12-24 Gbyte 4 mm DDS-3 Tape Drive Installation and User's Guide

THE NETWORK IS THE COMPUTER™

Sun Microsystems Computer Company
A Sun Microsystems, Inc. Business
2550 Garcia Avenue
Mountain View, CA 94043 USA
415 960-1300 fax 415 969-9131

Part No.: 802-7791-11
Revision A, April 1997

Please
Recycle

Adobe PostScript

12-24 Gbyte 4 mm DDS-3 Tape Drive Installation and User's Guide

The 12-24 Gbyte 4mm DDS-3 tape drive (Figure 1) is equipped with a single-ended narrow SCSI-2 (small computer system interface) controller and 2 Mbyte data buffer. The tape drive has a data transfer rate of 1 Mbyte per second before the additional enhancement of data compression, and 2 Mybtes per second with compression.

This SCSI device is in compliance with ANSI/ECMA DDS, DDS-DC and DDS-3 storage device format standards.

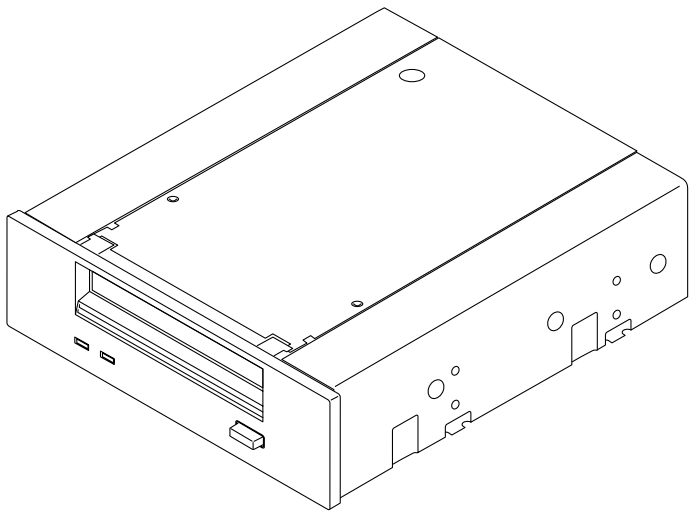

Figure 1 12-24 Gbyte 4mm DDS-3 Tape Drive

Physical Characteristics

Table 1 Physical Characteristics

Height	41.2 mm (1.6 inches)
Width	146 mm (5.7 inches)
Depth	150 mm (5.9 inches)
Weight	1.1 kg (2.4 pounds, including 5-1/4" mounting bracket)

Data Transfer Rates

Table 2 Data Transfer Rates

Maximum sustained native	1 Mbyte per second
Maximum burst asynchronous	3 Mybtes per second
Maximum burst synchronous	10 Mybtes per second

Power Requirements

Table 3 Power Requirements

DC voltage	+12 Vdc +/-10%, +5 Vdc +/-5%
Operational current	60 mA, 850 mA

Note – On powering up, both supplies should come up within one second of each other. On powering down, the 12V supply should stay within a +/- 10% limit until the 5V supply drops below 4.5V.

Panel Descriptions

This section contains descriptions of the front and back panels of the DDS-3 tape drive.

Front Panel Controls and Indicators

The tape drive has an activity light and an attention light on the front panel. (Figure 2).

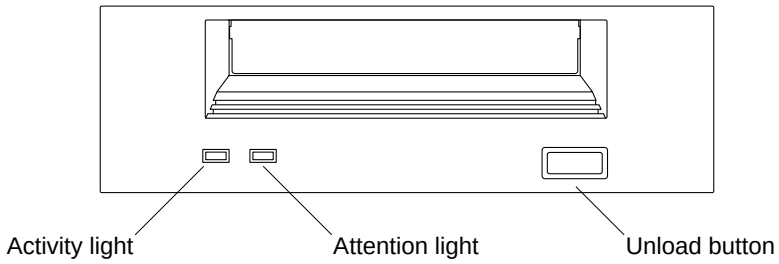

Figure 2 Front Panel Controls and Indicators

Activity Light

- *Flashes green* to show activity (loading, unloading, reading, and writing)
- Is a *steady green* when a cartridge is loaded and the tape drive is ready to begin operations

Attention Light

- *Flashes amber* to indicate that a cartridge is near the end of its life or that the heads need cleaning (see “Media Caution Signal” on page 6)
- Is a *steady amber* when there is a hard fault

Refer to Figure 3 for more detail.

