

Sun StorEdge™ L1000 Tape Library

Just the Facts



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Positioning



Figure 1. Sun StorEdge™ L1000 tape library

Introduction

The growing complexity of heterogeneous distributed systems and the extremely rapid growth of storage requirements are causing considerable interest in enterprise-wide solutions for backing up, restoring, and archiving data. Stemming from this rapid growth is the need for DLTtape libraries with more than 15 cartridges and several terabytes of native storage capacity. At the low end of tape libraries currently offered by Sun, the Sun StorEdge™ L1000 tape library effectively addresses growing data volumes as well as customer concerns about the accessibility and integrity of business-critical data.

Designed for backup of workgroup and midrange servers, the Sun StorEdge L1000 tape library offers 1.2 TB capacity in the reliable DLT 8000 format. It supports up to 30 tape cartridges and up to 4 tape drives with a native aggregate transfer rate of up to 24 MB per second. It can be used with VERITAS NetBackup or Solstice Backup™ software, as well as many other storage management software applications, to easily handle the unattended backup of a 500-GB database in 6 hours or less.

The Sun StorEdge L1000 tape library consists of a robotic system to remove cartridges from the cartridge slots, load them into the drives, unload them from the drives when the operation is complete, and return them to the cartridge slots. In addition to robotic access, the Sun StorEdge L1000 tape library includes an operator-accessible, single-cartridge load port. Two differential fast/wide SCSI-2 buses provide access to the Sun StorEdge L1000 library from the host Sun™ server(s).

The Sun StorEdge L1000 tape library is based on ATL's P1000 tape library.

Storage Management Systems

Today, tape libraries are sold as a collection of tapes organized to perform backup and archival tasks. With increasing numbers of tape libraries and a higher demand for backup and archival solutions in mission-critical 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's 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 a large number of tapes can be daunting and challenging. System administrators require simplified administration when backing up their data to free up time for more important tasks.
- **Integration:** Hardware and software must fit seamlessly into existing customer server and client environments.
- **Backward compatibility:** Read and write to tapes written in DLT 7000 drives on Sun StorEdge L1000 libraries.

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.
- **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 solution 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 as well as software.
- **Availability of robotic mechanisms:** Robotic mechanisms that can handle multiple cartridges increase storage capacity and offer unattended operations.
- **Media stability:** Storage media stability determines the length of time data is readable from stored files.
- **Standards:** Compatible form factors and formats help ensure the usability of older files with current drives.

Key Messages

- **Part of a complete tape backup solution:** Combined with Sun Enterprise™ servers and software (like VERITAS NetBackup and Solstice Backup software), the Sun StorEdge L1000 tape library contributes towards a complete tape backup solution.
- **Heavy-duty tape library for enterprise applications in mission-critical environments:** At Sun's mid-point of its tape library line, the Sun StorEdge L1000 tape library allows customers to backup databases as large as 500 GB overnight.
- **High performance, reliability, and availability:** Hot-pluggable drives afford excellent performance, reliability, and availability.
- **Excellent quality:** Sun has an extremely rigorous qualification testing and design collaboration process.



- **One-stop shopping:** Besides hardware and software, Sun offers maintenance (via a SunSpectrumSM program contract) of the Sun StorEdge L1000 tape library worldwide.

Product Availability

The Sun StorEdge L1000 tape library with DLT 8000 drives is currently available.

The Sun StorEdge L1000 tape library with DLT 7000 drives was announced and started shipping in July 1998. Last order date for these libraries is February 15, 2002.

Target Markets

Typical markets for the Sun StorEdge L1000 tape library include Internet service providers (ISPs), as well as the banking, medical, finance, insurance, retail and distribution, oil and gas, government, and military industries. These organizations use the Sun StorEdge L1000 tape library in several ways including the following:

- Data warehouses
- Medium to large databases
- Enterprise servers
- Data centers

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 library offerings include the following (note that all capacities listed are native):

- Sun StorEdge L9 tape autoloader (360-GB, DLT autoloader)
- Sun StorEdge L20 tape library (800-GB to 2.4-TB DLT library)
- Sun StorEdge L1000 tape library (1.2-TB DLT library)
- Sun StorEdge L180 tape library (3.48-TB 9840 to 6.96-TB DLT 8000 library, or multimedia)
- Sun StorEdge L700 tape library (13.8-TB 9840 library or 27.6-TB DLT library)

Internationalization and Localization

The documentation provided with the Sun StorEdge L1000 tape library is localized into six languages: French, Japanese, German, Swedish, Italian, and Spanish. The touch-screen control panel is in English only.



