Sun StorEdge™ L3500 Tape Library

Just the Facts

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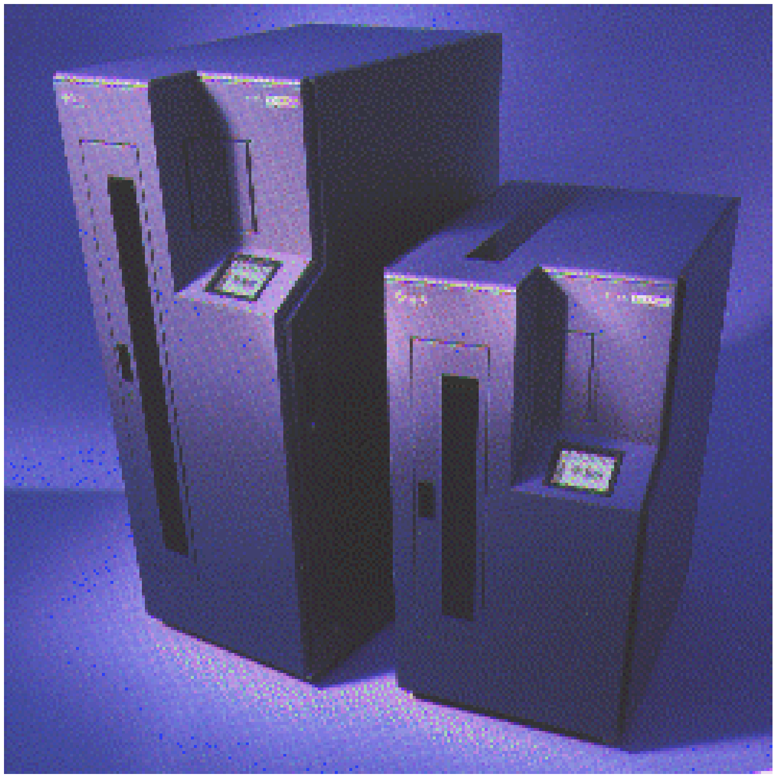

Figure 1. The Sun StorEdge™ L1800 tape library (right) and the Sun StorEdge L3500 tape library (left)

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 need for digital linear tape libraries with more than 50 cartridges and several terabytes of native storage capacity. The Sun StorEdge™ L3500 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 departmental and enterprise servers, the Sun StorEdge L3500 tape library offers approximately 3.5-TB capacity in the reliable DLT™ 7000 format. Briefly speaking, it supports up to 96 tape cartridges accessible via up to 7 tape drives with a native aggregate transfer rate of up to 35 MB per second. It can be used with Sun StorEdge Enterprise NetBackup™ or Solstice Backup™, as well as many other storage management software applications, to easily handle the unattended backup of a 1-TB database in 8 hours or less.

The Sun StorEdge L3500 tape library also 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 L3500 tape library includes an operator-accessible load port that can handle four cartridges. Four differential fast/wide SCSI-2 buses provide access to the Sun StorEdge L3500 tape library from the host Sun™ server(s).

The Sun StorEdge L3500 tape library is based on ATL's 7100 series of tape libraries.

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 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 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.

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 will determine the length of time data will be readable from stored files.
- **Standards:** Compatible form factors and formats will 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 Sun StorEdge Enterprise NetBackup and Solstice Backup), the Sun StorEdge L3500 tape library comprises an essential part of a complete tape backup solution.
- **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 SunSpectrum℠ contract) of the Sun StorEdge L3500 tape library (worldwide).

Product Availability

The Sun StorEdge L3500 tape library was announced on July 15, 1997.

Target Markets

Typical markets for the Sun StorEdge L3500 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 will use the Sun StorEdge L3500 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. In addition to the Sun StorEdge L3500 library, Sun's tape library offerings include the following (note that all capacities listed are native).

- Sun StorEdge 7-GB, 8-mm tape drive
- Sun StorEdge 20-GB, 8-mm tape drive
- Sun StorEdge DDS-3 tape autoloader
- Sun StorEdge L280 tape library (DLT autolaoder)
- Sun StorEdge L400 tape library (8-mm library)
- Sun StorEdge L1000 tape library (1.0-TB DLT library)
- Sun StorEdge L1800 tape library (1.8-TB DLT library)
- Sun StorEdge L11000 tape library (11.4-TB DLT library)

Year 2000 Compliance

The Sun StorEdge L3500 tape library is Year-2000 compliant. Sun StorEdge LibMON™ 1.0 software, which was non-Year-2000 compliant, is no longer bundled with the Sun StorEdge L3500.

