and have confidence in the roadmap of the future.
- **Market acceptance:** The proof of any new technology is how it is being adopted. By any measure, LTO Ultrium is experiencing universal market adoption:
 - As of January 2002, over 80,000 LTO Ultrium drives and 1 million data cartridges have shipped.
 - Thirty-one LTO Ultrium technology licensees
 - Eight media licensees
 - Six compliant media manufacturers are shipping today
 - Universal automation vendor adoption
 - Strong system vendor adoption

Front Panel Display

The Sun StorEdge L9 tape autoloader LCD front panel display provides user-friendly messages, has status indicators for drive and robotics and is simple to use and configure. Through it, the user can access the necessary routines to enable autoloader configuration and to run diagnostics routines.

Barcode Reader

The Sun StorEdge L9 tape autoloader has a bar code reader as a standard feature. The bar code reader allows the library to quickly inventory and track cartridges; backup application software is also



supported. The Sun StorEdge L9 tape autoloader is also able to detect empty bins using the laser bar code scanner. When a cartridge is present, this label is hidden. When the Sun StorEdge L9 tape autoloader scans the bin, it instantly recognizes an empty bin and distinguishes between unlabeled cartridges and empty bins. There is no need for additional sensors.

To order additional bar code labels, refer to the Ordering section of this document.

Highly Accessible Cartridges

Cartridges can be accessed via software or the LCD front panel or via the web when the option RMC card is installed. If using backup software, it is recommended that the software be used to control transfer of cartridges from the cartridge slots to the drive and vice versa. This keeps the inventory correct within both the software and the hardware. In the offline mode, the load port can be accessed via the front panel without problems.

All media is stored in the Sun StorEdge L9 tape autoloader is stored in a six-cartridge removable magazine and three fixed cartridge slots in the rear of the unit.

Smaller Footprint

With a vertical design that yields 900 GB (LTO) of native storage in each 6U-EIA (Electronic Industry Association) unit, the Sun StorEdge L9 tape autoloader delivers high storage capacity per cubic foot capacity. Two Sun StorEdge L9 tape autoloaders can be rackmounted side by side, thus saving on rack and floor space.



Front and Rear Views of the Sun StorEdge L9 Tape Autoloader

Below are front and rear views of the Sun StorEdge L9 tape autoloader.

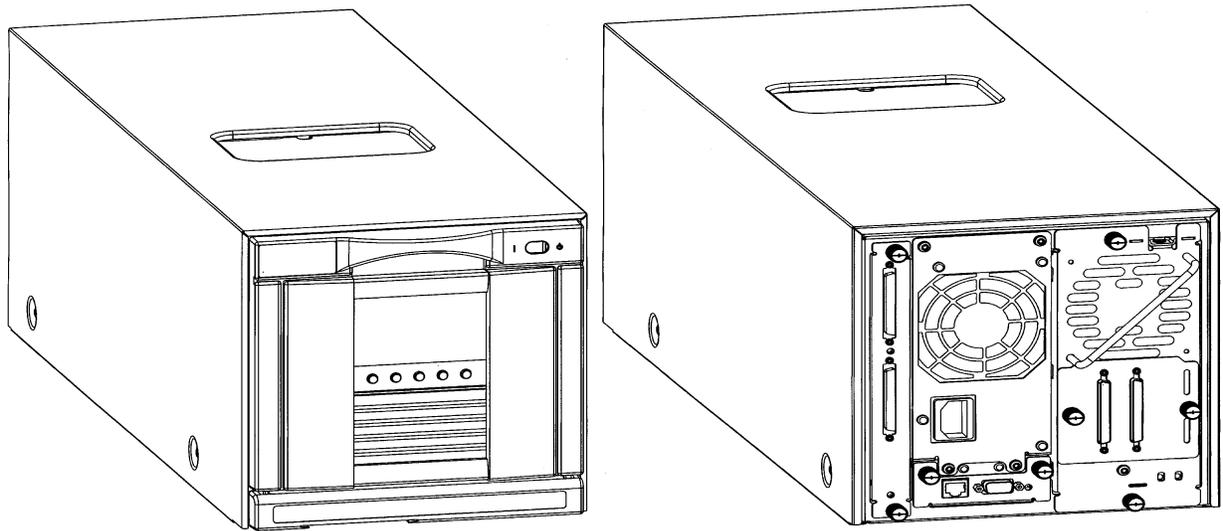


Figure 2. Front (left) and rear (right) views of the Sun StorEdge L9 autoloader

Reliability, Availability, and Serviceability (RAS)

Reliability

The Sun StorEdge™ L9 tape autoloader is designed, built and tested for extreme durability:

- Third-generation automated storage product
- The Sun StorEdge L9 tape autoloader employs industry-leading and field-proven technologies
- Mean swaps between failure (MSBF): 1,000,000 swaps
- Mean time between failure (MTBF): 100,000 hours (robotics only)

Availability

The Sun StorEdge L9 tape autoloader, via VERITAS NetBackup or Solstice Backup™ software, initiates backups, swaps tapes, cleans the drive when needed, skips bad or write-protected media, and automatically writes to the next cartridge, so backups continue without interruption.