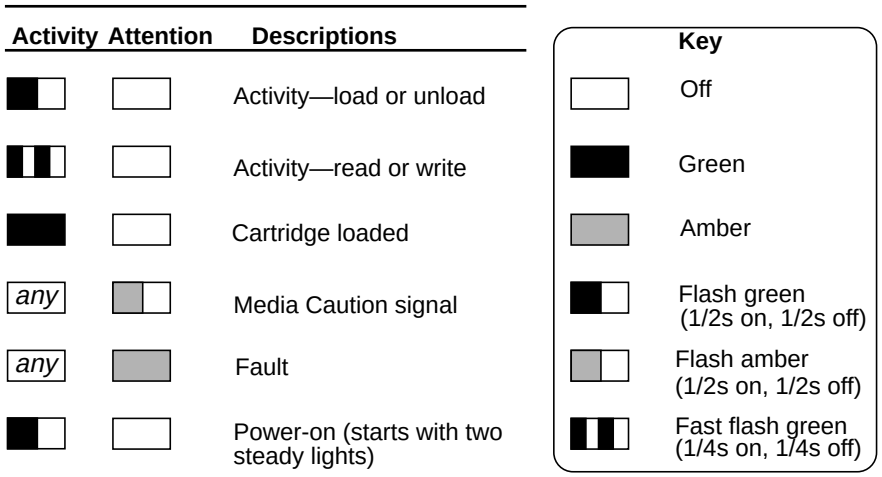

Figure 3 Descriptions of Light Patterns

Media Caution Signal

The 12-24 Gbyte 4mm DDS-3 tape drive monitors the number of correctable errors that occur during reading and writing. If the number of errors becomes excessive, the tape may be nearing the end of its useful life, or the tape heads may need cleaning.

- If the Media Caution signal appears (flashing amber), clean the tape drive as described in “Cleaning the Tape Drive” on page 16.
- If the signal still displays after cleaning the heads, repeat the operation with a different tape. If this clears the signal, the first tape is nearing the end of its life. Copy the data onto a new tape and discard the old one.

The Media Caution signal is cleared when a new tape is loaded or when the drive is power-cycled.

Back Panel Connections

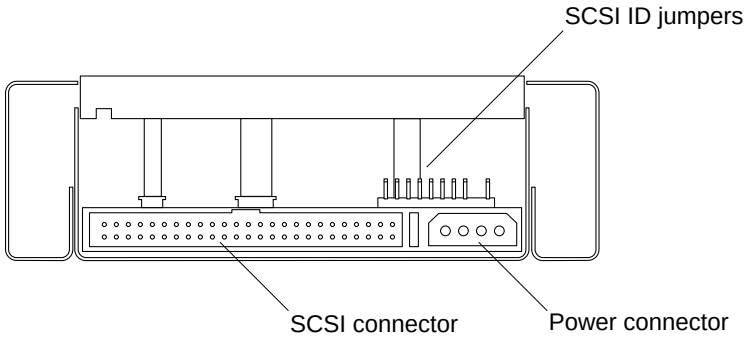

Figure 4 Rear View of 12-24 Gbyte 4mm DDS-3 Tape Drive

Installing the Tape Drive

Installing the tape drive involves the following steps:

- Determining an available SCSI ID within your system
- Setting the SCSI ID jumpers on the tape drive
- Installing the tape drive into your system or enclosure
- Configuring the tape drive for operation with your system

The following section describes how to identify and set the SCSI ID. Refer to your enclosure or system documentation for instructions on how to install a tape drive.

After installing your tape drive, refer to “Software Commands” on page 9 for information about modifying the system files and configuring your system.