Internationalization and Localization

The documentation provided with the Sun StorEdge L3500 tape library is in English only.

Typical Applications

- Backup for active-use databases up to 3.5 TB

  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 storage.
- Archival
- Hierarchical storage management (HSM)

Software Compatibility

The Sun StorEdge L3500 tape library is supported by Sun StorEdge Enterprise NetBackup™, Solstice Backup™, and many other storage management software applications.

Technical Overview

The Sun StorEdge™ L3500 tape library includes a number of features that makes it especially well-suited to backup enterprise networks and servers. They include

- The Intelligrip mechanism—a highly reliable, self-calibrating robotic technology for loading and unloading cartridges
- Digital linear tape technology—which increases data transfer rates and lowers tape wear-and-tear
- An adaptive cache buffering scheme—allows for automatic adjustment of data transfer rate
- 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 L3500 tape library uses the Intelligrip mechanism, which moves laterally and vertically on bearings as it loads and unloads cartridges. In addition, unlike other picker arms, which are suspended by rollers and hang off a central assembly, the Intelligrip in the Sun StorEdge L3500 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 also self-calibrating, very reliable, and requires scheduled maintenance approximately once a year (lubrication).

Digital Linear Tape Technology Overview

Digital linear tape technology uses multichannel linear or serpentine recording. Linear or 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 DLT™ 7000 essentially doubles data transfer rates compared to the DLT 4000 (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.

The digital linear tape is one-half inch (12 mm) wide. This width allows for more data to be recorded on digital linear tape than 8-mm or 4-mm tapes, offering higher capacity (35 GB on DLT 7000 tapes versus 20 GB or 12 GB for 8-mm and 4-mm tapes, respectively).

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. Note, however, that future digital linear tape drives and media will have the same form factor. Thus, they will be compatible with today's Sun StorEdge L3500 tape library.

Digital linear tape offers several advanced features, such as full SCSI-2 command set implementation, built-in diagnostics, and a high (native) data transfer rate of 5 MB per second. The current version of DLT 7000 tapes have a native capacity of 35 GB. The digital linear tape cost per MB is comparable to 4-mm or 8-mm technology.

As the digital linear tape technology is evolving to even higher capacity tapes and higher transfer rates, it is a suitable option for enterprise environments where storage needs are increasing rapidly.

Adaptive Cache Buffering Scheme

The digital linear tape transfer rate could surpass that of many host computers. Digital linear tape overcomes this by using an adaptive cache buffering scheme. Host data rates are monitored and digital linear tape automatically adjusts its transfer rate to match that of the system. This minimizes the number of times the drives have to stop and reposition.

Bar Code Reader

The Sun StorEdge L3500 tape library has a bar code reader as a standard feature. The bar code reader enables the library to quickly inventory and track cartridges. There is no camera technology, nor is one needed. The Sun StorEdge L1800 tape library uses an IR scanner to read the barcodes. Despite what some competitors say, camera technology is not far superior, but it is more expensive.

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.

ATL sells bar code labels. Customers can call Mari Burke in ATL’s sales administration department at (949) 856-7880 to order these.

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 will keep 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.

Specifications and Configuration

Specifications

Sun StorEdge™ L3500 Tape Library	
Technology	DLT™ 7000[1]
Capacity	3.5 TB native (with 100 digital linear tape, compact IV tapes)
Sustained Transfer Rate	35 MB/sec. native (concurrent operation of all 7 drives)
Average Cartridge Swap Time	33 seconds (average)
Load/Unload Time	2.5 minutes/2.0 minutes
Average Rewind Time	60 seconds
Maximum Rewind Time	120 seconds
Maximum Access Time	120 seconds
Average Access Time	60 seconds
Unload Time from BOT	17 seconds
Tape Speed	160 inches/second
Search Speed	175 inches/second
Robotics MSBF	2 million load/unload cycles
Robotics MTBF	170,000 power-on hours
Digital Linear Tape Cartridge Capacity	35 GB native[2]
Drive MTBF	200,000 hours (100 percent duty cycle)
Drive Head Life	30,000 hours
Media Life	Average 1,000,000 passes, 15,000 uses
Touch Screen GUI Panel	Yes
Inventory Time	Less than 6 minutes (fully loaded, with barcodes)
Firmware Level	Drive: V72[3] Robotics: V2.20

[1] DLT 7000 drives have the capability to both *read* and *write* in a DLT 4000 mode. The DLT 7000 drive is read compatible back to the DLT 2000 product, which Sun does not offer.