No scheduled maintenance down time is required.

Serviceability

There are four main FRUs on the Sun StorEdge L9 tape autoloader:

- LTO or DLT8000 drive
- Driveless autoloader
- RMC (remote management control) card
- Removable magazine

The drives and RMC card can be removed using two thumb screws. The average mean time to repair (MTTR) is less than 30 minutes.



Specifications

General Specifications

Feature	DLT8000 Models	LTO Models
Technology	DLT8000 ¹	LTO
Capacity	360 GB (9 DLTtape Type IV media)	900 GB (LTO Type 1 media)
Sustained Transfer Rate	6 MB/sec. native	15 MB/sec. native
Digital Linear Tape Cartridge Capacity	40 GB native	100 GB
Robotics MSBF	1,000,000 swaps	
Robotics MTBF	100,000 hours	
Drive MTBF	250,000 hours at 100% duty cycle (not including heads)	250,000 hours at 100% duty cycle
Drive Head Life	50,000 tape motion hours	60,000 tape motion hours
Media Life	1,000,000 write/read passes	
Average Tape Exchange Time	35 seconds	
Average Access Time	60 seconds	71 seconds
Load Time to BOT	37 seconds	25 seconds
Tape Unload Time from BOT	17 seconds	13 seconds
Tape Rewind Time	120 seconds	4.1 m/second
Firmware Level	Drive: V59 Robotics: 2.33s	Drive: E1AV Robotics: 2.33s or later
Operating Interface	HVD SCSI	
Control Panel	Backlit LCD status display Select buttons to scroll menu items LED indicator light (operation/fault status/diagnostic)	
¹ DLT8000 read/write compatible with DLT7000, and read compatible with DLT4000		



Environment

Feature	Specification
Power Requirements (operating) <ul style="list-style-type: none"> Line voltage Line frequency Power consumption 	100 to 127/200 to 240 VAC 50 to 60 Hz Typical: 100 watts Maximum: 120 watts
Operating Environment <ul style="list-style-type: none"> Relative humidity Temperature Altitude 	20 to 80 percent, noncondensing 10 to 35 degrees C (50 to 95 degrees F) 0 to 3.05 km (0 to 10,000 feet)
Non-operating Environment <ul style="list-style-type: none"> Humidity Temperature Altitude 	10 to 90 percent, non-condensing -35 to 60 degrees C (-31 to 140 degrees F) Sea level to 50,000 ft. (15,240 m) - shipping Sea level to 10,000 ft. (3,050 m) - storage
Maximum Heat Dissipation	425 BTU hr: 105 kCal/hr; 125 watts
Acoustic Noise (in accordance with ISO 9296) <ul style="list-style-type: none"> Operating Idle 	<7.5 bels <7.0 bels
Safety	UL 1950 cUL CSA C22.2-No 950-M95 TUV EN950
RFI/EMI	FCC Class .15B. Class A CE Mark VCCI class A



Hardware Dimensions

Specification	U.S.	Metric
• Standalone		
– Height	9.0 in.	230 mm
– Width	9.5 in.	243 mm
– Depth	27.0 in.	685 mm
– Weight	54.3 lb.	24.7 kg
– Shipping Weight	63.5 lb.	28.9 kg
• Rackmount		
– Height	8.5 in.	215 mm
– Width	8.8 in.	221 mm
– Depth	27.0 in.	685 mm
– Weight	50.0 lb.	22.7 kg
– Shipping Weight	54.0 lb.	24.5 kg

Regulations

The Sun StorEdge™ L9 autoloader meets or exceeds the following requirements.

Safety

Country	Standard
U.S.	UL Listed to UL 1950, 3rd Edition
Canada	CSA Standard CAN/CSA-C22.2 No. 950
Germany	GS licensed to EN 60950, 2nd Edition, 1991 +A1, A2, A3, A4
Norway	Nemko Certified to EN 60950 (1992) A1/A2/A3/A4/A11
Sweden	Semko Certified to EN 60950 (1992) A1/A2/A3/A4/A11
Denmark	Demko Certified to EN 60950 (1992) A1/A2/A3/A4/A11
Finland	Fimko Certified to EN 60950 (1992) A1/A2/A3/A4/A11
European Union	EMKO-TSE (74-SEC) 207/94 CB test Certified

