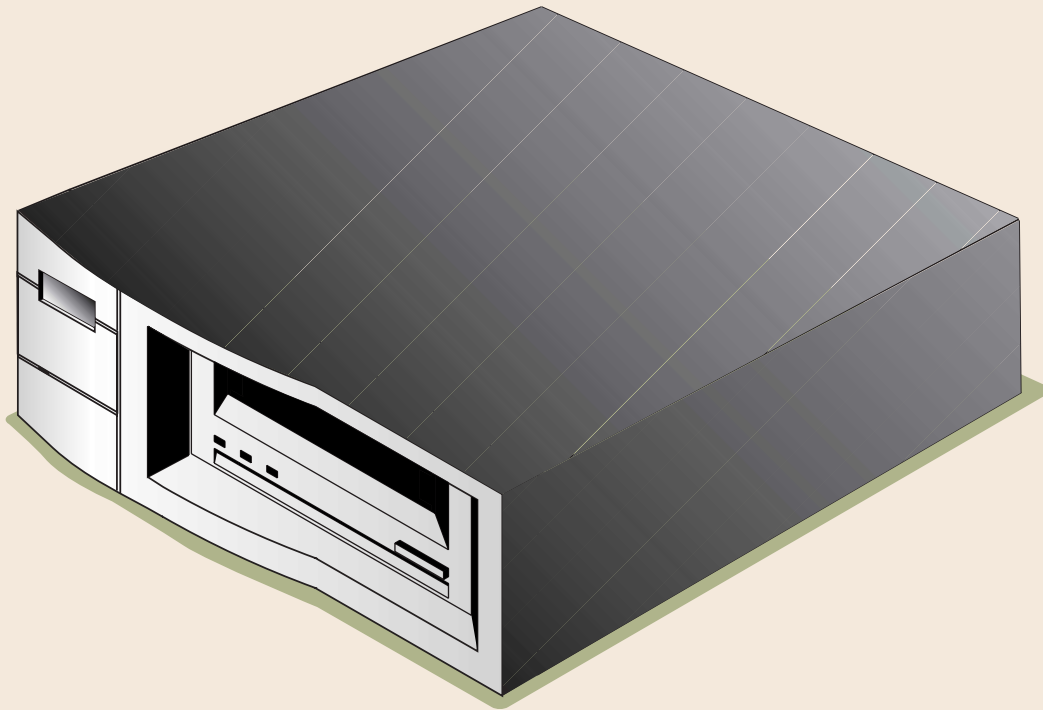


# Online User's Guide



**DDS-4/DAT 72**

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Part Number 50000711

May 2003

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Certance assumes no responsibility for the accuracy, completeness, sufficiency, or usefulness of this manual, nor for any problem that might arise from the use of the information in this manual.

## Warnings

All safety and operating instructions should be read before this product is operated, and should be retained for future reference. This unit has been engineered and manufactured to assure your personal safety. Improper use can result in potential electrical shock or fire hazards. In order not to defeat the safeguards, observe the following basic rules for installation, use and servicing.



*CAUTION: This symbol should alert the user to the presence of "dangerous voltage" inside the product that might cause harm or electric shock.*

*Caution! Risk of electric shock! Do not open!*

*To reduce the risk of electric shock, do not remove the cover (or back). No user-serviceable parts are inside. Refer servicing to qualified service personnel.*

- Heed warnings — All warnings on the product and in the operating instructions should be adhered to.
- Follow instructions — All operating and use instructions should be followed.
- Ventilation — The product should be situated so that its location or position does not interfere with proper ventilation.
- Heat — The product should be situated away from heat sources such as radiators, heat registers, furnaces, or other heat producing appliances.
- Power sources — The product should be connected to a power source only of the type directed in this document or as marked on the product.
- Power cord protection — The power cord should be routed so that it is not likely to be walked on or pinched by items placed upon or against it, paying particular attention to the cord at the wall receptacle, and the point where the cord exits from the product.
- To complete the disconnection of the electricity, please remove the power (electric) cord and the SCSI cable from their connections in the back of the product. The plugs should be placed near the product for easy access.
- Object and liquid entry — Care should be taken to insure that objects do not fall and liquids are not spilled into the product's enclosure through openings.
- Servicing — The user should not attempt to service the product beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

# Precautions

- Do not use oil, solvents, gasoline, paint thinners, or insecticides on the unit.
- Do not expose the unit to moisture or to temperatures higher than 140 °F (60 °C) or lower than -40 °F (-40°C).
- Keep the unit away from direct sunlight, strong magnetic fields, excessive dust, humidity, and electronic/electrical equipment, which generate electrical noise.
- Hold the power cord by the head when removing it from the AC outlet; pulling the cord can damage the internal wires.
- Use the unit on a firm level surface free from vibration, and do not place anything on top of the unit.

## FCC Notice

This equipment generates and uses radio frequency energy and, if not installed and used properly — that is, in strict accordance with the manufacturer's instructions — may cause interference to radio communications or radio and television reception. It has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment on and off, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer into a different outlet so that the computer and receiver are on different branch circuits.

If necessary, you should consult the dealer or an experienced radio/television technician for additional suggestions. You may find the booklet, *How to Identify and Resolve Radio-TV Interference Problems*, prepared by the Federal Communications Commission, helpful. This booklet (Stock No. 004-000-00345-4) is available from the U.S. Government Printing Office, Washington, DC 20402.



*WARNING: Changes or modifications made to this equipment, which have not been expressly approved by Certance, may cause radio and television interference problems that could void the user's authority to operate the equipment.*

Further, this equipment complies with the limits for a Class B digital apparatus in accordance with Canadian Radio Interference Regulations.

Cet appareil numérique de la classe B est conforme au Règlement sur brouillage radioélectrique, C. R. C., ch. 1374.

The external device drive described in this manual requires shielded interface cables to comply with FCC emission limits.



*WARNINGS: To prevent fire or electrical shock hazard, do not expose the unit to rain or moisture. To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel.*



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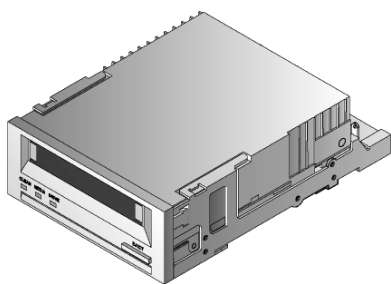
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# 7 Introduction

## **Congratulations!**

You have purchased the finest, most reliable digital data storage (DDS) drive available. As the industry leader, Certance has once again revolutionized storage with the Seagate® Model DDS-4 and Model DAT 72 drives. The DAT 72 and DDS-4 DDS drives represent Certance's commitment to engineering reliable and durable tape drive products that implement leading-edge technology.

Designed for computer environments that require high-performance, high-capacity data storage, the DDS-4 and DAT 72 drives are based on a 3.5-inch mechanism and available as external and internal tape drives (see Figure 1 on page 11). The drives combine established Digital Audio Tape (DAT) technology, high-density recording, and hardware data-compression capabilities with Certance's proven computer-grade design to provide unmatched reliability and performance characteristics among DDS products.



*Internal Drive*



*External Drive*

**FIGURE 1.** Drives Covered in This User's Guide

# Features

The following list summarizes the key features of the DDS-4 and DAT 72 drives.

