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# Safety Regulations

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## Owner's Record

The model and serial numbers are located on the rear. Record the serial number in the space provided below.  
Refer to them whenever you call upon your Sony dealer regarding this product.

Model No.

Serial No.

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## Information

### **WARNING**

To prevent fire or shock hazard, do not expose the drive to rain or moisture.

To avoid electrical shock, do not open the cabinet.  
Refer servicing to qualified personnel only.

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# How to Use this Guide

This Guide describes the DDS Autoloader TSL-9000 and how to take care of it. Please read it carefully before using the drive, and keep it handy for future reference.

The Guide consists of two parts plus the specifications. Refer to the parts that relate to your use of the drive.

**Chapter 1** describes the features of the DDS Autoloader, its system components, and the name and function of each part.

**Chapter 2** describes how to use the drive, including how to insert and remove the magazine and cartridges, how to take care of the drive, cartridges and magazines, and how to clean the drive heads.

**Appendix** provides the major specifications of the TSL-9000.

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# Chapter 1 Introduction

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## About the DDS Autoloader

Congratulation on your purchase of the Sony DDS-3 drive SDT-9000.

The Sony TSL-9000 Autoloader is a DDS drive unit and cartridge changer mechanism that provides high capacity data storage using 4-mm DAT (Digital Audio Tape) technology. The TSL-9000 achieves high data reliability by read-after-write, an additional level of Error Correction Code and other features.

Recording media can be loaded in all 8 cartridge slots of the magazine, or, depending on the application software, an 8-cartridge magazine can be loaded with 1 cleaning cartridge and 7 recording cartridges. This configuration results in the TSL-9000 having a typical total capacity of 168 GB with data compression.

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### Features

The TSL-9000 DDS Autoloader has the following features:

- A highly durable linear guide mechanism provides automatic loading/unloading of data cartridges to the built-in SDT-9000 DDS drive unit .
- The Digital Data Storage format provides a huge data storage capacity on DDS-3 data cartridges.
- Read-After-Write Function and third-level error correction code guarantee high data reliability.
- When data is recorded using data compression together with 125-meter DDS-3 data cartridges, you can record as much as to 24 to 48 gigabytes of data on a single data cartridge.\*1
- Stored data is automatically checked for compression. The drive unit can read uncompressed data written by earlier-model drives.
- Complies with the SCSI-2 standard (ANSI SCSI-2 X3T9.2/86-109 REV.10C). Supports both the SCSI-2 sequential access device command set and the media changer device command set.
- Read/Write operation is available with DDS-3, DDS-2, DDS and DDS-DC format.

\*1 The degree of compression attained while recording data varies according to system environment and data type.

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## Useable Cartridges

Data cartridges used with the TSL-9000 must be marked with the DDS-3 or DDS-2 or DDS-1 logo.



DDS-3 Logo



DDS-2 Logo



DDS-1 logo

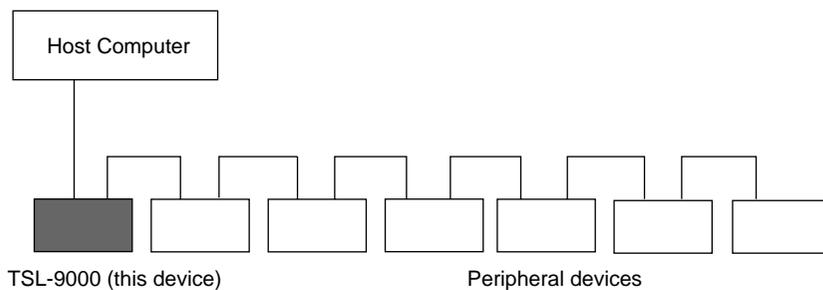
### Caution:

Be sure to use only the cartridges designed specifically for DDS (do not use DAT music cartridges).

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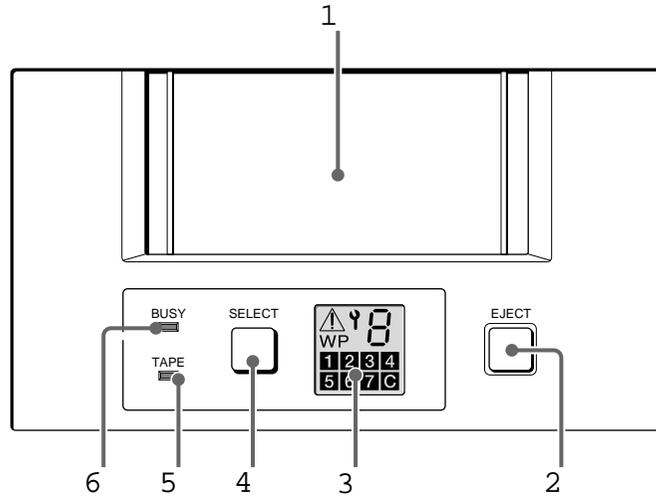
## System Components

The TSL-9000 connects to the host computer via a SCSI-2 interface.



# Part Names and Functions

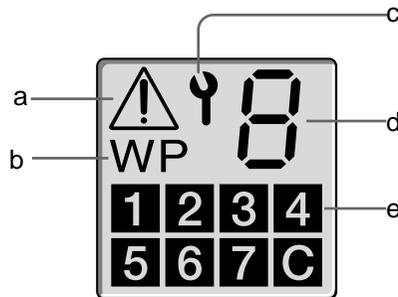
## Front Panel



- 1 Magazine receptacle  
See page 16 and 18 for information on inserting and removing a magazine. See page 11 for information on inserting data cartridges.
- 2 EJECT Button  
When pushed, the data cartridge in the DDS drive is returned to the magazine, then the magazine is ejected from the drive.