Electromagnetic Compatibility

Country	Standard
U.S.	FCC #47, Part 15, Subpart B, Class A
Canada	ICES-003



Country	Standard
Japan	VCCI Class A
European Union	EN 55022/A1 (1995) / CISPR 22 (1997, 3. Ed.), Class A
Australia/New Zealand	AS/NZS 3548:1996

Electromagnetic Interference

Test	Standard
ESD	EN 55024-2 (1998) / IEC 1000-4-2 (1995), 4 kV CD, 8 kV AD
Radiated Electric Field	EN 55024-3 (1998) / IEC 1000-4-3 (1995), 3 V/m
Electrical Fast Transient Burst	EN 55024-4 (1998) / IEC 801-4-4 (1988), 1 kV Peak Power Lines 0,5 kV Signal Lines
Harmonics	EN 61000-3-2 (1995) / IEC 1000-3-2 (1995), Harmonics
Flicker	EN 61000-3-3 (1995) / IEC 1000-3-3 (1994), Flicker
Surge	EN 61000-4-5:2001 (2kV I/O, 2kV Power LL, 4kV Power LG)
RF Conducted	EN 61000- 6:2001 (10V)
Voltage Dip and Interruption	EN 61000-4-11:2001

Requirements and Configuration

Operating Environment Support

The Sun StorEdge™ L9 autoloader supports the Solaris™ 2.6, 7, and 8 Operating Environments.

Note: Support for Solaris 8 Operating Environment: Sun PatchID: 108725-05 or later (DLT8000), 108725-10 or later (LTO), Solaris 7 Operating Environment: Sun PatchID: 107460-09 or later, Solaris 2.6 Operating Environment: Sun PatchID: 105847-09 or later

Sun Hardware

The Sun StorEdge L9 tape autoloader supports the following Sun systems:

- Sun Ultra™ 5, 10, 60, and 80 workstations
- Sun Blade™ 100 and 1000 workstations
- Sun Enterprise Ultra™ 5S and 10S servers
- Sun Enterprise™ 220R, 250, 420R, and 450 servers
- Sun Enterprise 3X00–6X00 and 10000 servers (recommended as boot device)
- Sun Fire™ 280R, V880, 3800, 3810, 4800, 6800, and 15000 servers

Notes:

- *A high voltage differential host bus adapter is required.*
- *Technically, the Sun StorEdge L9 tape autoloader can be plugged into DEC/Compaq, EMC, HP, Siemens, and other servers, but has not been subjected to Sun's rigorous qualification testing with all of these systems. Sun Enterprise Services or any SunSpectrum™ program contract does not cover this type of system setup.*

Drives, SCSI Configurations, and HBAs

Two Sun StorEdge L9 tape autoloaders maximum are supported per host adapter for DLT8000 or one per host adapter for LTO.

Host Adapters: DLT8000

The table below lists maximum configurations and HBA information for the Sun StorEdge L9 autoloader with DLT8000 technology.

Tape Library/Automation: L9 Drive Type: DLT8000 Max. Drives per Sun StorEdge L9: 1							
HBA Part #	Description	SBus/ PCI	Type	Support	Max. Direct Attach	Daisy Chain	Comments
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Fire 15000	1	0	Only boot disk
X1065A	Ultra Fast Wide	SBus	UDWIS/S	Sun Enterprise 10000	1	0	Only boot disk



Tape Library/Automation: L9 Drive Type: DLT8000 Max. Drives per Sun StorEdge L9: 1							
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Fire 6800	1	0	Only boot disk
X6541A, X6749A	Ultra Fast Wide	PCI	UDWIS/P	Sun Fire 4800, 4810	1	0	Only boot disk
X6541A, X6749A	Ultra Fast Wide	cPCI	UDWIS/cPCI	Sun Fire 3800	1	0	Only boot disk
X1065A	Ultra Fast Wide	SBus	UDWIS/S	Sun Enterprise 3500 to 6500	1	0	Only boot disk
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Enterprise 250, 450	2	0	
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Enterprise 220R, 420R	2	0	
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Fire 280R, V880	2	0	
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Ultra 60, 80	2	0	
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Blade 100, 1000	2	0	
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Ultra 5, 10	2	0	
X1065A	Ultra Fast Wide	SBus	UDWIS/S	Ultra 2	2	0	

Host Adapters: LTO

The table below lists maximum configurations and HBA information for the Sun StorEdge L9 autoloader with LTO technology.