- Compatibility
  - DDS-4: Supports DDS-2, DDS-3, and DDS-4 recording formats.
  - DAT 72: Supports DDS-3, DDS-4, and DDS 5<sup>th</sup> Generation recording formats.
- LVD / Ultra Wide SCSI connection
- Three convenient form-factors:
  - 3.5-inch internal form-factor for installation in a 3.5-inch half-height space
  - 3.5-inch half-height drive factory-installed with 5.25-inch mounting rails and bezel for installation in a 5.25-inch half-height space
  - External subsystem with built-in, auto-sensing, worldwide power supply
- Support for various native data-storage capacities (see Table 1 on page 13)
- High-speed transfer rates for fast backups (see Table 1 on page 13)
- Advanced onboard DDS-DC hardware using Lempel-Ziv (DCLZ) data-compression, doubling the drive's uncompressed capacity (e.g., a 20 GB uncompressed drive can be 40 GB with compression). See Table 1 on page 13.
- High-performance SCSI burst transfer rates
- Three levels of error-correction code (ECC) and four-head design for read-after-write (RAW) error detection and correction (uncorrectable error rate of less than 1 in  $10^{15}$  bits)
- "Flying" preamplifier for greater signal-to-noise ratio
- Flash memory to store setup parameters and enable field firmware upgrades
- Automatic power-on self-test
- State-of-the-art sealed drive mechanism and tape handling components for improved immunity to airborne contaminants and extended media life

# Capacity and Transfer Rates

**TABLE 1. DDS-4 and DAT 72 Capacity and Transfer Rates**

Characteristic	DDS-2*	DDS-3	DDS-4	DDS 5 <sup>th</sup> Generation**
Tape Length (meters)	120	125	150	170
Native Capacity (Gbytes)	4	12	20	36
Compressed Capacity (Gbytes)	8	24	40	72
Native Transfer Rate (Mbytes/sec)	1.375	2.75	2.75	3.5

\* Applies to DDS-4 drives only

\*\* Applies to DAT 72 drives only

## Applications

The DAT 72 and DDS-4 drives are ideal for workstation, server, and network/enterprise applications. These applications include, but are not limited to:

- Backup of high-capacity fixed discs
- Data interchange between systems
- Network servers
- Online data collection
- Near-line secondary storage for all types of text, graphics, or multimedia information
- Archival storage

## Using This Guide

This User's Guide describes how to install, configure, and care for the DDS-4 and DAT 72 external and internal tape drives. Please read the appropriate chapters and appendixes carefully, and keep this Guide handy for future reference.

- **Chapter 2** provide quick-start instructions for getting the drives up and running in the shortest possible time.
- **Chapter 3** describes how to install internal DDS-4 and DAT 72 drives.
- **Chapter 4** describes how to install the external tape drives.
- **Chapter 5** describes how to operate the drives.
- **Chapter 6** describes the front-panel LEDs on the drives.
- **Chapter 7** provides troubleshooting procedures you can follow in the unlikely event you encounter a problem with your drive.
- **Appendix A** describes how to upgrade firmware for your tape drive.
- **Appendix B** provides technical-support information.

## 2 Quick Start Installation

This chapter provides quick-start instructions for getting the internal or external tape drives up and running in the shortest possible time.

Topics in this chapter are:

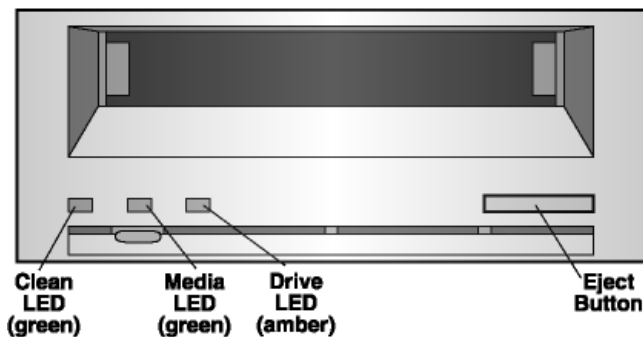
- "Tape Drive Components" on page 14
- "Installing the Internal Tape Drive" on page 15
- "Installing the External Tape Drive" on page 16



**NOTE:** If you prefer more detailed instructions, see Chapter 3 for internal drive installation instructions or Chapter 4 for external drive installation instructions.

### Tape Drive Components

The following describes the major components of the tape drives.



**FIGURE 2. Front Panel Components**

For more information on LEDs and their meaning, see "Front Panel LEDs" on page 46.

# Installing the Internal Tape Drive

Use the following procedure to install the internal tape drive. Print this page and check each step as you complete it. If you need more information about a step, turn to the section referenced in the step.

- 1.** *Unpack the contents of your drive package, and check for missing or damaged items.  
See "Unpacking" on page 17.*
- 2.** *Identify any other items you need to perform this installation.  
See "What Else You Need" on page 18.*
- 3.** *Collect the tools you will need to perform the installation.  
See "Collecting the Necessary Tools" on page 19*
- 4.** *Observe Electrostatic precautions when handling the internal tape drive.  
See "Avoiding Electrostatic Damage" on page 18.*
- 5.** *Review the drive's default settings and change them if necessary:*
  - *SCSI ID: 6*
  - *Parity Checking: Enabled*
  - *Terminator Power: Disabled*
  - *Data Compression: Enabled*
  - *Media Recognition (DDS-4 drives only): Enabled*
  - *Power-On Self-Test: Enabled*
  - *Host Operating System: Windows 98/Me/XP/NT/2000/2003 Server*
  - *SCSI Interface Compatibility (DDS-4 drives only): Wide SCSI*
  - *Vendor ID: SEAGATE DAT**See "Reviewing Drive Default Settings" on page 19.*
- 6.** *Turn off your computer, remove its covers and power cable, and select a mounting bay for the drive. Depending on your drive, select a 3.5-inch or 5.25-inch bay.  
See "Accessing the Inside of Your Computer" on page 26.*
- 7.** *Mount the drive into the bay and secure using the supplied screws.  
See "Mounting the Internal Tape Drive" on page 26.*
- 8.** *Connect a SCSI interface cable to the drive.  
See "Connecting a SCSI Cable" on page 29.*
- 9.** *Be sure the internal tape drive is not the last device on the SCSI bus (the drive does not provide SCSI termination).  
See "Checking SCSI Termination" on page 30.*
- 10.** *Connect a power cable to the drive.  
See "Connecting a Power Cable" on page 30.*
- 11.** *Replace the computer covers and power cable, turn on the computer, and verify that the internal tape drive is operating properly.  
See "Completing Your Installation" on page 31.*
- 12.** *Register your tape drive.  
See "Registering Your Tape Drive" on page 32.*

# Installing the External Tape Drive

Use the following procedure to install the external tape drive. Print this page and check each step as you complete it. If you need more information about a step, turn to the section referenced in the step.

- 1.** *Unpack the contents of your drive package, and check for missing or damaged items.  
See "Unpacking" on page 33.*
- 2.** *Identify any other items you need to perform this installation.  
See "What Else You Need" on page 33.*
- 3.** *Review the drive's default settings and change them if necessary:*
  - *SCSI ID: 6*
  - *Parity Checking: Enabled*
  - *Terminator Power: Supplied to the SCSI bus*
  - *Data Compression: Enabled*
  - *Media Recognition (DDS-4 drives only): Enabled*
  - *Power-On Self-Test: Enabled*
  - *Host Operating System: Windows 98/Me/XP/NT/2000/2003 Server*
  - *SCSI Interface Compatibility (DDS-4 drives only): Wide SCSI*
  - *Vendor ID: SEAGATE DAT**See "Reviewing Drive Default Settings" on page 34.*
- 4.** *Connect a SCSI interface cable to the drive.  
See "Connecting a SCSI Cable" on page 37.*
- 5.** *Check the SCSI termination.  
See "Checking SCSI Termination" on page 38.*
- 6.** *Connect a power cable to the drive.  
See "Connecting a Power Cable" on page 38.*
- 7.** *Turn on the computer, turn on the external tape drive, and verify that the external tape drive is operating properly.  
See "Completing Your Installation" on page 39.*
- 8.** *Register your tape drive.  
See "Registering Your Tape Drive" on page 39.*



# 3 Installing internal tape drives

This chapter describes how to install internal DDS-4 and DAT 72 drives.

Topics in this chapter are:

- “Unpacking” on page 17
- “What Else You Need” on page 18
- “Avoiding Electrostatic Damage” on page 18
- “Installation Summary” on page 18
- “Registering Your Tape Drive” on page 32



*NOTE: If you have an external drive, refer to Chapter 4 for installation instructions.*

## Unpacking

Before you unpack the contents of your drive package, inspect the shipping containers for damage. If you spot damage to the container, notify your carrier immediately.