### 3 LCD panel

The liquid crystal display contains five indicators that indicate the status of the DDS autoloader. These indicators are as follows.



#### a WARNING indicator

This indicator lights upon occurrence of a condition that requires caution. The specific type of condition is indicated by the numeral that is displayed by the 7-segment numeric indicator.

#### b Write-Protect indicator

This indicator lights when a write-protected data cartridge is loaded into the drive. Write protection can be set using the write-protect tab on either the data cartridge or the magazine.

#### c ERROR indicator

This indicator lights when an error occurs.

If this indicator lights, please contact your service center for assistance.

#### Note:

When an error occurs, you may be able to eject the magazine and cartridges remaining in the magazine by pressing and holding the EJECT button for 10 seconds or longer. If the error indicator lights and the 7-segment numeric indicator displays “4” after the magazine is ejected, a cartridge is still present inside the DDS drive.

#### d 7-segment numeric indicator

Ordinarily, this indicator displays the number of the data cartridge that is currently loaded into the DDS drive.

When the SELECT button is pressed, this indicator shows the number of the cartridge that has been selected.

When the WARNING indicator lights, it displays a numeral indicating the specific type of warning condition.

Numerals displayed and their meanings are as follows.

When WARNING indicator lit	
 1	Indicates a cleaning request. (Drive needs cleaning.)
 2	End of tape reached during cleaning.
 3	DDS cartridge loaded with incorrect orientation or slide shutter is positioned incorrectly. Remove all cartridges from the magazine, then reload them correctly.
 4	Magazine does not contain correct number of cartridges.

 “1” is displayed when:  
the drive automatically requests head cleaning after every 24 hours of drum rotation, or the drive is unable to read or write data due to debris on the read/write head.

If  “1” appears frequently, the cartridge should be replaced.

**e Cartridge number indicator**

The eight numbered boxes on the bottom of the LCD screen show which slots in the magazine contain cartridges. A blinking number indicates that a cartridge is being loaded. A number does not appear if a cartridge is not present in the magazine, and turns on when the cartridge is returned to the magazine.

**4 SELECT Button**

Push to select the number of a data cartridges set into the magazine. The selected cartridge is loaded into the DDS drive.

**5 TAPE Indicator**

Lights green when a data cartridge is loaded into the SDT-9000. The indicator flashes while a cartridge is being loaded or unloaded.

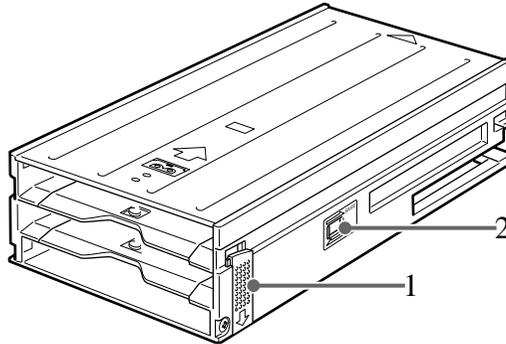
**6 BUSY Indicator**

Lights green when the SCSI interface is ready for data transfer. This indicator flashes under the following conditions:

While data is being read from the cartridge loaded into the DDS drive, while searching for data, or while the cartridge is being rewound:	Green lamp flashes with equal-length on and off intervals.
While data is being written to the cartridge loaded into the DDS drive:	Yellow lamp flashes with equal-length on and off intervals.

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## Magazine



- 1 Stopper**  
Prevents loaded cartridges from slipping out of the magazine.  
See page 11 and 13 for information on loading and removing cartridges.
- 2 Write-protect tab**  
Used to inhibit writes to data cartridges. Sliding this tab to the right write-protects all data cartridges, whether or not write protection is set on the individual data cartridges.

### Caution:

The write protection status is determined by checking for the reflective plate on the write-protect tab. In order to ensure correct determination of the status, keep the plate reasonably clean, and never affix labels or the like over the write protect tab.

# Chapter 2 Operation

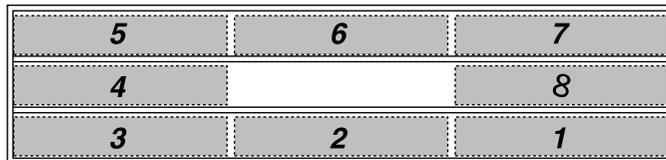
This section describes how to insert data cartridges into the magazine, how to start up the drive unit, and how to handle the magazine and data cartridges.

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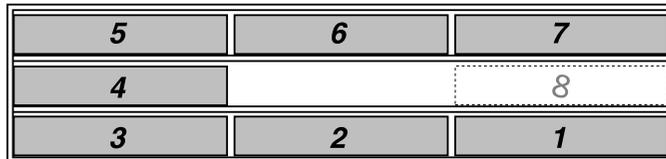
## Loading Cartridges into the Magazine

### Loading 8 cartridges into the magazine

It is recommended that all 8 cartridges be used as recording media. Depending on the application software, a cleaning cartridge can be set in place of one of the data cartridges. The sequence in which cartridges are set into the magazine determines the numbers by which they are managed as indicated in the figure below.