Selling Highlights

Typical Applications

- Backup for active-use databases up to 500 GB
- To ensure capacity for multiple backups of data — daily, weekly, and monthly — tape capacity should be configured for at least 3 to 5 times the capacity of on-line disk storage.
- Archival
- Hierarchical storage management (HSM)

Software Compatibility

The Sun StorEdge™ L1000 tape library is supported by VERITAS NetBackup, Solstice Backup™ software, and many other storage management software applications.



Enabling Technology

Technology Overview

The Sun StorEdge™ L1000 tape library includes a number of features that make it especially well-suited to backup of enterprise networks and servers. They include the following:

- Hot-pluggable drives for superior RAS
- The Intelligrip mechanism, a highly reliable robotic technology for loading and unloading cartridges
- DLTtape technology, which increases data transfer rates and lowers tape wear-and-tear
- A PCI backplane, which enables the connection of PCI devices
- A bar code reader for identification of tapes and detection of empty bins
- A highly accessible load port, via software or front panel

Highly Reliable Robotic Technology

The Sun StorEdge L1000 tape library uses the Intelligrip mechanism, which moves laterally and vertically on bearings as it loads and unloads cartridges. When moving cartridges to and from the bins (or load ports located on the front door), the Intelligrip robot also moves rotationally.

In addition, unlike other picker arms, which are suspended by rollers and hang off a central assembly, the Intelligrip in the Sun StorEdge L1000 tape library is fully supported on sealed bearings. This arrangement makes the Intelligrip much less prone to misalignment and easier to replace, if needed. The robot is self-calibrating, very reliable, and does not require any scheduled maintenance.

PCI Backplane

The PCI backplane of the Sun StorEdge L1000 tape library includes four PCI edge-connector slots. PCI slots let users upgrade the capabilities of the Sun StorEdge L1000 tape library by plugging in devices which use technology similar to that which is plugged into a personal computer. PCI slots can be used to alter the library configuration to change from SCSI to Fibre Channel or, in single-board computers, to turn the Sun StorEdge L1000 tape library into a network appliance.

DLTtape Technology Overview

DLTtape (DLT) technology uses multi-channel linear serpentine recording. Linear serpentine technology uses a multi-channel tape. Each of the channels passes over its own write element within the head. The use of four channels with the DLT 8000 essentially doubles data transfer rates compared to the DLT 4000 (two channels). The DLTtape is one-half inch (12 mm) wide.

Media and read/write head durability further distinguishes DLTtape technology from other offerings. DLTtape 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 DLTtape products should 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.



DLTtape 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. The current version of DLT 8000 tapes have a native capacity of 40 GB. The DLTtape cost per MB is comparable to 4-mm or 8-mm technology. As DLTtape 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.

Bar Code Reader

The Sun StorEdge L1000 tape library has a bar code reader as a standard feature. The bar code reader allows the library to quickly inventory and track cartridges and is compatible with application software.

The Sun StorEdge L1000 tape library 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 L1000 tape library scans the bin, it instantly recognizes an empty bin and distinguishes between unlabeled cartridges and empty bins. There is no need for additional sensors.

Bar Code Labels

The supported barcode type is a 3 of 9 standard. Code 39 is an alphanumeric bar code designed to encode 26 uppercase letters, 10 digits, and 7 special characters. It can be extended to code all 128 ASCII characters. Each data character encoded in a Code 39 symbol is made up of 5 bars and 4 spaces for a total of 9 elements. Each bar or space is either "wide" or "narrow" and 3 out of the 9 elements are always wide; hence the name code 3 of 9.

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

Load Port

The load port can be accessed via either software or the GUI front panel. If using backup software, it is recommended that the software be used to transfer cartridges from the bins to the load ports (and vice versa), as 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.

The Sun StorEdge L1000 tape library also has two 8-cartridge load packs for easy bulk load/unload of data cartridges.