When you unpack the package, compare the items received with those on the packing list. If any item is missing or damaged, please contact your place of purchase immediately.



*NOTE: internal tape drives come in two mounting configurations, one for 3.5-inch half-height bays and one for 5.25-inch half-height bays. These two drives are identical, except that the drive designed for 5.25-inch installations has mounting brackets on each side of the drive and a different front bezel.*

# What Else You Need

In addition to the contents included with your internal tape drive, you need the following items to install your internal tape drive.

- A SCSI host bus adapter that is properly installed and configured in a host computer
- A 3.5-inch or 5.25-inch half-height bay
- A SCSI ribbon cable
- Backup application software that supports the internal tape drive. For a list of the latest backup software applications tested with the internal DDS-4 and DAT 72 tape drives, please visit our Web site at <http://support.certance.com>.

## Avoiding Electrostatic Damage

Your internal tape drive has very sensitive components that are prone to damage from electrostatic discharge (ESD). Use extreme care when handling the drive, as it can be damaged by ESD.

Before handling the drive, read these ESD instructions to prevent damage to the drive.

- Wear an ESD-preventive grounding wrist strap or observe similar ESD precautions when working with the drive. Be sure the wrist strap makes good skin contact. Do not remove the wrist strap until you finish working with the drive.
- Avoid contact between the drive, other equipment, and clothing. The wrist strap only protects the equipment from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- When the drive is not being used, keep it in its antistatic bag.
- Before you remove the drive from the antistatic bag, touch a metal or grounded surface to discharge any static electricity buildup from your body.
- Hold the drive by its edges only. Avoid touching any exposed parts on the printed circuit board.
- Always place the drive on top of or inside the antistatic bag to reduce the chance of ESD damage.

## Installation Summary

The following steps summarize the installation procedure for your internal tape drive.

- 1. Gather the Necessary Tools**  
See "Collecting the Necessary Tools" on page 19.
- 2. Review the Drive's Default Settings**  
See "Reviewing Drive Default Settings" on page 19.
- 3. Record Your Drive's Information**  
See "Recording Drive Information" on page 25.

- 4. Access the Inside of the Computer**  
See "Accessing the Inside of Your Computer" on page 26.
- 5. Mount the Drive into the Computer Mounting Bay**  
See "Mounting the Internal Tape Drive" on page 26.
- 6. Attach a SCSI Interface Cable**  
See "Connecting a SCSI Cable" on page 29.
- 7. Attach a Power Cable**  
See "Connecting a Power Cable" on page 30.
- 8. Complete and Verify Your Installation**  
See "Completing Your Installation" on page 31.

## Collecting the Necessary Tools

Before proceeding with the installation, gather the tools you will need to install the internal tape drive into the computer mounting bay. The following list identifies some of the tools you will need. You may need additional items, depending on your installation requirements.

- Phillips screwdriver
- Flatblade screwdriver, if your computer uses flathead screws
- Torx screwdriver, if your computer uses torx screws
- Computer documentation, which you can refer to during the installation

## Reviewing Drive Default Settings

Your internal tape drive comes with various default settings. These settings are configured using jumpers and switches.

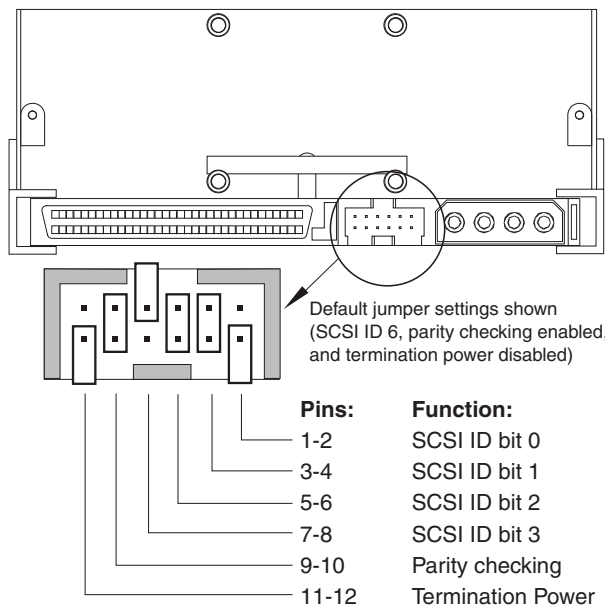
- The jumpers are located on the back of the drive, between the SCSI interface and power connectors (see Figure 3 on page 20)
- The switches are located on the underside of the drive. If you change a switch setting, you must turn the drive off and then on to have the new setting take effect (see Figure 4 on page 21).

You may need to change these settings to suit your requirements. Review the default settings in Table 2 on page 20 to determine whether they suit your requirements or need to be changed.

- If you do not need to change these default settings, skip to "Accessing the Inside of Your Computer" on page 26.
- To change one or more settings, refer to the appropriate page in Table 2 on page 20.

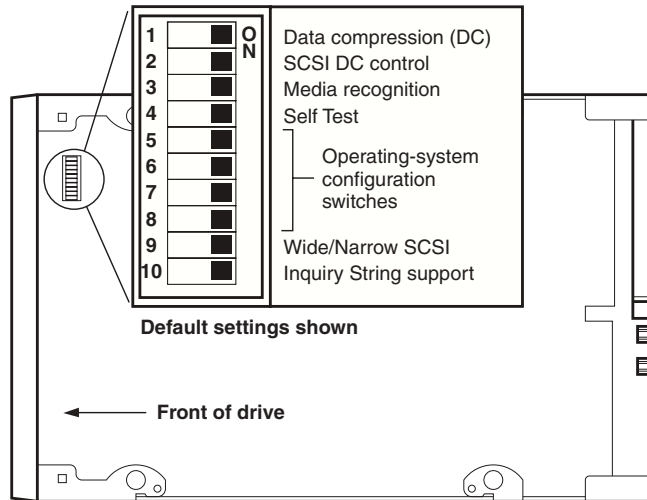
**TABLE 2. Internal Tape Drive Default Settings**

Parameter	Default Setting	Jumper Pins/Switches	See...
SCSI ID	6	Jumper pins 1–2, 3–4, 5–6, 7–8	page 21
Parity checking	Enabled	Jumper pins 9–10	page 22
Terminator power	Disabled	Jumper pins 11–12	page 22
Data compression	Enabled	Switches 1 and 2	page 23
Media Recognition System checking (DDS-4 drives only)	Enabled	Switch 3	page 23
Power-On Self-Test diagnostic	Enabled	Switch 4	page 24
Host operating system	Microsoft Windows 98/Me/XP/NT/ 2000/2003 Server	Switches 5 through 8	page 24
SCSI interface compatibility (DDS-4 drives only)	Wide SCSI (LVD and single ended)	Switch 9	page 25
Vendor ID	SEAGATE DAT	Switch 10	page 25



SCSI ID	Pin 1-2	Pin 3-4	Pin 5-6	Pin 7-8
SCSI ID=0	■	■	■	■
SCSI ID=1	■	■	■	■
SCSI ID=2	■	■	■	■
SCSI ID=3	■	■	■	■
SCSI ID=4	■	■	■	■
SCSI ID=5	■	■	■	■
SCSI ID=6	■	■	■	■
SCSI ID=7	■	■	■	■
SCSI ID=8	■	■	■	■
SCSI ID=9	■	■	■	■
SCSI ID=10	■	■	■	■
SCSI ID=11	■	■	■	■
SCSI ID=12	■	■	■	■
SCSI ID=13	■	■	■	■
SCSI ID=14	■	■	■	■
SCSI ID=15	■	■	■	■
Parity enable	■	■	■	■
Term. power	■	■	■	■

**FIGURE 3. Internal Tape Drive Jumper Settings**



**FIGURE 4.** Internal Tape Drive Switch Settings

## SCSI ID

**Jumper Pins: 1-2, 3-4, 5-6, 7-8**

**Default Setting: SCSI ID 6**

Each SCSI device on the bus must have its own unique ID. Your internal tape drive is shipped with a default SCSI ID of 6. If another SCSI device in the SCSI chain is already using this ID, use jumper pins 1-2, 3-4, 5-6, and 7-8 to change the drive's SCSI ID. Table 3 lists the SCSI IDs and their corresponding jumper settings.