Setting the SCSI ID Jumpers

Refer to the *Solaris Handbook for SMCC Peripherals* that corresponds to the vesion of your operating system to determine available SCSI target IDs. If you do not have a handbook and would like to order one, see “Ordering Sun Documents” on page 19.

For Enclosures With Target ID Selector Switches

To set the SCSI ID for the 12-24 Gbyte tape drive:

1. **Connect the SCSI ID cable from the target ID switch on the interior back panel of the enclosure to the ID cable on the tape drive (Figure 5).**

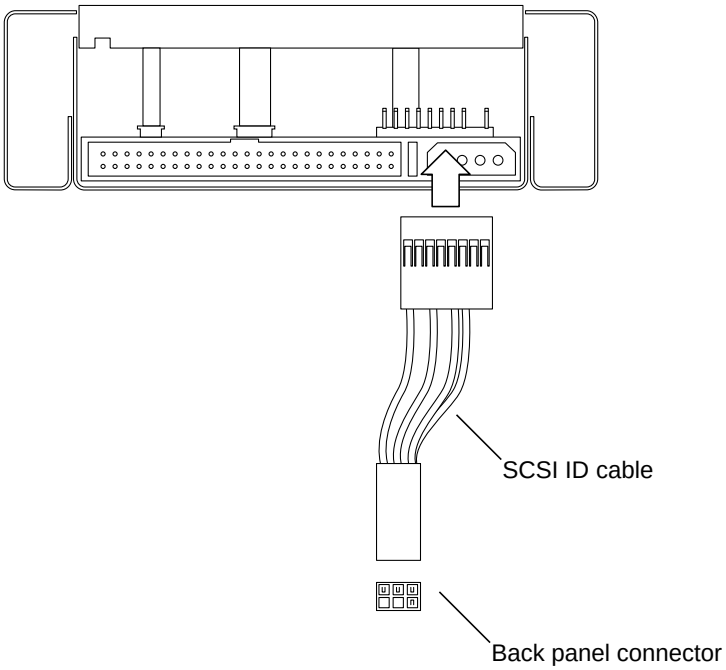

Figure 5 Location of SCSI Address Jumpers

2. **Set the target ID selector switch on the enclosure to an available SCSI ID address (tape drives are normally 4 or 5).**

For Enclosures Without Target ID Selector Switches

♦ **Identify an available SCSI ID (tape drives are normally 4 or 5), and then configure the jumpers on the rear of the drive according to Figure 6.**

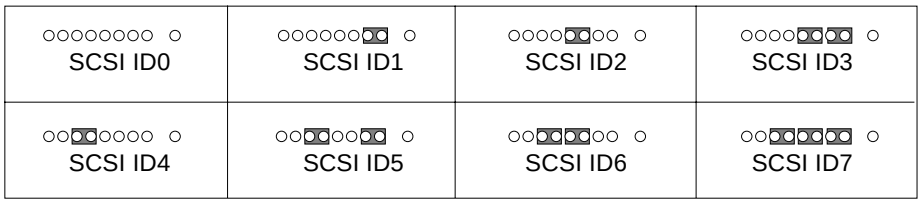

Figure 6 Setting SCSI Address Jumpers

Software Commands

For information about 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. If you do not have a handbook and would like to order one, see "Ordering Sun Documents" on page 19.

Modifying Configuration Files

Depending upon the operating system you have, follow the appropriate procedures.

SunOS 5.x Operating Environments

For optimum performance on systems running SunOS releases 5.4, 5.5 and 5.5.1, you must modify the `st.conf` file.

Read this entire procedure before editing the `st.conf` file.

Note – The syntax is critical. Verify the placement of commas, semicolons, and beginning and ending quotation marks. Some numerical fields are preceded by `0x`.