Tape Library/Automation: L9 Drive Type: LTO Max. Drives per Sun StorEdge L9: 1							
HBA Part #	Description	SBus/ PCI	Type	Support	Max. Direct Attach	Daisy Chain	Comments
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Fire 15000	1	0	Only boot disk
X1065A	Ultra Fast Wide	SBus	UDWIS/S	Sun Enterprise 10000	1	0	Only boot disk
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Fire 6800	1	0	Only boot disk
X6541A, X6749A	Ultra Fast Wide	PCI	UDWIS/P	Sun Fire 4800, 4810	1	0	Only boot disk
X6541A, X6749A	Ultra Fast Wide	cPCI	UDWIS/cPCI	Sun Fire 3800	1	0	Only boot disk
X1065A	Ultra Fast Wide	SBus	UDWIS/S	Sun Enterprise 3500 to 6500	1	0	Only boot disk
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Enterprise 250, 450	2	0	
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Enterprise 220R, 420R	2	0	
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Fire 280R, V880	2	0	
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Ultra 60, 80	2	0	
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Blade 100, 1000	2	0	
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Ultra 5, 10	1	0	
X1065A	Ultra Fast Wide	SBus	UDWIS/S	Ultra 2	2	0	



System Configuration

The Sun StorEdge L9 tape autoloader is available in these configurations:

- A desktop enclosure with one DLT8000 tape drive (HVD SCSI interface) and nine DLT cartridge slots; or the same configuration bundled with VERITAS NetBackup BusinessServer or Solstice Backup workgroup edition software
- A desktop enclosure with one LTO Ultrium tape drive (HVD SCSI interface) and nine LTO cartridge slots and bundled with VERITAS NetBackup BusinessServer or Solstice Backup workgroup edition software

The Sun StorEdge L9 tape autoloader can be rackmounted by purchasing an optional rackmount kit (SG-XRACKIT-L9) and removing the outer cover.

Controller

If the autoloader controller fails, the unit is considered non-functional. Since the robotics controller communicates with the robot and all functional controls and calibration values are held on that board, the autoloader is "dead" to the outside world (even in a manual mode) if a failure occurs with the autoloader controller.

Racks

The Sun StorEdge L9 tape autoloader currently fits into, and is supported a standard 72-inch rack. The Sun StorEdge L9 tape autoloader is half of the width of the rack. One rackmount kit is required for every two units. Although one unit can be rackmounted, the other side has a plate to cover the empty area.

Media Compatibility

The DLT8000 version of the Sun StorEdge L9 tape autoloader utilizes DLT Type IV media. There are different cleaning cartridges for each type of drive.

The LTO version of the Sun StorEdge L9 tape autoloader utilizes LTO data and cleaning cartridges only.

Tape Drive Cleaning

Cleaning cartridges can be put into any open slot in the autoloader. Once the autoloader performs an inventory, it identifies the slot where the cleaning cartridge resides to the application software. The Sun StorEdge L9 tape autoloader does not have auto-clean features; it is up to the software to initiate a cleaning requirement. When the DLT drive requests a cleaning, the autoloader sends a "cleaning required" message to the host.

For the LTO tape drive, use an LTO cleaning cartridge. Do not clean the drive until it requests the operation. Typically, the drive requests this directly to the ISV package.

Note for DLT8000: *A bad tape may trigger a cleaning request message, although the next good tape loaded resets the cleaning request message. If the tape cleaning message keeps coming on, the drive may require cleaning before reading additional tapes.*



System Management

LCD Control Panel

The Sun StorEdge™ L9 tape autoloader is managed via an LCD control panel located on the front of the unit. See below for functions.

Diagnostics

The Sun StorEdge L9 tape autoloader includes extensive built-in diagnostics and setup options that can be used to conduct system tests and generate reports. Diagnostics are stored in flash RAM and are initiated from the operator panel. The built-in diagnostic functions allow the user to:

- Initiate autoloader tests
- Monitor autoloader status
- View statistics
- Generate reports via Internet browser (with optional RMC card)
- Configure the autoloader
- Move cartridges between slots and drive
- Test specific phases of robotics operation individually
- Change passwords
- Perform monitoring and operating functions through the optional RMC card; it can provide error logs and status in an HTML file and e-mailed to any location for review

MTBF

- Mean swaps between failure (MSBF): 1,000,000 swaps
- Mean time between failure (MTBF): 100,000 hours (robotics only)

Software Support

The Sun StorEdge L9 tape autoloader is supported by

- VERITAS NetBackup 3.4 and above
- Solstice Backup™ 5.5.1 software and above (DLT8000)
- Solstice Backup 6.1 software and above (LTO)
- Many other storage management software applications



The Sun StorEdge L9 tape autoloader is supported on leading database applications as shown in the table below.