**TABLE 3.** SCSI IDs and Corresponding Jumper Settings

SCSI ID	Jumpers			
	1-2	3-4	5-6	7-8
0	Open	Open	Open	Open
1	Shunted	Open	Open	Open
2	Open	Shunted	Open	Open
3	Shunted	Shunted	Open	Open
4	Open	Open	Shunted	Open
5	Shunted	Open	Shunted	Open
6 (default)	Open	Shunted	Shunted	Open
7	Shunted	Shunted	Shunted	Open
8	Open	Open	Open	Shunted
9	Shunted	Open	Open	Shunted
10	Open	Shunted	Open	Shunted
11	Shunted	Shunted	Open	Shunted

**TABLE 3. SCSI IDs and Corresponding Jumper Settings (Continued)**

SCSI ID	Jumpers			
	1-2	3-4	5-6	7-8
12	Open	Open	Shunted	Shunted
13	Shunted	Open	Shunted	Shunted
14	Open	Shunted	Shunted	Shunted
15	Shunted	Shunted	Shunted	Shunted



**NOTES:** You can also change SCSI IDs by connecting a SCSI address-selection switch to pins 1 through 8.

If you change the drive's default SCSI ID, avoid using SCSI IDs 0 and 1 (which typically are assigned to a boot drive) and SCSI ID 7 (which typically is assigned to SCSI controllers or host bus adapters).

## Parity Checking

**Jumper Pins 9-10:** Pins 9-10 shunted: Enable parity checking (default)  
Pins 9-10 open: Disable parity checking

By default, parity checking is enabled on the internal tape drive. To disable parity checking, remove the jumper from pins 9 and 10.



**NOTE:** If you disable parity checking, the drive still generates a parity bit.

## Terminator Power

**Jumper Pins 11-12:** Pins 11-12 shunted: Enable terminator power  
Pins 11-12 open: Disable terminator power (default)

By default, terminator power is disabled on the internal tape drive. To enable terminator power, place a jumper across pins 11 and 12.



**NOTE:** If you enable terminator power, be careful not to short the TERMPWR signal to ground (for example, by attaching the SCSI cable upside down). If a short occurs, terminator power to the bus is interrupted. After the short is removed, a fuse in the drive is automatically reset, restoring terminator power.

## Data Compression

**Settings:**    **Switch 1 ON = Enable hardware data compression (default)**  
                  **Switch 1 OFF = Disable hardware data compression**

**Switch 2 OFF = Recognize SCSI data compression commands (default)**  
**Switch 2 ON = Ignore SCSI data compression commands**

The internal tape drive provides two switches for controlling data compression.

Switch 1 determines whether hardware data compression is enabled or disabled. By default, switch 1 is set to ON, enabling hardware data compression. To disable hardware data compression, set switch 1 to the OFF position.

Switch 2 controls whether SCSI commands are recognized for enabling or disabling hardware data compression. By default, switch 2 is set to ON, allowing SCSI commands to be used to enable or disable hardware data compression. To prevent SCSI commands from enabling or disabling hardware data compression, set switch 2 to the OFF position.

When data compression is enabled, the drive compresses all data written to tape and decompresses all compressed data read from tape. The degree of compression varies due to the type of data being processed.

- Data with a high degree of redundancy, such as structured database files or graphics files, are compressed most efficiently, often at a ratio of 2:1 or more.
- Data with little redundancy, such as executable programs, are compressed the least.

## Media Recognition System (DDS-4 Drives Only)

**Settings:**    **Switch 3 ON = Enable MRS (default)**  
                  **Switch 3 OFF = Disable MRS**

Using non-DDS media may appear to give satisfactory results, but the inferior specifications of such media can cause data-integrity problems. To avoid these problems, the internal tape drive provides a media-recognition system (MRS) feature that determines whether tape cartridges conform to the DDS tape standard.

By default, switch 3 is set to ON, enabling MRS. With this setting, the drive:

- Reads from and writes to MRS media.
- Reads from but does not write to non-MRS media.

To disable MRS, set switch 3 to the OFF position. With this setting, the drive reads from and writes to MRS and non-MRS media.



*NOTE: Switch 3 is reserved on internal DAT 72 drives.*

## Power-On Self-Test

**Settings:**     **Switch 4 ON = Drive performs Power-On Self-Test (default)**  
                   **Switch 4 OFF = Drive does not perform Power-On Self-Test**

Switch 4 enables or disables the Power-On Self-Test diagnostics that the drive performs when powered on. By default, the drive responds to SCSI commands only after it successfully completes the Power-On Self-Test (about 5 seconds). To prevent the drive from performing the Power-On Self-Test when powered-up, set switch 4 to the OFF position.

## Host Operating System

**Switches: 5, 6, 7, 8**

**Default Setting:**                    **Microsoft Windows 98/Me/XP/NT/  
2000/2003 Server**

Switches 5 through 8 configure the internal tape drive for a host operating system. By default, these switches are all ON. This setting configures the drive for a Microsoft Windows 98/Me/XP/NT/2000/2003 Server operating system.

To use the internal tape drive with a different operating system:

- Set switches 5 through 8 to select the appropriate settings.
- Refer to the operating system drive configuration supplement for information on scripts and other settings for various non-Windows operating systems. This supplement is available on your Tape Resource CD and at <http://support.certance.com>.

Table 4 shows the supported operating systems and their corresponding switch settings.

**TABLE 4. Host Operating Systems and Corresponding Switch Settings**

Host Operating System	Switches				
	SW5	SW6	SW7	SW8	SW10
Windows NT 4.0 with native backup applet using Seagate's STDAT4.SYS driver (default).	ON	ON	ON	ON	ON
Windows NT 4.0 with native backup applet using Microsoft's 4mmDAT.SYS driver.	ON	ON	ON	ON	OFF
Novell 4.11 with native backup applet using the TAPEDAI driver or NWTAPE.CDM driver dated before 11/3/99.	OFF	ON	ON	OFF	OFF
Novell 4.11 with native backup applet using the NWTAPE driver dated after 11/3/99.	ON	ON	ON	ON	OFF
Novell 5.x with native backup applet using the NWTAPE.CDM driver dated before 11/3/99.	OFF	ON	ON	OFF	OFF
Novell 5.x with native backup applet using the NWTAPE.CDM driver dated after 11/3/99.	ON	ON	ON	ON	OFF
DEC UNIX	OFF	ON	ON	ON	—
Sun UNIX	ON	OFF	ON	ON	—
SGI	ON	ON	ON	ON	—



**TABLE 4. Host Operating Systems and Corresponding Switch Settings**

Host Operating System	Switches				
	SW5	SW6	SW7	SW8	SW10
HP-UX	ON	ON	OFF	ON	—
IBM AIX	ON	OFF	ON	OFF	—
Linux	ON	ON	ON	ON	—
SCO (ODT and Open Server) installation using the MAKDEV utility.	OFF	ON	ON	OFF	—
SCO UnixWare 7.x	ON	ON	ON	ON	—

## SCSI Wide/Narrow Configuration (DDS-4 Drives Only)

**Settings:**    **Switch 9 ON = SCSI Wide Operating Mode (default)**  
                   **Switch 9 OFF = SCSI Narrow Operating Mode**

Switch 9 enables SCSI Wide or Narrow operation. By default, switch 9 is set to ON, enabling SCSI Wide (16-bit) operation. To enable SCSI Narrow (8-bit) operation, set switch 9 to the OFF position. This allows the DDS-4 drive to terminate the upper byte of the SCSI bus.