### Loading 7 cartridges into the magazine

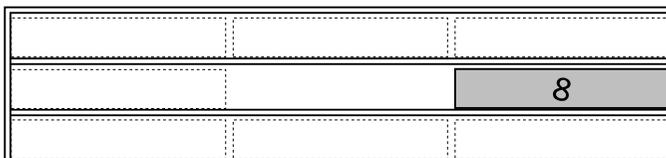


#### Note:

If cartridges are not loaded in one of the arrangements indicated in the figures, the magazine will eject. The cleaning cartridge can only be used in the 8 position.

### Loading 1 cartridge into the magazine

Either a data cartridge or cleaning cartridge can be loaded into slot “8”. See “When 1 cartridge is set in the magazine” on page 17 for the relevant magazine loading procedure. When the cleaning cartridge is used, the magazine is automatically ejected once cleaning is completed.

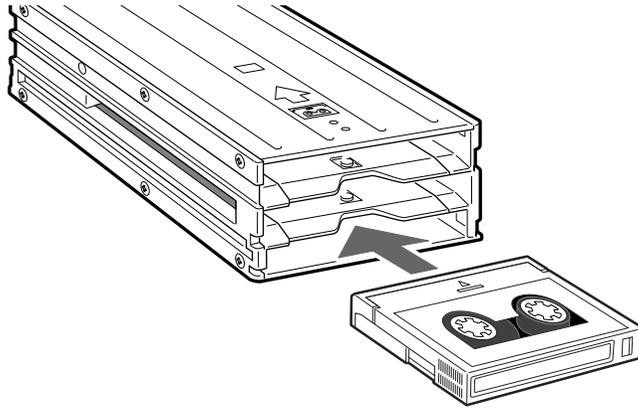


#### Note:

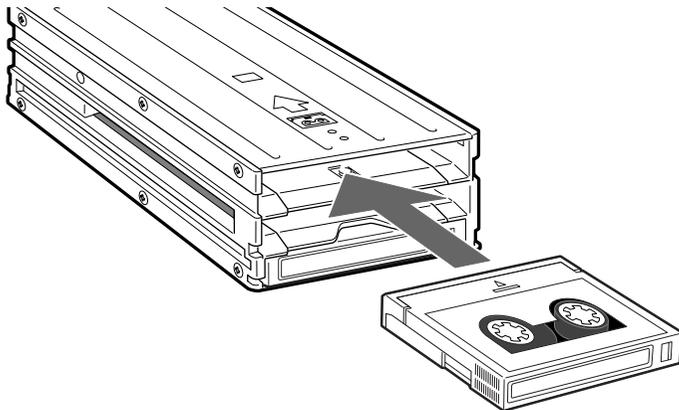
If no cartridge is loaded into the position indicated above, the magazine is ejected.

Load data cartridges into the magazine as follows.

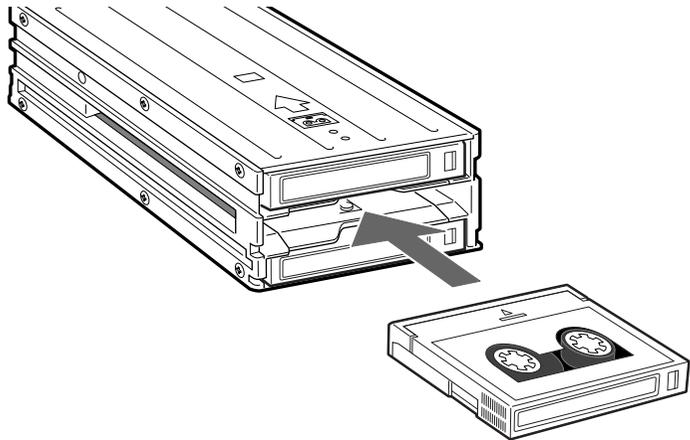
- 1 First, load data cartridges into the bottom shelf of the magazine as shown in the figure below.  
Load cartridge 3 first, followed by cartridges 2 and 1 (in that order).



- 2 Load data cartridges into the top shelf of the magazine as shown in the figure below.  
Load cartridge number 4 first, followed by cartridges 5, 6, and 7 (in that order).



- 3 A data cartridge should be set into the middle shelf of the magazine. Depending on the application software, a cleaning cartridge can be inserted instead of a data cartridge.