[2] Sun customers typically experience a 1.4:1 compression ratio.

[3] When drives are replaced or added in the field, there have been occurrences where “down rev’d” drives are installed (Enterprise Services, for example, does not purge their field stock when new revs are released). Ensure that when drives are replaced or serviced, that all drives are at the same firmware revision. Also, calibrate the new drive with the robotic arm via the front panel.

Physical Characteristics

Size	Height: 56 inches (142 cm) Width: 23 inches (58 cm) Depth: 36 inches (91 cm)
Footprint	5.75 ft^2 (0.47 m^2)
Weight	500 pounds (227 kg) without cartridges
Operating Interface	Differential, fast/wide SCSI-2 interfaces
Diagnostic Interface	RS-232C service port
Control Panel	240 x 320 dpi with 8 x 10 touch screen CCFL Backlight Real-time status display Full diagnostic capability Password protection

Environmental Specifications

Power	
• Standby	270W, 350 VA (nominal)
• Average Running	310W, 405 VA (100% duty cycle)
• Peak Running	340W, 430 VA (worst case)
• Electrical Connection to Power	IEC 320 C19 male connector inside rear door
Operating Environment	
• Humidity	20 to 80 percent, noncondensing
• Temperature	15 to 32 degrees C (59 to 90 degrees F)
• Altitude	Sea level to 10,000 ft. (3,000 m)
Non-Operating Environment	
• Humidity	5 to 95 percent, noncondensing
• Temperature	-40 to 60 degrees C (-40 to 151 degrees F)
• Altitude	Sea level to 12,000 ft.
Safety	UL1950 listed CSA C22.2-No. 950 TUV-EN60950
Emission	FCC Part 15B Class A CE Mark VCCI Class 1
Heat Dissipation (Operating)	1,057 BTUH 310 Watts

Configuration Information

	2-Drive Configuration	7-Drive Configuration
Number of Drives	2	7
Fixed Slots	96	96
Mailbox Slots (Load Port)	4	4
Barcode Reader	1	1
Blank Digital Linear Tape, Compact IV Tape Cartridges	7	7
Cleaning Cartridge	1	1
4-meter, 68-pin to 68-pin, Differential SCSI cables[1]	1	4
SCSI Terminators	1	4
US Power Cable	1	1
Documentation for Installation and Use	yes	yes

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

Note: *A one-drive upgrade kit consists of one DLT 7000 drive and one terminator.*

Drives, Host Adapters, and SCSI Configurations

- Two drives maximum per host adapter (recommended)

  You can theoretically connect more than two drives to the same bus, but it is not recommended due to poor performance reasons
- One host adapter for a two-drive Sun StorEdge L3500 tape library (ideal configuration where the SCSI terminators are plugged into the library SCSI buses in the back of the library)
- Four host adapters for a seven-drive Sun StorEdge L3500 tape library (ideal configuration where the SCSI terminators are plugged into the library SCSI buses in the back of the library)
- Recommended that no other devices (such as disks or tape drives) are on any SCSI bus with the drives
- 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 (1 to 5 additional drives can be added to the two-drive configuration)

Note: *It is theoretically possible to have one SCSI bus per tape drive, although this is not recommended. Note that disk bandwidth should be configured to keep the tapes streaming. To keep from back-hitching (i.e., keep the tapes streaming), the tape drives need to receive data at a rate no less than 3.5 MB/sec. Thus, to keep the data streaming at a minimum of 3.5 MB/sec., it is recommended that the library be configured with two drives per SCSI bus.*

Host Adapters

- Differential fast/wide intelligent SCSI (DWSI) host adapter (X1062A)
- Dual-channel differential UltraSCSI host adapter (PCI-based) (X6541A)

The X1065A host adapters are NOT compatible with Sun's tape libraries. They are only compatible with disk subsystems.

X6541A host adapters can support four DLT drives. The speed of the SCSI host adapter is not the performance factor; it is the speed of the tape drive on a bus. Both the X1062A and X6541A are faster than the tape drive. Since the X6541A can handle 40 MB/sec., it can support 4 drives streaming at 5 MB/sec. The X6541A is a dual port, ultra fast wide host adapter. "Dual port" means that the host adapter can independently communicate to many SCSI devices.