---

1. **Become superuser and make a copy of the original** `st.conf` **file**/`kernel/drv/st.conf` **as a backup (**`st.conf.old`**).**

```
%su
Password:

#cp /kernel/drv/st.conf st.conf.old
```

2. **Edit the** `st.conf` **file.**
   Using an editor, scroll through the `st.conf` file to the following line:

```
# tape-config-list=
```

   a. **Delete the # character that begins the line, if it hasn't already been removed. (# = comment line).**

   b. **Using the editor, continue to scroll until you come to the following line entry:**

```
# "HP      C1539A",     "HP DDS-2 4mm DAT",           "HP_DAT",
```

   c. **On the next lines, add the following entry exactly as shown**
   (Note there are *six spaces* between "HP" and "C1537A.")

```
"HP      C1537A",     "HP DDS3 4mm DAT",           "HP_DAT";
```

Note – Do not use a # character at the beginning of the line just added. The # character is used to comment-out a specific line entry.

Note – If multiple devices are enabled (lines uncommented), only the *last* uncommented line with this format needs to end with a semicolon. All previous lines with this format *must* end with a comma.

---

d. Using the editor, continue to scroll until you come to the following line entry:

```
#HP_DAT          =        1,0x34,0,0x19679,1,0x0,0;
```

e. On the next line, add the following entry exactly as shown:

```
HP_DAT =        1,0x34,0,0x9639,4,0x00,0x8c,0x8c,0x8c,1;
```

Note – Do not begin this line with a # character.

Note – This should be the last line entry and *must* end with a semi-colon.

f. Save the file as `st.conf`**.**

3. Halt the system following the normal procedure.

4. Reboot the system with the `-r` **option to recognize the drive:**

```
ok boot -r
```

Watch the boot messages for any indications of problems with the `st.conf` entry.

Note any indicated line numbers. If any error messages occur, edit the `st.conf` file again and then reboot.

5. Install a tape cartridge in the tape drive and allow the drive to fully load the cartridge.

6. Verify that the `st.conf` **entry is correct.**

```
%mt -f /dev/rmt/0 status
```

You may need to replace the 0 with 1, 2, and so on, until you find the number that the system has identified for this drive.

- `DAT tape drive` indicates a 12-24 Gbyte tape drive that is correctly recognized. The specific Sense Key returned is usually not an issue.
- No Additional Sense indicates that there are no error conditions.
- Unit Attention indicates that the drive has just been powered on or that a tape has just been inserted.

Undesired Responses from the Drive

- `SCSI tape drive` indicates the `st.conf` entry is incorrect. You must edit the `st.conf` file and reboot until you no longer see `SCSI Tape Drive`.
- `No tape loaded or drive offline` indicates there is no cartridge in the drive or that the cartridge is not yet loaded. Install a cartridge or wait for the cartridge load to complete and retry the `mt status` command.
- `No such file or directory` indicates there is no tape drive attached to that rmt (remote) number. Try another rmt number.

Other Sources of Information

- Check the man pages for additional information on software commands.

The man page for the `mt` command lists numerous helpful commands. This is accessed by typing `man mt`.

SunOS 4.1.4 Operating Environment

In order to correctly use the DDS-3 tape drive with the SunOS 4.1.4 operating environment, you must perform the following procedures to edit the `st_conf.c` and `stdef.h` files and make a new kernel.

Note – The only SunOS 1.x operating environment supported by this tape drive is SunOS 4.1.4 (Solaris 1.1.2).

---

1. **Become superuser by typing `su` and pressing Return.**
   The system responds with a request for your superuser password.

2. **Type your superuser password and press Return.**
   The root prompt (#) is displayed.

```
Isis% su
Password: Type the superuser password
#
```

3. **Change directories to the device configuration directory.**

```
# cd /usr/kvm/sys/scsi/targets
```

4. **Change the permissions to allow editing of the** `st_conf.c` **file.**

```
# chmod +w st_conf.c
```

5. **Edit the** `st_conf.c` **file in the following manner.**
   Use vi or any other text editor to edit the file.:

```
/* HP 4mm Helical Scan */
{
“HP DDS3 4mm DAT”, 2, “HP”, ST_TYPE_HPDAT, 1024,
(ST_VARIABLE | ST_BSF | ST_BSR | ST_LONG_ERASE),
6000, 6000,
{ 0x00, 0x8C, 0x8C, 0x8C },
{ 0, 0, 0, 0 }
},
```

Modifying the `stdef.h` *File*

1. **Become superuser by typing** `su` **and pressing Return.**
   The system responds with a request for your superuser password.