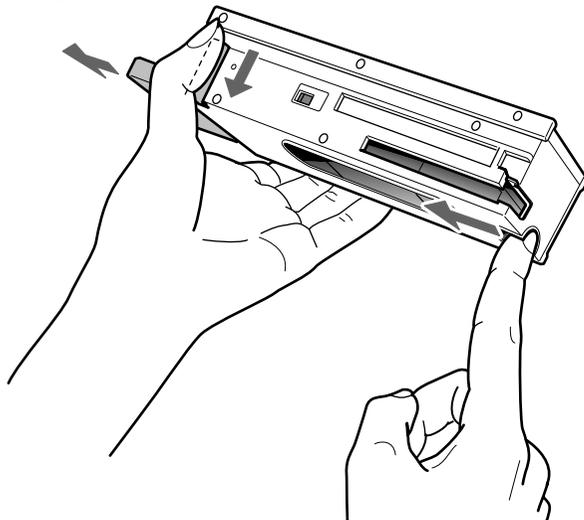


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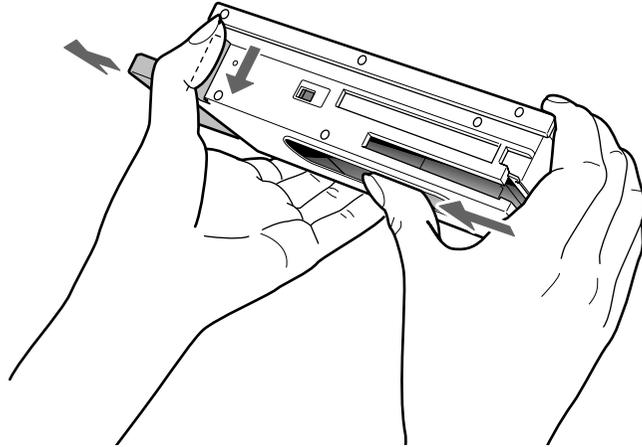
## Removing Cartridges from the Magazine

Remove cartridges from the magazine as follows.

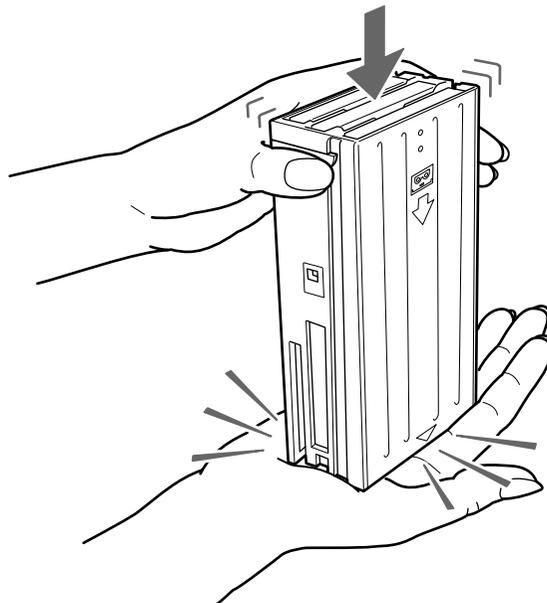
- 1 While pressing down on the magazine stopper, place your finger in the hole at the rear of the magazine and push data cartridges toward the front of the magazine.



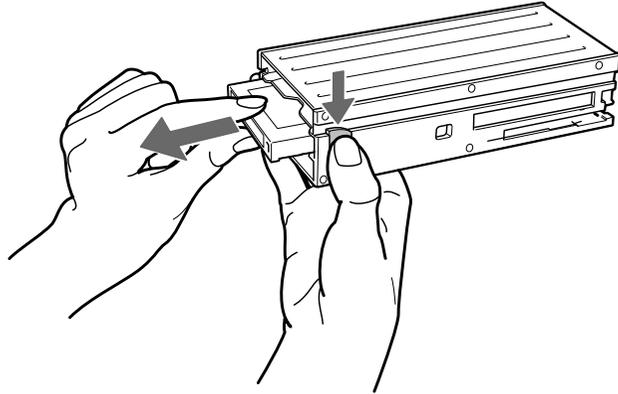
- 
- 2 Position your thumb in the slot in the bottom of the magazine and continue sliding the cartridges toward the front of the magazine.



- 
- 
- 3 Repeat steps 1 and 2 to remove five of the cartridges.
- 4 Turn the magazine so that the open end faces up and tap it gently against your hand or a soft object. This makes cartridges move from the top shelf to the bottom shelf.



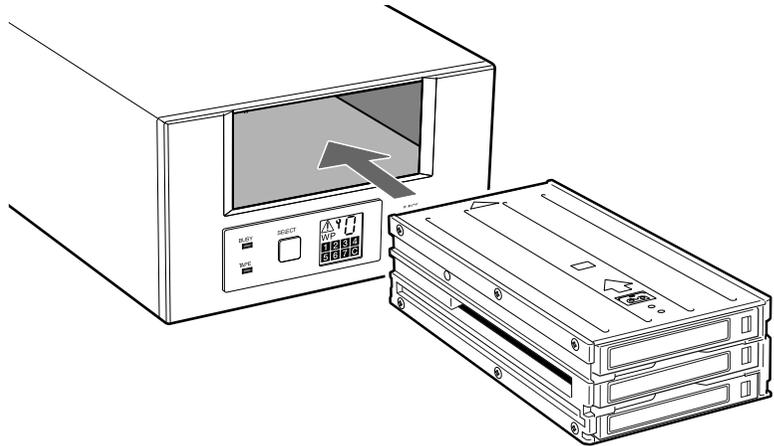
- 5 Repeat steps 1 and 2 to remove the cartridges from the bottom shelf.
- 6 Finally, remove the cartridge from the cleaning cartridge position in the middle shelf.



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# How to Use the DDS Auto Loader

- 1 Load the desired number of cartridges (1, 7 or 8) into the magazine. Refer to page 11. How to Insert the Cartridges.
- 2 To load the magazine, insert it into the slot in the front of the autoloader in the direction of the large arrow. Apply steady pressure until the mechanism pulls the magazine into the autoloader.



- 3 The TSL-9000 runs a rotation test automatically to check which cartridges are loaded in the magazine, and whether they are inserted in the correct direction.

It takes about 90 seconds to complete this rotation check. After completing this check, the numbers “1” to “8” on the LCD should stop blinking and stay on.

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## Data Cartridge Selection

### When 7 or 8 cartridges are loaded in the magazine

You can select data cartridges loaded into the magazine as necessary by using the software on your computer.