Database	Solstice Backup	VERITAS NetBackup
Oracle	X	X
Informix	X	X
SAP	X	X
MS Exchange	X	X
MS SQL Server	X	X
Oracle on Microsoft Windows NT	X	X
Lotus Notes on Microsoft Windows NT	X	X
Lotus Notes on SPARC™	X	X
Sybase	X	X

Software Command and Applications

VERITAS NetBackup and Solstice Backup storage management applications each have their own documentation to assist with the setup and management of tape automation products like the Sun StorEdge L9 tape autoloader. Currently, the LTO version of the Sun StorEdge L9 autoloader is only available as a bundle with VERITAS NetBackup and Solstice Backup software.

The Sun StorEdge L9 tape autoloader is supported in sequential mode by standard UNIX® commands like `tar` and `ufsdump` without modification to the kernel in the Solaris™ Operating Environment. (DLT8000 version only. LTO version must be utilized with an approved backup software package).

The AutoLoad feature that is provided with this autoloader is very useful, but cannot be enabled when used with the current versions of VERITAS NetBackup and Solstice Backup software. Its functionality can be emulated through the use of scripted solutions using the backup product command set. AutoLoad should only be enabled and import tapes when the drive does not have a tape in it.

For information about other software commands, refer to the Solaris Handbook for SMCC Peripherals or the AnswerBook™ documentation for the operating system. The Solaris Handbook for SMCC Peripherals also describes how to determine which SCSI target IDs are available and how to configure the system after installation.

The Sun StorEdge L9 tape autoloader has three modes of operation:

- **Stacker mode:** Stacker mode allows use of the autoloader as a standalone drive, without using special automation software. The autoloader automatically unloads and loads tapes from the drive until it unloads the last tape. With this operating mode, the user must also select:
 - **Circular mode on/off:** If the Circular mode option has been selected, the autoloader reloads the first tape cartridge after unloading the last tape cartridge. If Circular mode is disabled and the last tape cartridge has been unloaded, the autoloader stops operating until the user loads additional tape cartridges.
 - **AutoLoad on/off:** If the AutoLoad option is selected, the first available tape loads into the drive at power up. When the host issues a SCSI unload command to the drive, the autoloader automatically removes the tape cartridges from the drive and inserts the next available tape.



If the autoloader encounters a cleaning cartridge during the cycle, it is loaded into the drive as normal, but is automatically unloaded after the cleaning cycle.

- **Random mode:** Random mode provides full autoloader functionality with special automation software in the host computer. Tapes can only be loaded to the drive from the front panel, host SCSI commands, or the optional remote management card. The autoloader does not automatically load tapes as it does in Stacker mode.
- **Autodetect mode (factory default):** In Autodetect mode, the autoloader starts in Stacker mode until it receives a SCSI "changer" command. The autoloader then runs in Random mode. The "changer" commands include the following: INITIALIZE ELEMENT STATUS, READ ELEMENT STATUS, POSITION TO ELEMENT, MOVE MEDIA, and EXCHANGE MEDIA.

With this operating mode, the user must also select Circular mode on/off. If the Circular mode option is ON, the autoloader reloads the first tape cartridge after unloading the last tape cartridge. If Circular mode is OFF and the last tape cartridge has been unloaded, the autoloader stops operating until the user loads additional tape cartridges.



Ordering Information

Part Numbers

Order Number	Title and Description
SG-XAUTODLT8D-L9	Sun StorEdge™ L9 tape autoloader with DLT8000, desktop version ¹ <ul style="list-style-type: none">• Type IV DLT media (1 cartridge)• One DLT cleaning tape• US power cord• User's Guide• User's manual CD• Media label kits (each kit contains 25 DLT bar code data labels plus 5 cleaning cartridge labels)• Custom Sun errata sheet• Wide differential terminator• SCSI jumper cable• Sun content list <p><i>Note: This unit does not come with a SCSI cable</i></p>
SG- XRACKIT-L9	Sun StorEdge L9 tape autoloader rackmount kit ²
SG-XRMCCARD-L9	Remote management control (RMC) card (10/100BASE-T)
X6541A	Dual-channel differential UltraSCSI host adapter (PCI)
X1065A	SBus differential fast/wide intelligent SCSI-2 host adapter
X6749A	Dual-channel differential UltraSCSI host adapter (cPCI)
X902A	2-meter SCSI cable
X979A	12-meter SCSI cable
SG-XMEDDLTCIV-10	DLT type IV data cartridges (package of 10)
SG-XMEDDLTCL-10	Digital linear tape cleaning cartridges (package of 10)

¹ There is an optional rackmount kit for rackmounting the Sun StorEdge L9 tape autoloader.

² Includes sheet metal hardware needed to mount two autoloaders into a standard 19-inch rack.