The Sun StorEdge L3500 tape library is not supported on any on-board host adapter. A minimum of one differential host adapter is required.

System Compatibility

Operating Environment Support

- Solaris™ 2.5.1 and 2.6 operating environments
- Modification to `st.conf` file required for Solaris 2.5.1 and 2.6 operating environments

Hardware Compatibility

Sun Hardware

Supported Server	Maximum Number of Sun StorEdge L3500 Tape Libraries Supported
• Sun Enterprise™ 1 server	1
• Sun Enterprise 2 server	1
• Sun Enterprise 150 server	1
• SPARCserver™ 1000E	1
• SPARCcenter™ 2000E	1
• Sun Enterprise 250 server	1
• Sun Enterprise 450 server	1
• Sun Enterprise 3000–6000 and 3500–6500 servers	2
• Sun Enterprise 10000 server	3

Non-Sun Hardware

Support on non-Sun platforms is expected in the near future. The first platform planned to be supported is Microsoft Windows NT, which is expected in the fourth quarter of calendar year 1999.

Note: *The Sun StorEdge L3500 tape library can be plugged into DEC/Compaq, EMC, HP, Siemens, and other host systems with SCSI functionality. This does not mean, however, that all such possible configurations have been subjected to Sun's rigorous qualification testing or that they are supported by Enterprise Services or by SunSpectrum℠ contracts.*

Diagnostics

The Sun StorEdge™ L3500 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 you:

- 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 L3500 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).

User Interfaces

Sun StorEdge LibMON™

Sun StorEdge LibMON™ software is free-of-charge with each Sun StorEdge L3500 tape library. This software enables remote administration via an Internet browser. Other features include

- Event logging
- Even notification via e-mail, pager, and SNMP alerts
- Remote library configuration
- Remote library diagnostics
- Visual status monitoring of library inventory, cartridges, and drives

Graphical User Interface

The Sun StorEdge L3500 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 with or without room illumination. The GUI clearly shows the status and activity of the library.

Compared to the competitive GUIs with small, character-only LCD displays, the Sun StorEdge L3500 tape library GUI's feature-rich touch screen control panel is clearly superior.

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

In addition to ease of use, the control panel enhances security by providing access to five different security levels. A password screen containing a graphical keyboard 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 Commands

Sun StorEdge Enterprise NetBackup™ and Solstice Backup™ storage management applications have their own documentation, which will help you get set up and running with tape automation products like the Sun StorEdge L3500 tape library.

Two useful utilities, AutoClean and AutoLoad, that are provided with this library, are very useful, but cannot be enabled when used with the current versions of Sun StorEdge Enterprise Netbackup and Solstice Backup. Their functionality can be emulated through the use of scripted solutions using the backup product command set. Also, AutoLoad should only be enabled and only import tapes when none of the tape drives have tapes loaded in them.

The Sun StorEdge L3500 tape library is supported in sequential mode by standard UNIX® commands like `tar` and `ufsdump`. 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 your operating system. The Solaris Handbook for SMCC Peripherals also describes how to determine which SCSI target IDs are available and how to configure your system after installation.

The Sun StorEdge L3500 Software Interface Guide is available on the service CD, which is only provided in service kits. Enterprise Services needs to be contacted to purchase this kit.

Software Compatibility

The Sun StorEdge L3500 tape library is supported by Sun StorEdge Enterprise NetBackup, Solstice Backup, and many other storage management software applications.

If Sun StorEdge Enterprise NetBackup is used, a Tier 2 robotics license is needed.

The `st.conf` file needs to be modified for the system to recognize the digital linear tape drives in the library. Instructions on how to modify the file come with the library.

The Sun StorEdge L3500 library is supported on leading database applications as follows:

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

Application Software

Sun StorEdge LibMON software provides local and remote web-based monitoring of the library. It is free-of-charge with the Sun StorEdge L3500 tape library. Ordering information is available later in this document.

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, however. 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.