Hot-Pluggable Drives

During the replacement procedure, only the drive being swapped out is unusable. Library operation continues normally and the unaffected drives remain active.

Note: *Whenever a drive is replaced or added, two actions must be performed. First, ensure that the firmware levels of all drives are the same. Second, calibrate the new drive with the robotic arm. This is done via the front panel.*



Specifications and Configuration

Specifications

Sun StorEdge™ L1000 Tape Library	
Technology	DLT 8000 ¹
Capacity	1.2 TB native (with 30 DLTtape IV)
Sustained Transfer Rate	24 MB/sec. native (concurrent operation of all 4 drives)
Average Cartridge Swap Time	28 seconds (average)
Tape Speed	168 in./sec.
Search Speed	175 in./sec.
Load/Unload Time	37 sec./17 sec.
Average Rewind Time	60 seconds
Maximum Rewind Time	120 seconds
Maximum Access Time	120 seconds
Average Access Time	60 seconds
Maximum Load to BOT	12 sec. formatted, 40 sec. unformatted
Unload from BOT	21 seconds
Repositioning Time	2.4 seconds
Robotics MSBF	2 million load/unload cycles
Robotics MTBF	250,000 power-on hours
DLTtape Cartridge Capacity	40 GB native
Drive MTBF	250,000 hours (100 percent duty cycle)
Drive Head Life	50,000 hours
Media Life	Average 1,000,000 passes, 15,000 uses
Hot-Pluggable Drives	Yes
Touch Screen GUI Panel	Yes
Inventory Time	Less than 3 minutes (fully loaded, with barcodes)
Firmware Level	Drive: V80 Robotics: V2.01
Notes: ¹ DLT 8000 read/write compatible with DLT 7000, and read compatible with DLT 4000	



Physical Characteristics

Feature	Specification
Size, Rackmount Unit	Height = 21 in. (53.3 cm) Width = 17.3 in. (43.9 cm) Depth = 28.5 in. (72.3 cm) Footprint = 3.42 ft. ² (0.32 m ²) Weight = 89 lb. (41 kg) without cartridges
Size, Deskside Unit	Height = 22 in. (55.8 cm) Width = 18.4 in. (46.7 cm) Depth = 28.5 in. (72.3 cm) Footprint = 3.64 ft. ² (0.34 m ²) Weight = 101 lb. (46 kg) without cartridges
Operating Interface	Differential, fast/wide SCSI-3 interface
Diagnostic Interface	RS-232C service port
Control Panel	240 x 320 dpi with 4 x 3 touch screen CCFL Backlight Real-time status display Full diagnostic capability Password protection

Environmental Specifications

Power <ul style="list-style-type: none"> • AC Voltage (Minimum) • AC Voltage (Maximum) • Frequency • Power Inlet (US and Canada) 	90 to 180 VAC 132 to 264 VAC 47 to 63 Hz IEC-320 connector
Operating Environment <ul style="list-style-type: none"> • Humidity • Temperature • Altitude 	20 to 80 percent, noncondensing 10 to 32 degrees C (50 to 95 degrees F) Sea level to 10,000 ft. (3,000 m)
Non-Operating Environment <ul style="list-style-type: none"> • Humidity • Temperature • Altitude 	5 to 95 percent, noncondensing -40 to 66 degrees C (-40 to 151 degrees F) Sea level to 12,000 ft. (12,000 m)
Safety	UL1950 listed, CSA C22.2-No. 950, TUV-EN60950
Emission	FCC Part 15B Class B, CE Mark, VCCI Class 1, C-Tick, GOST, BCIQ
Maximum Heat Dissipation	830 BTU/hour 207 kCal/hour 245 Watts



Configuration Information

Feature	Specification
Number of Drives	1 to 4
Fixed Slots	30
Mailbox Slots (Load Port)	1
Blank DLTtape IV Tape Cartridges	1
Cleaning Cartridge	1
4-Meter, 68-pin to 68-pin, Differential SCSI Cables	1
SCSI Jumper Cable	1 (36 cm or 14 in.)
SCSI Terminators	2 per library
US Power Cable	1
Documentation for Installation and Use	yes
Barcode Labels (Data - package of 99)	1 package
Barcode Labels (Cleaning - package of 33)	1 package
Load Packs (8 cartridge capacity)	2

Notes:

The maximum supported length of the differential SCSI bus is 25 meters. If users require cables longer than the 4-meter cables provided with the library and one-drive upgrade kits, they must order them separately.