Data cartridges can also be selected by using the SELECT button on the drive.

When you press the SELECT button, the 7-segment indicator on the LCD panel displays the number of the selected cartridge. (The number changes sequentially each time you press the SELECT button.)

When a number has been displayed continuously for five seconds without any other operation taking place, the data cartridge currently loaded in the DDS drive is unloaded and the cartridge whose number is displayed is automatically loaded.

### When 1 cartridge is set in the magazine

When the magazine is inserted into the autoloader, the cartridge is automatically loaded into the drive. When a cleaning cartridge is inserted, the magazine is automatically ejected once cleaning is complete.

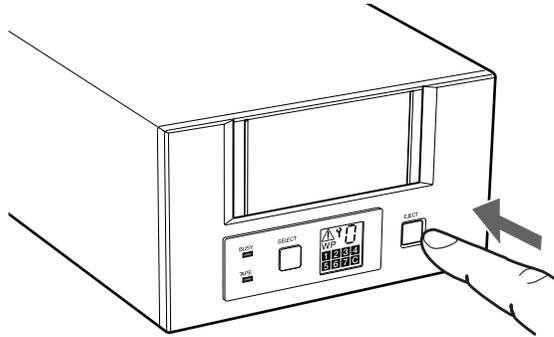
### Cautions:

- After loading the magazine, about 90 seconds pass while the cartridges inside the magazine are checked. During this time, the SELECT button does not function.
- If the SELECT button is pressed while the BUSY indicator is flashing, the current read or write operation is aborted and the cartridge is changed to the next one in the specified selection sequence.

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## Ejecting the Magazine

Press the EJECT button. The LCD indicator displays “E,” then the magazine is ejected after the data cartridge inside the DDS drive has been returned to the magazine. Time required for magazine ejection may be up to 140 seconds.



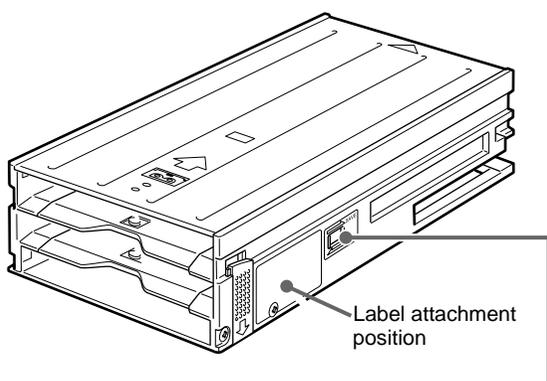
### Caution:

If the EJECT button is pressed while the BUSY indicator is flashing, the read or write operation currently in progress is aborted and the magazine is ejected as described above.

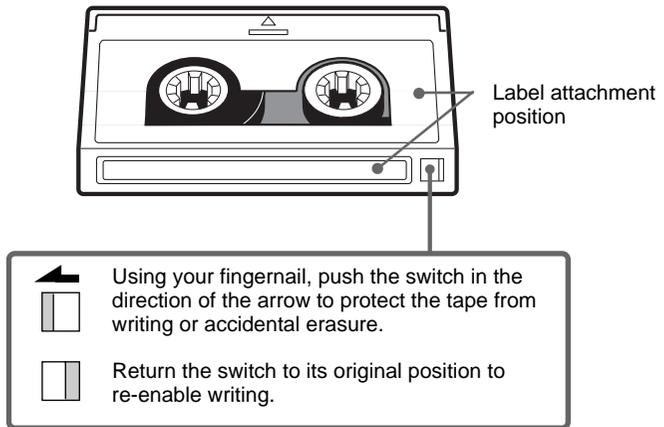
# Taking Care of Magazines and Cartridges

## Use Precautions

- Avoid heavy vibration and dropping.
- The shutter on the face of the cartridge is opened automatically when it is inserted into the drive. Do not open the shutter by hand, as touching the tape may damage it.
- Magazines and cartridges are carefully adjusted during assembly at the factory. Please do not try to open them or take them apart.
- The write-protect tabs on magazines and cartridges prevent the tape from being written to or accidentally erased. If you do not need to write to the tape, move the magazine or cartridge write-protect tab to the write-protect position.



BLACK	A diagram of a write-protect tab. The tab is a dark rectangle with a white arrow pointing to the right, labeled "SAVE". Below the tab, the word "REC" is written.	Slide the tab toward SAVE to prevent data from being written
MIRROR	A diagram of a write-protect tab. The tab is a light rectangle with a white arrow pointing to the left, labeled "SAVE". Below the tab, the word "REC" is written.	Slide the tab toward REC to allow data to be written



- In case of a sudden change in temperature, condensation may interfere with reading and writing to a tape.
- Avoid unnecessarily loading/unloading cartridges to/from the DDS drive if you do not need to write or read a tape.
- Attach the write-protect label provided with magazines and cartridges to the label attachment position indicated in the above figures. Do not attach the label outside of the indicated area or affix a second label on top of the first one.

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## Storage Precautions

- Keep the magazine in its case when not in use.
- Avoid storing cartridges in dusty places, in direct sunlight, near heaters or air conditioners, or in humid locations.
- Do not place cartridges on the dashboard or in a storage tray in a car.

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# Head Cleaning

To keep the DDS Autoloader in top condition, clean the head as needed, using the proper head cleaning cartridge (sold separately).