Tape Drive Cleaning

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

Ordering Information

Sun StorEdge™ L3500 Tape Library

X6079A	Sun StorEdge™ L3500 tape library (2-drive configuration)
X6080A	Sun StorEdge L3500 tape library (7-drive configuration)
X6063A	Sun StorEdge L3500 tape library (1-drive upgrade kit)
LMA9S-200-E999	Sun StorEdge LibMON™ 2.0 (media, documentation, and license)
LMA9S-200-E99C	Sun StorEdge LibMON 2.0 Japanese (media, documentation, and license)
X6541A	Dual-channel differential UltraSCSI host adapter (PCI)
X1062A	SBus differential fast/wide intelligent SCSI-2 host adapter
SG-XMEDDLTCIV-10	Digital Linear Tape compact IV tape (package of 10)
SG-XMEDDLTCL-10	Digital Linear Tape cleaning cartridges (package of 10)

Service and Support

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 area.

FEATURE	SUNSPECTRUM PLATINUM℠ Mission-critical Support	SUNSPECTRUM GOLD℠ Business-critical Support
Systems Features		
Systems approach coverage	Yes	Yes
System availability guarantee	Customized	No
Account Support Features		
Service account management team	Yes	No
Personal technical account support	Yes	Yes
Account support plan	Yes	Yes
Software release planning	Yes	No
On-site account reviews	Monthly	Semi-annual
Site activity log	Yes	Yes
Coverage / Response Time		
Standard telephone coverage hours	7 day/24 hour	7 day/24 hour
Standard on-site coverage hours	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday
7 day/24 hour telephone coverage	Yes	Yes
7 day/24 hour on-site coverage	Yes	Option
Customer-defined priority setting	Yes	Yes
• Urgent (phone/on-site)	Live transfer/2 hour	Live transfer/4 hour
• Serious (phone/on-site)	Live transfer/4 hour	2 hour/next day
• Not critical (phone/on-site)	Live transfer/ customer convenience	4 hour/customer convenience
Enhanced Support Features		
Mission-critical support team	Yes	For urgent problems
Sun Vendor Integration Program (SunVIP℠)	Yes	Yes
Software patch management assistance	Yes	No
Field change order (FCO) management assistance	Yes	No

FEATURE	SUNSPECTRUM PLATINUM℠ Mission-critical Support	SUNSPECTRUM GOLD℠ Business-critical Support
Remote Systems Diagnostics		
Remote dial-in analysis	Yes	Yes
Remote systems monitoring	Yes	Yes
Remote predictive failure reporting	Yes	Yes
Software Enhancements and Maintenance Releases		
Solaris enhancement releases	Yes	Yes
Patches and maintenance releases	Yes	Yes
Sun unbundled software enhancements	Option	Option
Internet and CD-ROM Support Tools		
SunSolve™ knowledge database	Yes	Yes
SunSolve EarlyNotifier℠ service	Yes	Yes

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 will be stored for later use.
Autoloader	A peripheral device that contains • 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 When commanded by a host system, autochangers can transport media back and forth between storage locations and the drive residing in the autoloader.
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.
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	*See* Single-ended.
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 per second. Wide devices can be connected to a narrow SCSI interface, but the extra data lines must be terminated.
GB	Gigabyte. A GB is 1 billion (1,000,000,000) bytes.

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 will 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 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 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™ 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.
TB	Terabyte. A disk or tape TB is 1 trillion (1,000,000,000,000) bytes, or 1,000 GB.

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, 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 #
References				
– *Sun Product Intro: Sun Enterprise Tape Library™ ETL 4/1800 and ETL 7/3500 Options and Upgrades*	Introduction E-mail	Sales Tool	SunWIN, Reseller Web, E-mail	70022
– *Sun Enterprise Tape Library Family Datasheet*	Data Sheet	Sales Tool	SunWIN	68746
– *Sun Product Intro: Sun StorEdge LibMON™ 2.0*	Introduction E-mail	Sales Tool	SunWIN, Reseller Web, E-mail	92394
– *Sun StorEdge LibMON 2.0 Datasheet*	Data Sheet	Sales Tool	SunWIN	92837
– *Sun StorEdge LibMON 2.0 Just-The-Facts*	Just The Facts	Sales Tool	SunWIN	92987
– *Sun Product Intro: Mass Storage: Media for Removable Tape Products*	Introduction E-mail	Sales Tool	SunWIN, Reseller Web, E-mail	96803
External Web Sites				
– *Sun StorEdge™ L3500 Tape Library Product Overview*	`http://www.sun.com/storage/ssl/L1800-L3500/`			
– *Sun StorEdge LibMON Product Overview*	`http://www.sun.com/storage/software/lib_monitor.html`			