The one-drive upgrade kit comes with one 0.18-meter SCSI jumper cable and one terminator.

Drives, Host Adapters, and SCSI Configurations

- Two drives maximum per host adapter with a single SCSI port is recommended. Theoretically, more than two drives can be connected to the same SCSI bus port, but it is not recommended due to poor performance. The drives need at least 6 MB/sec. sustained native streaming mode.
- Two host adapters maximum per Sun StorEdge L1000 tape library (ideal configuration where the SCSI terminators are plugged into the library SCSI buses on the back of the library)
- Recommended that no other devices (such as disks or tape drives) are on any SCSI bus with the tape drives; robotics and two tape drives can be on the same bus
- Robotics have their own SCSI ID and are attached to a SCSI bus with drives 0 and 1
- Additional drives can be installed in the libraries (one to three additional drives)
- An uneven number of drives is not recommended

Note: Sun recommends connecting two DLT 8000 drives per one SCSI host port. However, for more efficiency and throughput, one drive per one SCSI port is also acceptable.



Host Adapters

- Differential fast/wide intelligent SCSI (UDWIS) host adapter (X1065A - SBus)
- Dual-channel differential UltraSCSI host adapter (X6541A - PCI) Note: This adapter is not supported on Sun Enterprise 3X00–6X00 servers.
- cPCI dual channel differential UltraSCSI host bus adapter (X6749A - SBus)



System Compatibility

Operating Environment Support

The Sun StorEdge™ L1000 tape library supports the Solaris™ 2.6, 7, and 8 Operating Environment.

Software Compatibility

The Sun StorEdge L1000 tape library is supported by VERITAS NetBackup 3.2 or later and Solstice Backup™ 5.5.1 or later software.

Hardware Compatibility

Sun Hardware

- Sun Ultra™ 5, 10, 60, and 80 workstations
- Sun Blade™ 1000 workstations
- Sun Enterprise Ultra™ 5S and 10S servers
- Sun Enterprise™ 220R, 250, 420R, and 450 servers
- Sun Enterprise 3000–6000 and 3500–6500 servers
- Sun Enterprise 10000 servers
- Sun Fire™ 280R, V880, 3800, 4800, 4810, and 6800 servers
- Other Sun hardware is not recommended due to Sun StorEdge L1000 tape library performance demands

See the following matrix for maximum configurations and HBA information.

Tape Library/Automation: L1000 Drive Type: DLT 8000 Max. Drives per Sun StorEdge L1000: 4						
HBA Part #	Description	SBus/PCI	Type	Support	Max. Direct Attach	Daisy Chain
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Fire 15000	2	0
X1065A	Ultra Fast Wide	SBus	UDWIS/S	Sun Enterprise 10000	2	0
X6541A, X6749A	Ultra Fast Wide	PCI	UDWIS/P	Sun Fire 4800, 4810, 6800	2	0
X6749A	Ultra Fast Wide	cPCI	UDWIS/cPCI	Sun Fire 38010	2	0
X1065A	Ultra Fast Wide	SBus	UDWIS/S	Sun Enterprise 3500 to 6500	2	0
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Enterprise 250, 450, 220R, 420R	2	0
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Fire 280R, 880	2	0
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Enterprise Ultra 5S, 10S	2	0
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Ultra 60, 80;	2	0



Tape Library/Automation: L1000 Drive Type: DLT 8000 Max. Drives per Sun StorEdge L1000: 4						
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Sun Blade 100, 1000	2	0
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Ultra 10	2	0
X6541A	Ultra Fast Wide	PCI	UDWIS/P	Ultra 5	2	0
X6541A	Ultra Fast Wide	SBus	UDWIS/S	Ultra 2	2	0



System Management

Diagnostics

The Sun StorEdge™ L1000 tape library 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 let the user:

- Initiate library tests
- Monitor library status
- Enable and disable autocleaning
- View statistics
- Generate reports
- Configure the library
- Move actuators
- Move cartridges between bins or between bins and drives
- Test specific phases of robotics operation individually, such as horizontal or vertical movement
- Change passwords

In addition to the built-in diagnostics, the Sun StorEdge L1000 tape library includes an extensive suite of system tests, contained on the service CD. These tests are SCSI or via serial port and run on any Sun™ platform (except X86).