*NOTE: Narrow SCSI is not recommended.*

*Switch 9 is reserved on internal DAT 72 drives.*

## Vendor ID

**Settings:**    **Switch 10 ON = Vendor ID is "SEAGATE DAT" (default)**  
                   **Switch 10 OFF = Vendor ID is "ARCHIVE Python"**

Switch 10 determines the vendor ID that the internal tape drive returns when it receives a SCSI "Inquiry" command. By default, the drive returns the vendor ID **SEAGATE DAT**.

Setting switch 10 to the OFF position configures the drive to return the vendor ID **ARCHIVE Python**. Independent software vendors can use this vendor ID to provide software compatibility with previous Seagate DDS tape drives.

# Recording Drive Information

After you review and, if necessary, change the drive's default settings, record the drive information. That way, you can reference this information in the future, without having to gain access to the drive inside your computer.

# Accessing the Inside of Your Computer

To gain access to the inside of your computer:

1. Shut down the computer as you would normally. Then turn off the computer and all peripherals connected to it.
2. Remove the computer's power cord from the computer's AC connector.
3. Remove the computer cover to gain access to the inside of the computer. The documentation that came with your computer should explain this procedure.



*NOTE: If you have to disconnect cables to gain access to the mounting bay, note which cables were removed. You can then refer to this information when you reconnect the cables at the end of this procedure.*

4. Select an available 3.5-inch or 5.25-inch mounting bay, depending on the internal tape drive you want to install.



*NOTE: The internal tape drive can be mounted horizontally or vertically (on its side).*

5. If the mounting bay has a "filler panel," remove it according to the instructions in your computer's documentation. Place the screws aside. You will need them to secure the drive in the bay.
6. If the computer does not have a SCSI host adapter, you will need to purchase and install a SCSI host adapter.

## Mounting the Internal Tape Drive

An internal tape drive without mounting brackets can be installed into a 3.5-inch drive bay. An internal tape drive with mounting brackets can be installed into a 5.25-inch drive bay.

- To mount the internal tape drive into a 3.5-inch bay, see "Mounting the Internal Tape Drive" starting on page 26.
- To mount the internal tape drive into a 5.25-inch bay, see "Mounting the Drive into a 5.25-inch Drive Bay" starting on page 28.

### Mounting the Drive into a 3.5-inch Drive Bay

The following procedure describes how to mount the drive in a 3.5-inch drive bay. This procedure assumes your drive is not equipped with side-mounting brackets.

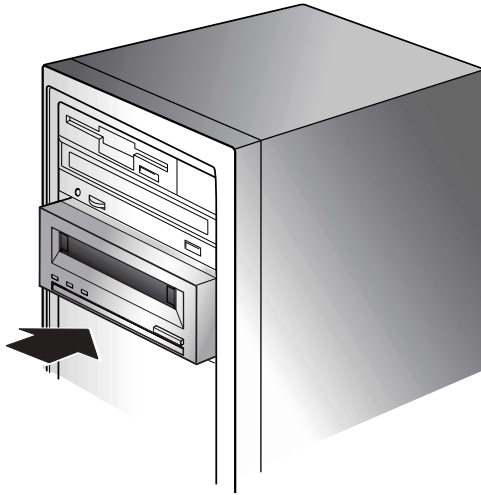
1. Orient the drive so the front of the drive faces the front of the computer.
2. Insert the drive into the computer's drive bay.
3. Align the drive's front panel with the front panel of the computer.

- Secure the drive in the mounting bay using two M3.0 metric screws on each side of the drive (see Figure 5 on page 27). As Figure 6 on page 27 shows, the 3.5-inch drive has four screw holes on the bottom and five on each side.

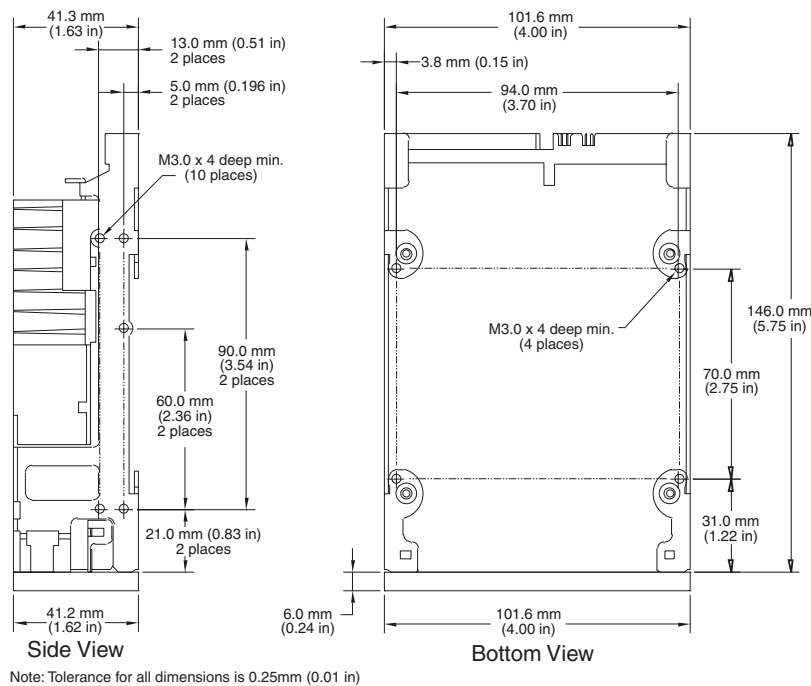


**WARNING:** Do not use screws longer than 4 mm; otherwise, you may damage the drive.

- Proceed to "Connecting a SCSI Cable" on page 29.



**FIGURE 5.** Mounting an Internal Tape Drive

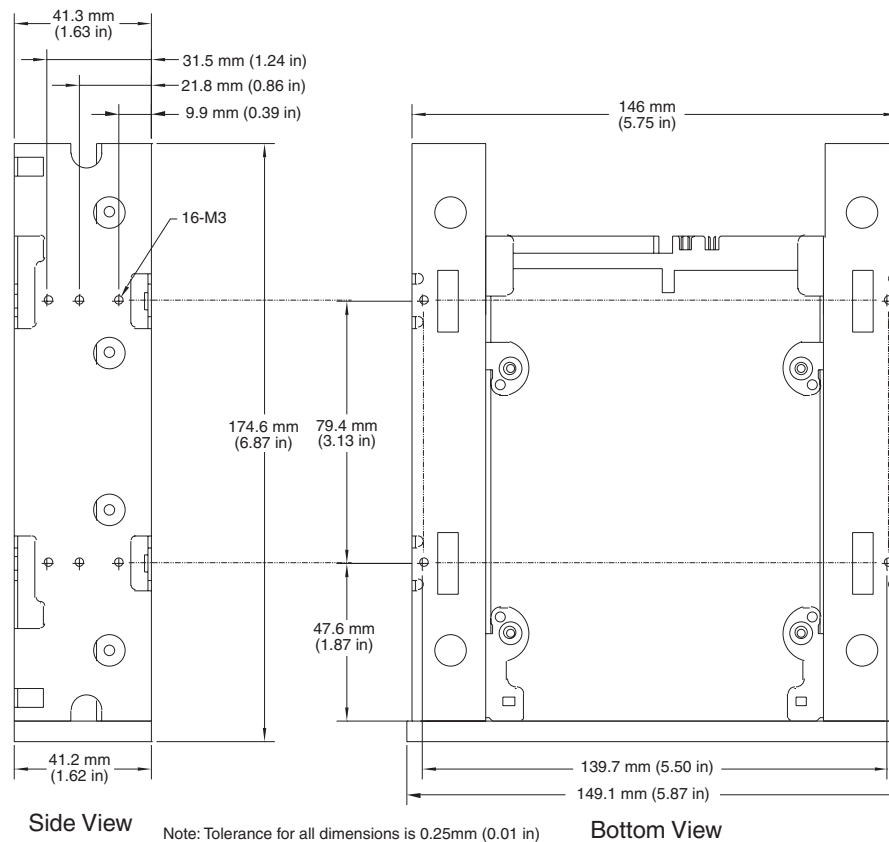


**FIGURE 6.** Mounting Holes for the Internal Tape Drive in a 3.5-inch Installation

## Mounting the Drive into a 5.25-inch Drive Bay

The following procedure describes how to mount the drive in a 5.25-inch drive bay. This procedure assumes your drive has mounting brackets on the sides.