Note: The following *DLT8000 versions of the Sun StorEdge L9 autoloader bundled with backup software are also available:*

- SG-XAUTONBU-L9 — Sun StorEdge L9 autoloader, DLT8000 version, with VERITAS NetBackup BusinessServer software; includes robotics and drive licenses, plus installation CD
- SG-XAUTOSBU8-L9 — Sun StorEdge L9 autoloader, DLT8000 version, with Solstice Backup, workgroup edition software; includes workgroup and autochanger licenses, media kit, and documentation



Order Number	Title and Description
SG-XAUTONBULT-L9 or SG-XAUTOSBULT-L9	<p>Sun StorEdge L9 tape autoloader with LTO, desktop version ¹</p> <ul style="list-style-type: none"> • One LTO data cartridge • One LTO cleaning tape • US power cord • User's Guide • User's manual CD • Media label kits (each kit contains 25 LTO bar code data labels plus 5 cleaning cartridge labels) • Custom Sun errata sheet • Low-voltage differential terminator • SCSI jumper cable • Sun content list • Backup software, either VERITAS NetBackup BusinessServer (<i>includes robotics and drive licenses, plus installation CD</i>) or Solstice Backup, workgroup edition software (<i>includes workgroup and autochanger licenses, media kit, and documentation</i>) <p><i>Note: This unit does not come with a SCSI cable</i></p>
SG- XRACKIT-L9	Sun StorEdge L9 tape autoloader rackmount kit ²
SG-XRMCCARD-L9	Remote management control (RMC) card (10/100BASE-T)
X1065A	SBus differential Ultra/Wide SCSI-2 host adapter
X6541A	Dual-channel differential UltraSCSI host adapter (PCI)
X6749A	Dual-channel differential UltraSCSI host adapter (cPCI)
X902A	2-meter SCSI cable
X979A	12-meter SCSI cable
SG-XMEDLTO100GB-10	LTO data cartridges (package of 10)
SG-XMEDLTOHPCL-5	LTO tape cleaning cartridge (package of 5)

¹ There is an optional rackmount kit for rackmounting the Sun StorEdge L9 tape autoloader.

² Includes sheet metal hardware needed to mount two autoloaders into a standard 19-inch rack.

Converting from Desktop to Rackmount

- Purchase the rackmount kit (one kit for two Sun StorEdge L9 tape autoloaders)
- Remove the skins and feet from the desktop unit, place in rack, and secure as necessary



Sun StorEdge L9 Tape Autoloader Ordering Process: DLT8000

The following depicts typical ordering processes for the Sun StorEdge L9 tape autoloader with DLT8000 technology.

Step Number	Marketing Part No.	Req./Optional
1. Order autoloader	SG-XAUTODLT8D-L9 <i>or</i> SG-XAUTONBU-L9 <i>or</i> SG-XAUTOSBU8-L9	Required
2. Order rackmount kit	SG-XRACKIT-L9	Optional
3. Order RMC card	SG-XRMCCARD-L9	Optional
4. Order required no. of host bus adapters – See matrix under Hardware Compatibility	X6541A (PCI-based) <i>or</i> X1065A (SBus-based) <i>or</i> X6749A (SCSI-cPCI-based)	Required
5. Order SCSI cable	X902A = 2-meter cable X979A = 12-meter cable	Required
6. Order additional media cartridges as appropriate	SG-XMEDDLTCIV-10 (package of 10)	Optional
7. Order additional cleaning cartridges as appropriate	SG-XMEDDLTCL-10 (package of 10)	Optional
8. Order backup/restore application of choice – Solstice Backup™ software – VERITAS NetBackup software	varies	Optional
9. Basic installation for the Sun StorEdge autoloader	NF-B-INST-ETL	Optional

Sun StorEdge L9 Tape Autoloader Ordering Process: LTO

The following depicts typical ordering processes for the Sun StorEdge L9 tape autoloader with LTO technology.

Step Number	Marketing Part No.	Req./Optional
1. Order autoloader	SG-XAUTONBULT-L9 <i>or</i> SG-XAUTOSBULT-L9	Required
2. Order rackmount kit	SG- XRACKIT-L9	Optional
3. Order RMC card	SG-XRMCCARD-L9	Optional



Step Number	Marketing Part No.	Req./Optional
4. Order required no. of host bus adapters – See matrix under Hardware Compatibility	X6541A (PCI-based) <i>or</i> X1065A (SBus-based) <i>or</i> X6749A (SCSI-cPCI-based)	Required
5. Order SCSI cable	X902A = 2-meter cable X979A = 12-meter cable	Required
6. Order media cartridges as appropriate	SG-XMEDLTO100GB-10 (package of 10)	Optional
7. Order additional cleaning cartridges as appropriate	SG-XMEDLTOHPCL-5 (package of 5)	Optional
8. Order backup/restore application of choice – Solstice Backup software – VERITAS NetBackup software	Comes with autoloader	N/A
9. Basic Installation for the Sun StorEdge autoloader	NF-B-INST-ETL	Optional

Ordering Additional Bar Code Labels

Labels for this product are provided by Colorflex, which sells to distributors or tape vendors such as Sun. End users will be directed to their nearest dealer, or may order labels directly from Colorflex via telephone or the Internet with a credit card.