Graphical User Interface

The Sun StorEdge L1000 tape library's control panel contains a large, easy-to-read 3-1/2-inch x 4-3/4-inch (9-cm x 12-cm) touch screen with 240 x 320 dpi resolution. It provides an intuitive "touch-and-select" graphical user interface (GUI) with the look and feel of an Internet browser for setup, administration, monitoring, and diagnostics. The backlit display can be read in virtually any light. The GUI presents a clear visual as to the status and activity of the library.

With input capability built into the touch screen, there are no mechanical or membrane buttons to decipher. Each function is clearly labeled.

The control panel is designed to enhance security as well as usability with three different security levels. A password screen containing a graphical keyboard representation is presented whenever a user attempts an operation that is not permitted by the current security level. To enter the password, users simply press the appropriate keys displayed on the screen.



Software Compatibility

The Sun StorEdge L1000 tape library is supported on leading database applications as follows.

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™ systems	X	X
Sybase	X	X

Note: If a customer wishes to use VERITAS NetBackup BusinessServer software with a Sun StorEdge L1000 library, the customer is limited to the use of two drives. If a customer wishes to use all four drives of the Sun StorEdge L1000 library, the customer must purchase the DataCenter version of VERITAS NetBackup software.

Software Commands

VERITAS NetBackup and Solstice Backup storage management applications have their own documentation, which helps the user get set up and running with tape automation products like the Sun StorEdge L1000 tape library.

The AutoLoad that is provided with this library 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 only import tapes when none of the tape drives have tapes loaded in them.

The Sun StorEdge L1000 tape library is supported in sequential mode by standard UNIX® commands such as `tar` and `ufsdump` without modification to the kernel in the Solaris™ Operating Environment (version 2.6 or later). It is not recommended to use the library in sequential mode, as autoloaders are better positioned for such use.

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.

Controller

If the controller fails, the library 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 library is "dead" to the outside world (even in a manual mode) if a failure occurs.

This has no impact on the data stored on the tapes in the library. The library and tape drives can still be powered on and the tapes loaded/unloaded manually. This is not recommended, however, due to the



unique load/unload characteristics of the automation-modified tape drives. It is advised to contact Enterprise Services for technical support when this is required.

Racks

The Sun StorEdge L1000 tape library currently fits into and is supported in the 72-inch rack.

Tape Drive Cleaning

Cleaning cartridges can be put into any open slot in the library. Once the library performs an inventory, it identifies to the application software where the cartridge is for accessibility.

Ordering Information

Part Numbers

The part numbers for the Sun StorEdge™ L1000 tape library are listed below.

Part Number	Description
SG-XLIBDLT81-L1000	Sun StorEdge L1000 tape library (1-drive configuration, deskside)
SG-XLIBDLT8R-L1000	Sun StorEdge L1000 tape library (1-drive configuration, rackmount)
SG-XTAPDLT8-L1000	Sun StorEdge L1000 tape library (1-drive upgrade kit)
X6541A	PCI card (only for Sun Enterprise 450 server)
X1065A	SBus ultra differential fast/wide intelligent SCSI-2 host adapter
X6749A	cPCI dual channel differential UltraSCSI host adapter
SG-XMEDDLTCIV-10	DLTtape IV tape (package of 10)
SG-XMEDDLTCL-10	DLTtape cleaning cartridges (package of 10)

Ordering Additional Bar Code Labels

Contact: Lowery Computer Products, John Mercado @ 408-866-9460 Ext.127.
Fax number: 408-866-9463

Part Number	Description
621-0201-01	3 of 9 bar code data labels (set of 264)

Service and Support

Warranty

The Sun StorEdge™ L1000 tape library with DLT 8000 technology comes with a 1-year, next day on-site warranty. Customers should be encouraged to purchase the appropriate SunSpectrum™ program that suits their needs.

SunSpectrum 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.