1. Orient the drive so the front of the drive faces the front of the computer.
2. Insert the drive into the computer's drive bay.
3. Align the drive's front panel with the front panel of the computer.
4. Secure the drive in the mounting bay using four screws on the bottom and six screws on each side of the drive (see Figure 7 on page 28).
5. Proceed to "Connecting a SCSI Cable" on page 29.



**FIGURE 7. Mounting Holes for the Internal Tape Drive in a 5.25-inch Installation**

# Connecting a SCSI Cable

The internal tape drives can be used with two SCSI interfaces:

- Wide SCSI — either Low Voltage Differential (LVD) or Single-ended (16-bit Wide mode),
- Narrow SCSI — either Low Voltage Differential (LVD) or Single-ended (8-bit Wide mode).

The tape drive automatically detects whether the SCSI bus is LVD or single ended. Be sure the SCSI bus is terminated properly.

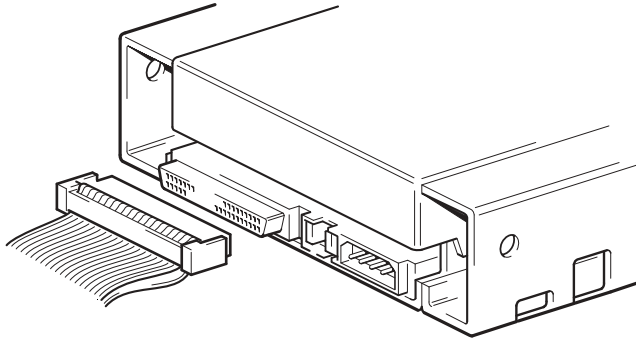


**NOTE:** We strongly recommend that you attach the tape drive to SCSI controllers that support the SCSI Ultra2 LVD interface only. Attaching the tape drive to a non-LVD SCSI controller or an 8-bit Narrow SCSI controller will degrade the performance of your tape drive and backup operations. Performance will also be degraded if you attach non-LVD SCSI devices on the same bus cable as your LVD connection. Do not connect the tape drive to a disk RAID controller (disk RAID controllers are not supported). If you install an adapter, we recommend you purchase a SCSI LVD controller kit that includes the SCSI cable and terminator.

## Connecting to a Wide SCSI Connector

If your computer has a 68-pin wide SCSI connector:

1. Attach the interface cable from the SCSI host adapter to the 68-pin SCSI interface connector on the back of the internal tape drive (see Figure 8 on page 29).



**FIGURE 8.** SCSI Interface Connector on the Internal Tape Drive

## Connecting to a Narrow SCSI Connector

The internal tape drives have an Ultra Wide SCSI interface. Obtaining a 50-to-68 pin adapter lets you connect the 68 pins on the internal tape drive to the 50 pins on the computer's narrow SCSI bus.

1. Connect the adapter to your computer's 50-pin SCSI connector.
2. Connect the SCSI cable with the adapter to the internal tape drive's 68-pin SCSI connector.



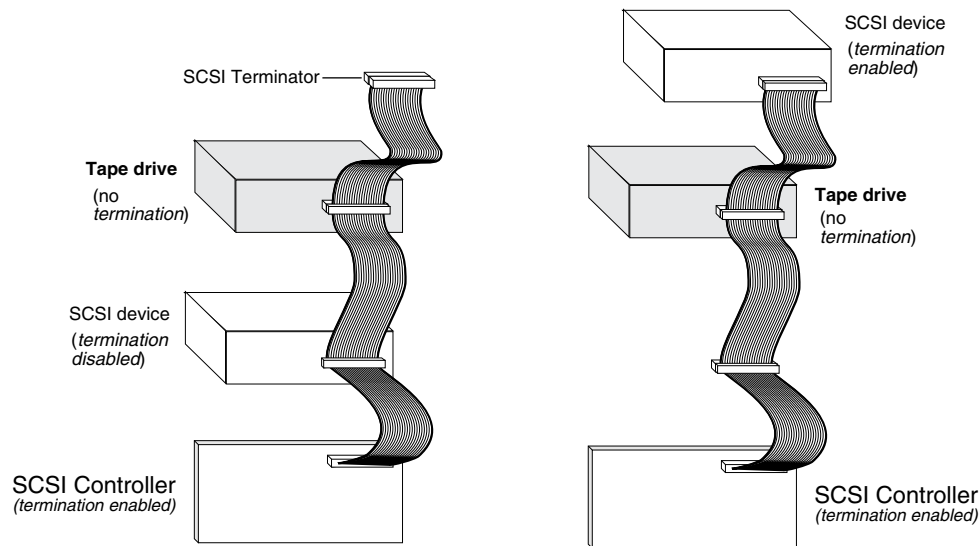
**NOTE:** Be sure the upper 8 data bytes of the 68-pin cable are properly terminated.

# Checking SCSI Termination

The internal tape drives do not provide SCSI termination. For this reason, they should not be the last device on a SCSI chain. Figure 9 on page 30 shows two examples of terminating the internal tape drives.

If the drive is the only SCSI device on the bus:

1. Attach it to the next-to-last connector on the SCSI chain.
2. Attach a multi-mode terminator to the last connector in the chain. This terminator typically is a small, rectangular plastic block that is marked **SCSI Terminator** and attaches to the cable.



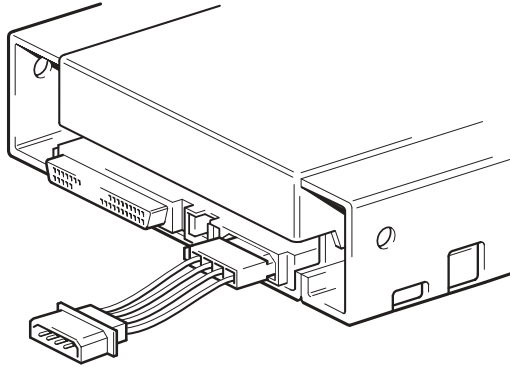
**FIGURE 9.** Two SCSI Termination Examples for the Internal Tape Drives

## Connecting a Power Cable

To connect a power cable to the internal tape drive:

1. Connect a spare 4-pin power cable from the computer's internal power supply to the power connector on the back of the internal tape drive. Figure 10 on page 31 shows the location of the power connector on the internal tape drive.

The recommended 4-pin power connector for the internal drives is an AMP 1-48024-0 housing, with AMP 60617-1 pins or equivalent.



**FIGURE 10.** Power Connector on the Internal Tape Drive

## Completing Your Installation

To complete and test your internal tape drive installation:

1. Use the screws you removed earlier to secure the drive in place.
2. Replace the computer cover.
3. Reconnect the power cord to the computer's power connector.
4. Turn on the computer. If the internal tape drive is configured to perform its Power-On Self-Test (see "Power-On Self-Test" on page 24), it performs the test for about five seconds. When the drive passes the test, all three front-panel LEDs should be OFF.
5. Install your backup software program. The documentation that came with your software should describe this procedure.
6. Gently insert a tape cartridge into the internal tape drive's slot (see "Loading a Cartridge" on page 42). Slide the cartridge into the slot until the drive accepts the cartridge and loads it. A brief delay occurs while the drive identifies the cartridge type and state, and moves the tape to the data area. Then the green Media LED goes ON.
7. Use your backup software application to perform a sample backup-and-verify operation. The amber Drive LED goes ON as data is written to and/or read from the tape.
8. At the end of the operation, press the Eject button on the front of the internal tape drive to eject the cartridge from the drive (see "Unloading a Cartridge" on page 43).

If you encountered any problems during this procedure, see Chapter 7 for troubleshooting procedures.