Location	Contact Information
USA	EDP/Colorflex 697 South Pierce Street Louisville, CO 80027 (888) 438-8362
Europe	EDP/Colorflex 43 Redhills Road South Woodham Ferrers Chelmsford, Essex CM35UL UK (44) 1245-322380
Via the Web	http://www.colorflex.com Click on Tri-Optic Media Labels, then either use the "Find a Label" tab to search by Library number, or the "Label Specs" tab to see PDF images of the various labels they produce (arranged by technology).

Note: 25 bar code labels plus 5 cleaning cartridge labels are included with the media label kit that is provided with every autoloader.

Upgrades

For internal information on upgrades, go to the sites <http://ibb.eng/upgrades> or <http://mysales.central> under the worldwide configuration guide.



For external information on upgrades, go to <http://www.sun.com/upgrades>.

Sun StorEdge L9 Autoloader with DLT1 EOL

The Sun StorEdge autoloader with DLT1 technology is being discontinued. The schedule for this end of life (EOL) is as follows:

- Last Order Date: November 22, 2002
- Last Ship Date: February 21, 2003

Service and Support

Warranty

The Sun StorEdge™ L9 autoloader warranty is a 1-year, next business day onsite.

SunSpectrum™ Support Program

The SunSpectrum™ program is an innovative and flexible service offering that allows customers to choose the level of service best suited to their needs, ranging from mission-critical support for maximum solution availability to backup assistance for self-support customers. The SunSpectrum program provides a simple pricing structure in which a single fee covers support for an entire system, including related hardware and peripherals, the Solaris™ Operating Environment software, and telephone support for Sun™ software packages. The majority of Sun's customers today take advantage of the SunSpectrum program, underscoring the value that it represents. Customers should check with their local Sun Enterprise Services representatives for program and feature availability in their areas.

SunSpectrum program support contracts are available both during and after the warranty program. Customers may choose to uplift the service and support agreement to meet their business needs by purchasing a SunSpectrum contract. For more information on the SunSpectrum program offerings refer to the following URL: http://service.central/TS/ESP/SunSpectrum/Feature_Matrix/index.html.

[//service.central/TS/ESP/SunSpectrum/Feature_Matrix/index.html](http://service.central/TS/ESP/SunSpectrum/Feature_Matrix/index.html).

The four levels of SunSpectrum support contracts are outlined below.

SunSpectrum Program Support

Program	Description
Mission-Critical SunSpectrum Platinum™ Support	Designed to support client-server, mission critical solutions by focusing on failure prevention, rapid recovery and year round technical services planning. Support is provided 24 x 7.
Business-Critical SunSpectrum Gold™ Support	Includes a complete package of proactive and responsive services for customers who require maximum uptime for their strategic business-critical systems. Support is provided 24 x 7.
System Coverage SunSpectrum Silver™ Support	Combines the service expertise, responsive on-site support and technical support by telephone and SunSolve™ CD/on-line services. Support is provided 8 a.m. to 8 p.m. Mon. through Fri.
Self-Directed SunSpectrum Bronze™ Support	Provided for customers who rely primarily upon their own in-house service capabilities. Enables customers to deliver high quality service by giving them access to UNIX® expertise, Sun certified replacement parts, software releases and technical tools. Support is provided 8 a.m. to 5 p.m. Mon. through Fri.



Glossary

Archive	The process of moving data from one medium to another where it is stored for later use.
Autoloader	<p>A peripheral device that contains</p> <ul style="list-style-type: none">• A mechanism for moving cartridges sequentially or under program control• Several storage locations for storage media• One drive capable of reading or writing the media• Interface circuitry <p>When commanded by a host system, autoloaders can transport media back and forth between storage locations and the drive residing in the autoloader.</p>
Automatic tape library	A robotic storage and retrieval system for digital linear tape cartridges.
Backup	The process of copying data to a secondary medium for protection in the event that the original copy is lost and needs to be recovered.
Bar code label	The identification label on digital linear tape cartridges.
Bin	A storage receptacle for a tape cartridge.
Compression	A procedure in which data is transformed by the removal of redundant information in order to reduce the number of bits required to represent the data.
Differential	Differential devices send signals by swapping over high and low states between two lines. This is more expensive to implement than the single-ended interface, but reduces interference and allows longer cable lengths.
DLT	Digital linear tape. Linear tape recording technology (contrasted with helical scan). Digital linear tape technology segments tape media into parallel, horizontal tracks, and records data by running the tape past a stationary head. digital linear tape provides higher performance than helical scan technology.
Fast/wide SCSI	Data transfer rate of 20 MB/second. Wide devices can be connected to a narrow SCSI interface, but the extra data lines must be terminated.
Helical scan	A means of recording data in narrow tracks that run diagonally across the tape. Formats include 4-mm, 8-mm, and 19-mm, and half-inch tape.
Host	The host computer system acting as controller for the drive.
Host adapter	A device that connects a peripheral device I/O protocol and medium to the computer system's I/O bus.
Host computer	The computer that issues SCSI commands to control the library robotics.