2. Type your superuser password and press Return.
The root prompt (#) is displayed.

```
Isis% su
Password: Type the superuser password
#
```

3. Change directories to the device configuration directory.

```
# cd /usr/kvm/sys/scsi/targets
```

4. Change the permissions to allow editing of the `stdef.h` file.

```
# chmod +w stdef.h
```

5. Edit the `stdef.h` file in the following manner.
Use vi or any other text editor to edit the file

a. Scroll down to the following line:

```
# define ST_TYPE_HP Ox23
```

On the next line, add the following entry:

```
# define ST_TYPE_HPDAT Ox34 /* HP DDS-3 DAT */
```

6. Save your changes and exit the editor.

7. Rebuild the kernel according to the instructions in the `/usr/kvm/sys/‘/usr/bin/arch -k‘/conf/README` file.

8. Reboot your system in order to use the new kernel.

a. Type `sync`.

b. Type `sync`.

c. Type `reboot`.

Upgrading Firmware From Tape

You can upgrade firmware by inserting a firmware upgrade cartridge.

Caution – Do not disconnect the power at any time during a firmware upgrade, particularly when the front panel lights are flashing. This may result in the drive having corrupt firmware or no firmware at all.

To upgrade firmware:

1. **Ensure that the drive is not engaged in any SCSI activity (the Activity light is off and the host is not going to be accessing the drive).**
2. **Insert the firmware upgrade cartridge into the drive.**
3. **Wait while the upgrade process takes place.**
   During the actual erasure and reprogramming of the firmware, it is critically important that you do not power down the drive. The front panel lights flash rapidly during this critical time.
4. **When the upgrade is complete (after about two minutes), the drive ejects the cartridge. Remove the cartridge and replace it in its box.**

Note the following:

- If the firmware upgrade is incompatible with your hardware, no upgrade will take place. The drive will eject the cartridge after about 30 seconds instead of the usual two minutes.
- The firmware upgrade cartridge must not be write-protected.
- The firmware upgrade cartridge can only be used a certain number of times. After that, the drive will reformat it for normal data use, although it is not advisable to use it for data.
- You cannot convert a firmware upgrade tape for normal data use.

Cleaning the Tape Drive

Do not use any method other than a DDS-approved cleaning tape cartridge to clean your tape drive. Clean the heads as follows:

Table 4 Head Cleaning Schedule

No. of DDS Cartridges Used Each Day	Cleaning Interval
1 or less	8 weeks
2	4 weeks
3	3 weeks
4 or more	Weekly

Tape Cartridge Information

This tape drive uses 4mm 60, 90, 120m or 125m cartridges, which have a typical storage capacity of 1.3 – 24.0 Gbytes. The cartridges do not require preformatting.

Table 5 Cartridge Storage Capacity

Format	Length	Native Capacity	Compressed Capacity[1]
DDS-1	60m	1.3 Gbytes	2.6 Gbytes
DDS-DC	90m	2.0 Gbytes	4.0 Gbytes
DDS-2	120m	4.0 Gbytes	8.0 Gbytes
DDS-3	125m	12.0 Gbytes	24.0 Gbytes

1. Assumes a typical compression ratio of 2:1. Compression will vary depending upon the type of data being compressed.

Caution – Never use DAT audio media. Always use computer grade media with a DDS/DDS-1, DDS-2, or DDS-3 logo.

Thermal Conditioning

To assure proper thermal conditioning, keep the cartridge at the same temperature as the drive for 24 hours before using.

Handling and Storage

- Keep cartridges away from anything magnetic.
- Store cartridges in a dust-free environment.
- Keep cartridges away from direct sunlight and sources of heat, cold, or humidity. Constant room temperature and 50% humidity is best.
- Do not open the cartridge door and touch the surface of the tape.