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## How to Clean

The magazine is primarily intended to be used with 7 data cartridges, which ordinarily should be set together with 1 cleaning cartridge (the DG-5CL) in its prescribed position on the middle shelf.

- 1 When the LCD indicator displays a cleaning request (  1 ), select “8” with the SELECT button. The “8” begins flashing and the cleaning cartridge is loaded into the drive from the middle shelf. The head is cleaned automatically, then the cleaning cartridge is returned to its place in the magazine.

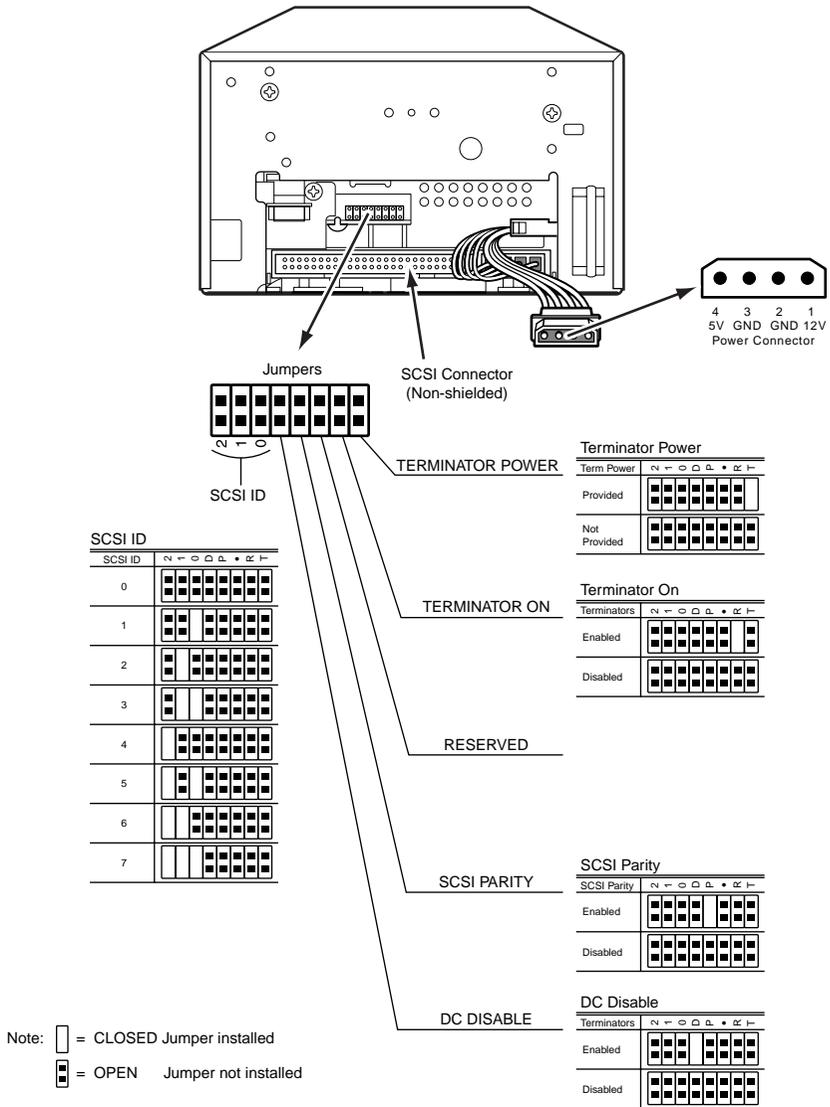
When the only cartridge set is a cleaning cartridge in the magazine's middle shelf

- 1 When the magazine is inserted into the autoloader, the cleaning cartridge is automatically loaded into the drive and the head is cleaned. After cleaning is completed, the cleaning cartridge is automatically returned to the magazine and the magazine is ejected.

One cleaning cartridge can be used 15 times.

# Installation

## SCSI Connection/Setting the SCSI ID/Option Switches



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# Interface Implementation

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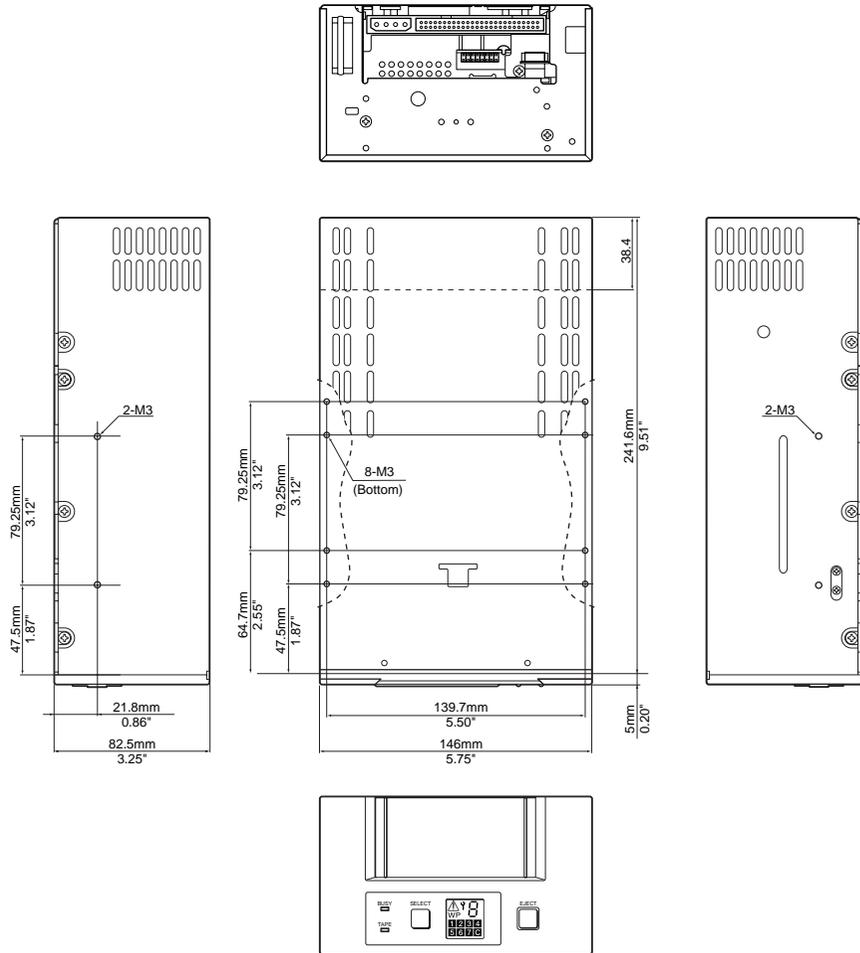
## Supported SCSI Messages