# Registering Your Tape Drive

After you install the internal tape drive, be sure to register it. Registering your drive ensures that you will receive the latest information about your drive, as well as other product, service, and support information. For your convenience, you can register your drive either through our Web site or by fax.

- If you have an Internet connection, please visit [www.certance.com](http://www.certance.com) and select "Product Registration" from the "Products" menu.
- If you do not have an Internet connection, complete the Registration Card included with your package and either mail or fax it to the address or fax number on the Card.



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# 4 Installing external tape drives

This chapter describes how to install external DDS-4 and DAT 72 drives.

Topics in this chapter are:

- “Unpacking” on page 33
- “What Else You Need” on page 33
- “Installation Summary” on page 34
- “Registering Your Tape Drive” on page 39



*NOTE:* If you have an internal drive, refer to Chapter 3 for installation instructions.

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## Unpacking

Before you unpack the contents of your drive package, inspect the shipping containers for damage. If you spot damage to the container, notify your carrier immediately.

When you unpack the package, compare the items received with those on the packing list. If any item is missing or damaged, please contact your place of purchase immediately.

## What Else You Need

In addition to the contents included with your external tape drive, you need the following items to install your external tape drive.

- A SCSI host bus adapter that is properly installed and configured in a host computer
- A 50-to-68 pin adapter, if your computer has a narrow SCSI interface connector.

- Backup application software that supports the external tape drive. For a list of the latest backup software applications tested with the external DDS-4 and DAT 72 tape drives, please visit our Web site at <http://support.certance.com>.

## Installation Summary

The following steps summarize the installation procedure for your external tape drive.

- 1. Review the Drive's Default Settings**  
See "Reviewing Drive Default Settings" on page 34.
- 2. Record Your Drive's Information**  
See "Recording Drive Information" on page 36.
- 3. Attach a SCSI Interface Cable**  
See "Connecting a SCSI Cable" on page 37.
- 4. Terminate the SCSI Bus, if Necessary**  
See "Checking SCSI Termination" on page 38.
- 5. Attach a Power Cable**  
See "Connecting a Power Cable" on page 38.
- 6. Complete and Verify Your Installation**  
See "Completing Your Installation" on page 39.

## Reviewing Drive Default Settings

Your external tape drive comes with various default settings. You may need to change these settings to suit your requirements. Review the default settings in Table 5 on page 34 to determine whether they suit your requirements or need to be changed.



*Note: These settings can be changed by accessing the switches located on the bottom of the drive. Turn the drive over and gently pull the tab on the access door to release it. Once the door is open, the switches will be accessible. Please refer to pages 20 - 21 for details about the switch settings.*

- If you do not need to change these default settings, skip to "Connecting a SCSI Cable" on page 37.
- To read about a setting, go to the page referenced in Table 5 on page 34.

**TABLE 5. External Tape Drive Default Settings**

Parameter	Default Setting	See...
SCSI ID	6	page 35
Parity checking	Enabled	page 35
Terminator power	Supplied to the SCSI bus	—
Data compression	Enabled	page 35

**TABLE 5. External Tape Drive Default Settings (Continued)**

Parameter	Default Setting	See...
Media Recognition System checking (DDS-4 drives only)	Enabled	page 36
Power-On Self-Test diagnostic	Enabled	page 36
Host operating system	Microsoft Windows 98/Me/ XP/NT/2000/2003 Server	page 36

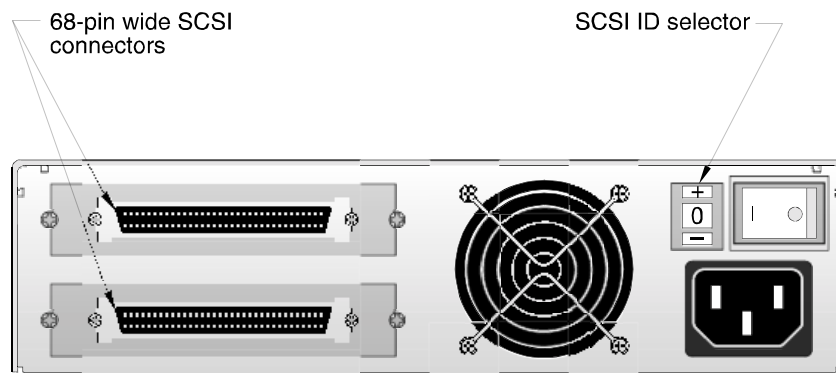
## SCSI ID

Each SCSI device on the bus must have its own unique ID. Your external tape drive is shipped with a default SCSI ID of 6. If another SCSI device in the SCSI chain is already using this ID, use the SCSI ID Selector switch on the back of the drive to change the drive's SCSI ID (see Figure 11 on page 35).



**NOTES:** If you change the drive's default SCSI ID, avoid using SCSI IDs 0 and 1 (which typically are assigned to a boot drive) and SCSI ID 7 (which typically is assigned to SCSI controllers or host bus adapters).

If you change the default SCSI ID, turn the drive power off and back on.



**FIGURE 11.** Back Panel of the External Tape Drive

## Parity Checking

By default, parity checking is enabled on the external tape drive. If you disable parity checking, the drive still generates a parity bit.

## Data Compression

By default, data compression is enabled. With this setting, the external tape drive compresses all data written to tape and decompresses all compressed data read from tape. The degree of compression varies due to the type of data being processed.

- Data with a high degree of redundancy, such as structured database files or graphics files, are compressed most efficiently, often at a ratio of 2:1 or more.

- Data with little redundancy, such as executable programs, are compressed the least.

## Media Recognition System (DDS-4 Drives Only)

Using non-DDS media may appear to give satisfactory results, but the inferior specifications of such media can cause data-integrity problems. To avoid these problems, the external tape drive provides a media-recognition system (MRS) feature that determines whether tape cartridges conform to the DDS tape standard.

By default, MRS is enabled. With this setting, the drive:

- Reads from and writes to MRS media.
- Reads from but does not write to non-MRS media.

If you disable MRS, the drive reads from and writes to MRS and non-MRS media.



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*NOTE: MRS is not available with external DAT 72 drives.*

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## Power-On Self-Test

By default, the external tape drive responds to SCSI commands only after it successfully completes the Power-On Self-Test (about 5 seconds). If you do not want the drive to perform this diagnostic when it powers-up, disable the Power-On Self-Test.

## Host Operating System

By default, the external tape drive is configured for a Microsoft Windows 98/Me/XP/NT/2000/2003 Server operating system.

# Recording Drive Information

After you review and, if necessary, change the drive's default settings, record the information.

# Connecting a SCSI Cable

The external tape drives provide two 68-pin, shielded connectors on the back panel (see Figure 11 on page 35). You can use either connector to attach the drive to the host computer or to another SCSI device.

The internal tape drives can be used with two SCSI interfaces:

- Wide SCSI — either Low Voltage Differential (LVD) or Single-ended (16-bit Wide mode).
- Narrow SCSI — either Low Voltage Differential (LVD) or Single-ended (8-bit Wide mode).

The tape drive automatically detects whether the SCSI bus is LVD or single ended. Be sure the SCSI bus is terminated properly.



*NOTE: We strongly recommend that you attach the tape drive to SCSI controllers that support the SCSI Ultra2 LVD interface only. Attaching the tape drive to a non-LVD SCSI controller or an 8-bit Narrow SCSI controller will degrade the performance of your tape drive and backup operations. Performance will also be degraded if you attach non-LVD SCSI devices on the same bus cable as your LVD connection. Do not connect the tape drive to a disk RAID controller (disk RAID controllers are not supported). If you install an adapter, we recommend you purchase a SCSI LVD controller kit that includes the SCSI cable and terminator.*

## Connecting to a Wide SCSI Connector

If your computer has a 68-pin wide SCSI connector:

1. Turn off your computer.
2. Connect the SCSI cable from the SCSI host adapter or from another unterminated SCSI device to either of the two 68-pin SCSI connectors on the back of the external tape drive (see Figure 11 on page 35).
3. If desired, use the other SCSI connector on the back panel of the external tape drive to attach another SCSI device. If the external tape drive is the last or only device in the SCSI chain, terminate the SCSI chain (see "Checking SCSI Termination" on page 38).