Inserting a Tape Cartridge

1. **Make sure all tape drive Attention and Activity lights are off.**
2. **Set the write-protect switch on the tape cartridge (Figure 7) for the desired operation. The switch is open for write-protected and closed for write-enabled.**
3. **Insert the cartridge face up into the drive.**
4. **Push gently on the tape until the unit pulls the cartridge into the drive.**

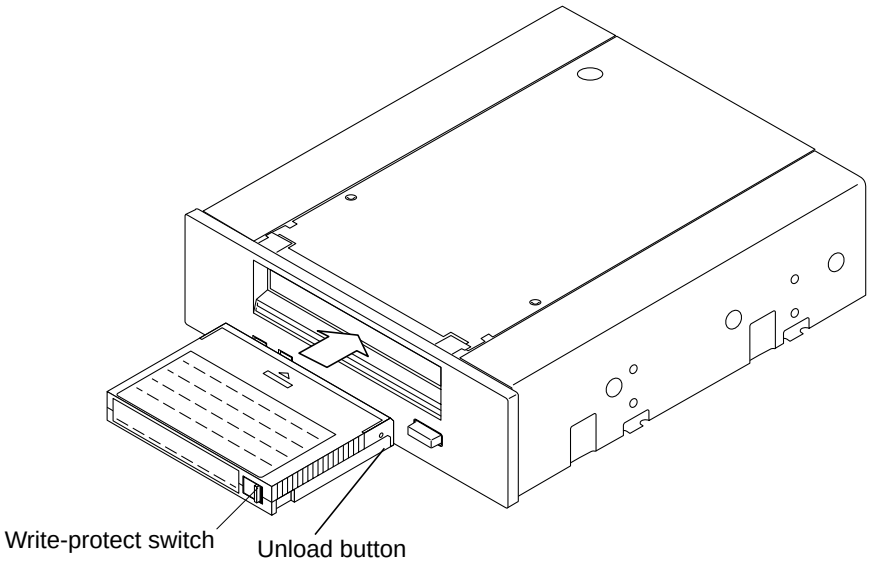

Figure 7 Inserting a Tape Cartridge

Removing a Tape Cartridge

♦ **To remove a cartridge, press the unload button or issue a SCSI "unload" command.**

Caution – Check the activity light to ensure there is no drive activity before ejecting the tape cartridge.

If the tape drive is free of errors, it performs the following actions in about one minute:

- Completes any command in process
- Writes any buffered information to tape
- Rewinds the tape to the beginning
- Unloads the tape and ejects the cartridge

Note – If an error occurs before or during the unload procedure, the tape drive suspends the unload sequence. To clear the error, press the eject button again. The tape drive reattempts the unload sequence, but does not write data in the buffer.

Ordering Sun Documents

SunDocs℠ is a distribution program for Sun Microsystems technical documentation. Contact SunExpress for easy ordering and quick delivery. You can find a listing of available Sun documentation on the World Wide Web.

Table 6 SunExpress Contact Information

Country	Telephone	Fax
Belgium	02-720-09-09	02-725-88-50
Canada	1-800-873-7869	1-800-944-0661
France	0800-90-61-57	0800-90-61-58
Germany	01-30-81-61-91	01-30-81-61-92
Holland	06-022-34-45	06-022-34-46
Japan	0120-33-9096	0120-33-9097
Luxembourg	32-2-720-09-09	32-2-725-88-50
Sweden	020-79-57-26	020-79-57-27
Switzerland	0800-55-19-26	0800-55-19-27
United Kingdom	0800-89-88-88	0800-89-88-87
United States	1-800-873-7869	1-800-944-0661

World Wide Web: `http://www.sun.com/sunexpress/`

Sun Welcomes Your Comments

We are interested in improving our documentation and welcome your comments and suggestions. You can email or fax your comments to us. Please include the part number of your document in the subject line of your email or fax message.

- Email: `smcc-docs@sun.com`
- Fax: SMCC Document Feedback
  1-415-786-6443