Abort  
Bus Device Reset  
Command Complete  
Disconnect  
Extended Message  
-Synchronous Data Transfer Request  
Identify (w/&w/o Disconnect)  
Initiator Detected Error  
Message Parity Error  
Message Reject  
No Operation  
Restore Pointers  
Save Data Pointer

## Supported SCSI Commands

Erase  
Initialize Element Status (LUN=1)  
Inquiry (LUN= 0 or 1)  
Load/Unload (LUN= 0 or 1)  
Locate  
Log Select  
Log Sense  
Mode Select (6)  
Mode Sense (6) (LUN= 0 or 1)  
Move Medium (LUN= 0 or 1)  
Prevent Allow Medium Removal (LUN= 0 or 1)  
Read  
Read Block Limits  
Read Buffer  
Read Element Status (LUN= 0 or 1)  
Read Position  
Receive Diagnostic Results  
Release Unit  
Request Block Address  
Request Sense  
Reserve Unit  
Rewind  
Seek Block  
Send Diagnostic (LUN= 0 or 1)  
Space  
Test Unit Ready (LUN= 0 or 1)  
Verify  
Write  
Write Buffer  
Write Filemarks

# Mounting Holes

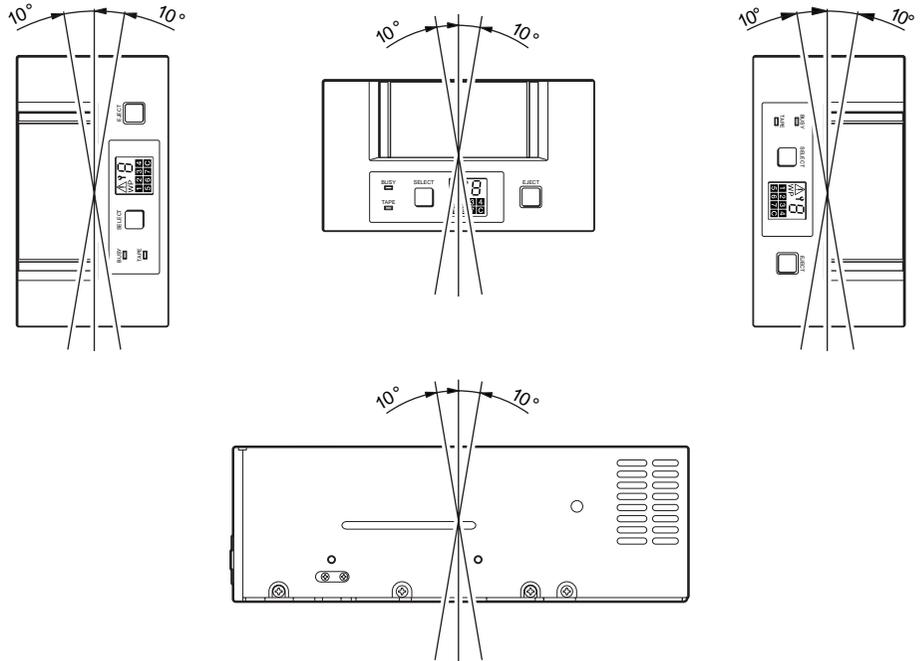


**Note:**

Maximum mounting screw thread length is 3.0 mm. Longer thread length may damage the drive.

# Orientation

The TSL-9000 can be installed in three different mounting positions as shown in the figure below. Each position has a maximum tolerance of  $\pm 10$  degrees.