The four levels of SunSpectrum support contracts are outlined below.

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.

Sun Enterprise Services also offers TapeStart, which is installation of this library at the customers site. The order number for this is NF-B-INST-ETL. Contact the local Sun Enterprise Services representative for further information on this.



Sun Professional Services

Sun Professional Services offers the Sun Professional Services Tape Library Implementation Service, which delivers a working Sun StorEdge L1000 tape library backup system. Generally speaking, it integrates the hardware and software components together. This provides customers with a platform that can be used to develop and implement their production backup and restore policies. The Sun Professional Services Tape Library Implementation Service addresses the following:

- Configuring VERITAS NetBackup or Solstice Backup™ software with the backup server system and tape library
- Functional testing of the backup server with an existing client system using single files of UFS for backup and restores.

The customer deliverables are:

- Tape library tested and functional in a production environment
- Full configuration documentation

Hardware installation is not covered under the Sun Professional Services Tape Implementation Service. The hardware must be installed prior to this service being performed. The Sun Professional Services Tape Implementation Service covers configuration of the tape library as well as configuration and installation of VERITAS NetBackup or Solstice Backup software.

The Sun Professional Services Tape Implementation Service does not address any database backup. This service can be provided as a separate quote by Sun Professional Services, however.

This service provides a basic functional, tested backup and restore platform, but does not develop any policies, procedures, nor is the backup and restore platform ready for full production. Additional service needs that customers may have can be discussed with the Sun Enterprise Support Service Sales Representative.

More information about the Sun Professional Services Tape Library Implementation Service can be found on the Sun Professional Services web site. On that site is a Sales Tool section with has an electronic service brief and a sales guide. The service brief is a piece of collateral which may be printed and given to the customer. Go to the URL:

http://sunps.central/Services/Storage/tape_lib_impl.html

A Statement of Work must be completed and approved by the customer and included with the Sales Quote. This ensures a successful Sun Professional Services Tape Library Implementation Service for the customer. The Statement of Work details what activities are performed by Sun Professional Services, the responsibilities of the customer, as well as specific terms and conditions of the service. Contact the local Sun Enterprise Support Service Sales Representative as early in the sales cycle as possible to complete this SOW and to help ensure the included Sun Professional Services can meet customers' needs.



Glossary

Actuators	Robotic components that move inside the library to manipulate cartridges. These include the gripper, extension axis, and vertical and horizontal axes.
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, autochangers 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 DLTtape 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 DLTtape 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.
Control panel	The panel on the front of the library that contains the Status Display Area, as well as the indicators and control button.
cPCI	The "c" in cPCI stands for compact. PCI connectors on board-level devices can use compact PCI (cPCI) connectors.
Differential	<i>See</i> Single-ended.
DLT	Linear tape recording technology (contrasted with helical scan). DLTtape technology segments tape media into parallel, horizontal tracks, and records data by running the tape past a stationary head. DLTtape provides higher performance than helical scan technology.
Fast/wide SCSI	Data transfer rate of 20 MB/sec. 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.
LCD	Liquid crystal display.
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.
MCBF	Mean cycles between failure. An activity-dependent measure of reliability for a robotic cartridge handling system.
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 DLTape 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 library 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	SCSI devices can be single ended or differential. 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. Differential devices send signals by swapping over high and low states between two lines. This is more expensive to implement, but reduces interference and allows longer cable lengths. Single-ended and differential devices must not be mixed on one SCSI bus.
SWIS/S	Single-ended, wide, intelligent SCSI/SBus host adapter.
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. <i>See</i> IOPS.
Transfer rate	The rate at which data is transferred from one device to another, for example from the host computer to the tape drive during backup.



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 L1000 Library, Just the Facts</i>	Reference Guide (this document)	Training Sales Tool	SunWIN, Reseller Web	89411
– <i>Sun StorEdge L1000 Library Data Sheet</i>	Data Sheet	Training Sales Tool	SunWIN, Reseller Web	82047
External Web Site				
– <i>Sun StorEdge L1000 Library Overview</i>	http://www.sun.com/storage/L1000/			
Internal Web Site				
– <i>Internal Sun StorEdge Product Overview</i>	http://webhome.ebay/networkstorage/products/L1000			