HSM	Hierarchical storage management. A method for keeping infrequently used data in secondary storage, then restoring it automatically when a user calls for the data. The underlying premise behind HSM is that if the most frequently used data is kept in the fastest (primary) storage, most of the time users perceive the overall system performance as if all the data were in fast storage. HSM software transparently "migrates" least frequently used data to more economical media, then restores it automatically as needed. HSM systems can provide users with performance and economy without sacrificing application portability or storage system transparency.
IOPS	Input/output operations per second, a measure of I/O performance usually used to quote random I/O performance.
Load	The process in which a drive takes in an inserted cartridge and goes online.
Load port	The operator-accessible component of the library that allows cartridges to be import/export loaded and unloaded into/from the library.
Magazine	A holder for tape cartridges used in robotic handling of media.
MSBF	Mean swaps between failure. A measure of reliability for the robotic cartridge handling system, this is the average expected number of full cartridge exchanges (i.e., the cartridge is unloaded from the digital linear tape drive and placed back into its storage slot, and a new cartridge is removed from its storage slot and loaded into the tape drive) between failures of equipment.
MTBF	Mean time between failure. The average expected time between failures of equipment, usually measured in operating hours.
MTTR	Mean time to repair.
Offline	A drive is offline if a tape is currently unloaded or not in the drive. The host has limited access, and cannot perform any commands that would cause tape motion. The host can, however, load a tape if one is inserted and can execute any diagnostic tests that do not require tape motion.
Online	A drive is online when a tape is loaded. The host has access to all command operations, including those that access the tape, set configurations and run diagnostic tests.
PCI	Peripheral component interconnect. PCI is an industry standard bus used in servers, workstations, and PCs.
Pick	Preparation for placing it in another location.
Rear panel	The rear cosmetic panel of the autoloader that contains the AC power switch, AC power receptacle and connectors for attaching external cabling to the library.
Robotics	The library robotics consist of the following components: gripper mechanism, vertical actuator, horizontal actuator, and extension actuator.
SBus	An I/O (input/output) bus used with host systems or boards designed according to SPARC™ processor architecture.



SCSI	Small computer system interface. A standard command specification and command set that enables computers and peripherals to communicate with each other. Sun's current family of tape drives adhere to the SCSI-2 specification.
SCSI address	The octal representation of the unique address (0–7) assigned to a narrow device, or hexadecimal representation of the unique address (0–15) assigned to a wide SCSI device.
Sequential access	Sequential access devices store data sequentially in the order received. Tape devices are the most common sequential access devices. By contrast, disk drives are direct access devices, where data is stored in blocks, not necessarily sequentially.
Single-ended	Single-ended devices transmit signals by setting a line in the cable to a pattern of high and low voltages in relation to a ground line. Single-ended and differential devices must not be mixed on one SCSI bus.
Termination	A SCSI bus (or cable) can have many devices plugged into it, but the end of the cable furthest from the host computer must always be terminated to avoid signals being reflected back and interfering with other signals. The terminator both absorbs signals and provides power to the lines in the cable. For this reason, it must itself be provided with power. Terminators can be of two types, active and passive.
Tape library	Type of tape autochanger that allows media to be accessed randomly.
Throughput	A measure of sequential I/O performance, quoted in MB per second. See IOPS.
Transfer rate	The rate at which data is transferred from one device to another.



Materials Abstract

All materials are available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Product Literature				
– <i>Sun StorEdge™ L9 Tape Autoloader, Just the Facts</i>	Reference Guide (this document)	Training Sales Tool	SunWIN, Reseller Web	122742
– <i>Sun StorEdge L9 Tape Autoloader Customer Presentation</i>	Presentation with Slide Notes	Training Sales Tool	SunWIN, Reseller Web	122743
– <i>Sun StorEdge L9 Tape Autoloader Data Sheet</i>	Data Sheet	Training Sales Tool	SunWIN, Reseller Web	121316
External Web Site				
– <i>Sun StorEdge L9 Tape Autoloader Overview</i>	http://www.sun.com/storage/L9			
Internal Web Site				
– <i>Sun StorEdge L9 Tape Autoloader</i>	http://webhome.ebay/networkstorage/products/L9			