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## Specifications

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### Performance

#### Storage Capacity

96 to 192 GB compressed  
(with 125m DDS-3 tape)

#### Bit Error Rate

less than  $10^{-15}$

#### Data Transfer Rate (Tape)

1.2 MB/s uncompressed  
2.4 MB/s compressed

#### Burst Data Transfer Rate (SCSI)

5 MB/s maximum, asynchronous  
10 MB/s maximum, synchronous

#### Magazine insertion/ejection time

2.5 seconds(typical)

#### Cartridge exchange time(controlled by SCSI)

50 seconds(typical)

#### Rewind time

less than 80 seconds  
(with 125m tape)

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### Operating Environment

#### Operating

Temperature: 5 to 40 °C  
Humidity: 20 to 80%  
(no condensation)  
Maximum wet bulb temperature  
26 °C

#### Non-Operating

Temperature: -40 to +70 °C  
Humidity: 5 to 95%

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### Shock

#### Operating

No Data Loss  
Half Sine  
5 G Peak 3 ms  
3 axes, 3 directions  
\*Interval 10 seconds

#### Non-Operating

No Device Damage  
Half Sine  
90 G Peak 3 ms  
(30 G Peak 11 ms)  
3 axes, 3 directions  
\*Interval 10 seconds

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### Vibration

#### Operating

Swept Sine 5 to 500 Hz  
\*0.25 G Peak 1 Octave/min.

#### Non-Operating

Swept Sine 5 to 500 HZ  
\*0.5 G Peak 1 Octave/min.  
3 axes,3 directions

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### Altitude

#### Operating

0 to 2133 m

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### Acoustic Noise

Streaming Write/Read : 35 dBA  
Insert/Eject : 60 dBA

**Note:** The sound meter, set to the A scale, is located 1m in front of the center of the drive front panel.

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## Suspended Particulate

Operating      Less than 150 microgram/m<sup>3</sup>

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## EMC

EMC Directive:                      89/336/EEC

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## Air-cooling Requirement

Surrounding temperature              < 40 °C

Clean air flow is recommended to minimize the possibility of data loss.

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## Power Requirements & Miscellaneous

Power	5 VDC	Tolerance: ±5 % Current: 1.3 A (typ.) : 2.9 A (max.)
	12 VDC	Tolerance: ±10 % Current: 0.3 A (typ.) : 1.5 A (max.)
Ripple	100 mV p-p	

### DDS Autoloader Dimensions

146.0 ∞ 82.5 ∞ 241.6 mm  
(W ∞ H ∞ D)  
(excluding protruding parts)

### Magazine Dimensions

83.0 ∞ 38.7 ∞ 168.5 mm  
(W ∞ H ∞ D)

## Weight

Autoloader	2.4 kg
(not including magazine)	
Magazine	215 g
(not including cartridges)	

Specifications may be subject to change, in the interest of technological improvement, without notice or obligation.

## Third Party Support Contacts

Host Adapter Vendors	Phone Numbers
Adaptec	408-945-8600
ATTO	716-691-1999
Bus Logic	408-492-9090
DPT	407-830-5522
Future Domain	714-253-0400
Initio	408-988-1919
Qlogic	714-438-2200
Ultra Systems Inc.	714-367-8800

Operating Systems	Backup Software Vendors	Phone Numbers
DOS	Seagate	407-333-7500
	Cheyenne	516-484-5110
	NovaStor	805-579-6700
Macintosh	Cheyenne	516-484-5110
	Dantz	510-253-3000
	NovaStor	805-579-6700
OS/2	Cheyenne	516-484-5110
	NovaStor	805-579-6700
Windows	Cheyenne	516-484-5110
	NovaStor	805-579-6700
Windows NT	Seagate	407-333-7500
	Cheyenne	516-484-5110
	Microsoft	206-882-8080
	NovaStor	805-579-6700
Windows 95	Cheyenne	516-484-5110
	NovaStor	805-579-6700
DEC Unix	Cheyenne	516-484-5110
	NovaStor	805-579-6700
SUN Unix	Legato	415-812-6000
	NovaStor	818-707-9900
Solaris Unix	Cheyenne	516-484-3150
	Legato	415-812-6000
	NovaStor	818-707-9900
SCO Unix	Cheyenne	516-484-3150
	Legato	415-812-6000
NCR Unix	NovaStor	818-707-9900
HP Unix	Cheyenne	516-484-3150
	NovaStor	818-707-9900

Operating Systems	Backup Software Vendors	Phone Numbers
AIX Unix	Cheyenne	516-484-3150
	Legato	415-812-6000
	NovaStor	818-707-9900
Novell NLM	Seagate	407-263-3500
	Legato	415-812-6000
	NovaStor	818-707-9900
	Novell	801-429-5544

\* All phone numbers listed are in the USA.

Add the country code(1) prior to those numbers when calling from outside the USA.

---

# Sony Contacts

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For further information, please contact:

## Sony Electronics Inc., Technical Support

3300 Zanker Road San Jose, CA95134-1940 USA  
TEL: (1) 800-352-7669 FAX: (1) 800-883-7669 TELEX: 171331

## Sony Corporation, Data Storage Sales & Marketing Dept.

Gotenyama Hills, 4-7-35 Kitashinagawa, Shinagawa-ku, Tokyo 104 Japan  
Tel: (03) 5448-2289 FAX: (03) 5448-7902 TELEX: J22262

## Sony of Canada Ltd., Computer and Personal Information Division

405 Gordon Baker Road, Willowdale, Ontario, M2H 2B6, Canada  
TEL: (416) 499-1414 FAX: (416) 499-8541

## Sony Computer Peripherals Components Europe A Division of Sony Deutschland GmbH

Landsberger Strasse 428 D-81241 München, Germany  
Compuserve 100634, 1752 FAX: (089) 82916-470

## Sony International (Singapore) Ltd. Asia Components Marketing Company

10 Hoo Chiang Road #21-00 Kepple Towers, Singapore 089315  
TEL: (65) 329-1553 FAX: (65) 329-1590

## Sony Electronics Devices (Hong Kong) Limited

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