## Connecting to a Narrow SCSI Connector

The external tape drives have an Ultra Wide SCSI interface. Obtaining a 50-to-68 pin adapter lets you connect the 68 pins on the external tape drive to the 50 pins on the computer's narrow SCSI bus.

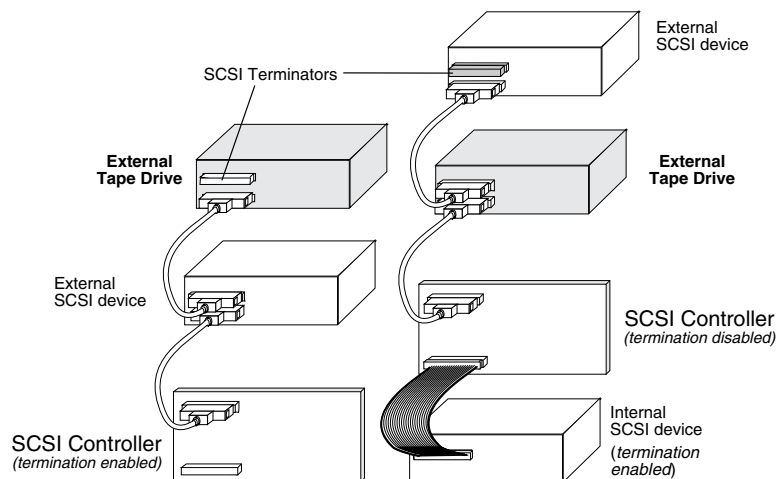
1. Turn off your computer.
2. Connect the adapter to your computer's 50-pin SCSI connector.
3. Connect the SCSI cable with the adapter to either of the two 68-pin SCSI connectors on the back of the external tape drive (see Figure 11 on page 35).
4. If desired, use the other SCSI connector on the back panel of the external tape drive to attach another SCSI device. If the external tape drive is the last or only device in the SCSI chain, terminate the SCSI chain (see "Checking SCSI Termination" on page 38).



**NOTE:** Be sure the upper 8 data bytes of the 68-pin cable are properly terminated.

## Checking SCSI Termination

If the external tape drive is the last or only device in the SCSI chain, install a terminating plug on the unused SCSI connector on the drive's back panel. This terminator typically is a small, rectangular plastic block that is marked **SCSI Terminator**. Figure 12 on page 38 shows two examples of using SCSI termination.



Example 1: SCSI termination in a system that has only external SCSI devices.

Example 2: SCSI termination in a system that has both internal and external SCSI devices.

**FIGURE 12.** Two SCSI Termination Examples for the External Tape Drives

## Connecting a Power Cable

To connect a power cable to the external tape drive:

1. Connect a power cable to the AC power connector on the back of the external tape drive (see Figure 11 on page 35).
2. Connect the other end of the power cable to a working AC outlet.



**NOTE:** Choose an AC outlet that is not controlled by a wall switch, which can turn off power to the AC outlet and to the external tape drive.

# Completing Your Installation

To complete and test your external tape drive installation:

1. Reconnect the power cord to the computer's power connector.
2. Use the On/Off Switch on the back of the external tape drive to turn on the drive (see Figure 11 on page 35). The external tape drive performs its Power-On Self-Test for about five seconds. When the drive passes the test, all three front-panel LEDs should be OFF.
3. Turn on the computer.
4. Install your backup software program. The documentation that came with your software should describe this procedure.
5. Gently insert a tape cartridge into the external tape drive's slot (see "Loading a Cartridge" on page 42). Slide the cartridge into the slot until the drive accepts the cartridge and loads it. A brief delay occurs while the drive identifies the cartridge type and state, and moves the tape to the data area. Then the green Media LED goes ON.
6. Use your backup software application to perform a sample backup-and-verify operation. The amber Drive LED goes ON as data is written to and/or read from the tape.
7. At the end of the operation, press the Eject button on the front of the external tape drive to eject the cartridge from the drive (see "Unloading a Cartridge" on page 43).

If you encountered any problems during this procedure, see Chapter 7 for troubleshooting procedures.

## Registering Your Tape Drive

After you install the external tape drive, be sure to register it. Registering your drive ensures that you will receive the latest information about your drive, as well as other product, service, and support information. For your convenience, you can register your drive either through our Web site or by fax.

- If you have an Internet connection, please visit [www.certance.com](http://www.certance.com) and select "Product Registration" from the "Products" menu.
- If you do not have an Internet connection, complete the Registration Card included with your package and either mail or fax it to the address or fax number on the Card.

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# 5 Operating Your Tape Drive

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This chapter describes how to operate your tape drive.

Topics in this chapter are:

- "Using the Appropriate Media" on page 40
- "Handling Cartridges" on page 41
- "Loading a Cartridge" on page 42
- "Unloading a Cartridge" on page 43
- "Write-Protecting a DDS Cartridge" on page 44
- "Cleaning the Tape Heads" on page 45

## Using the Appropriate Media

The Seagate DDS-4 and DAT 72 drives use data-grade DDS cartridges, which comply with ANSI specifications listed in the "3.81 mm Helical-Scan Digital Computer Tape Cartridge for Information Interchange," ANSI X3B5/89-156 standard.

For optimum performance and maximum storage capacity, use MRS tape cartridges that correspond to the format supported by your drive (see Table 6 on page 41). MRS cartridges have a series of alternate opaque and clear stripes at the beginning of the tape. These stripes classify the media as data-grade.



**TABLE 6. Matching Drives with the Media They Support**

Media	Tape Length	DDS-4 Drives	DAT 72 Drives
DDS-2	120 meters	✓	
DDS-3	125 meters	✓	✓
DDS-4	150 meters	✓	✓
DDS 5 <sup>th</sup> Generation	170 meters		✓

## Handling Cartridges

To protect your data cartridges and the information on them, observe the guidelines and avoid the pitfalls in Table 7 on page 41.

**TABLE 7. Cartridge Guidelines and Pitfalls**

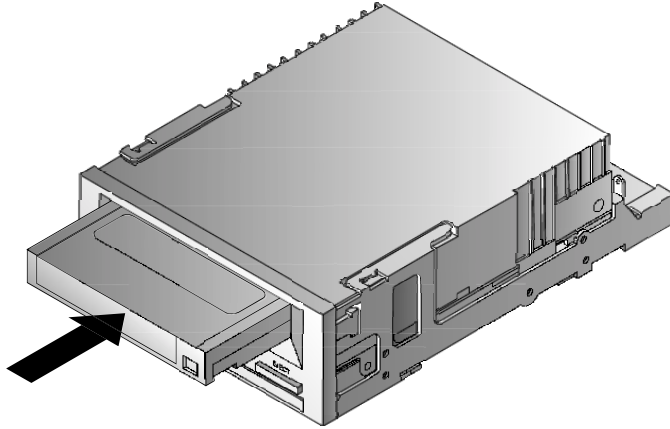
Guidelines to Follow...	Pitfalls to Avoid
Use DDS cartridges at temperatures from 5° C (40° F) to 40° C (104° F). Cartridges can be stored at temperatures down to -40° C (-40° F).	Do not expose cartridges to direct sunlight, moisture, excessively dry or humid places, extreme changes in temperature or humidity, or X-rays.
Handle cartridges gently.	Do not treat cartridges roughly or drop them.
Keep cartridges in plastic cases when they are not in use.	Do not try to clean the tape guides or tape path inside the cartridge.
Apply just one label to the designated area on the cartridge. Affixing more labels can jam the drive.	Never touch the exposed tape media with your fingers.
If your data is important, consider reading data off of tapes and rewriting to new and perhaps more modern tapes every few years.	Never leave cartridges close to magnetic fields, such as near a monitor or telephone handset.
If cartridges are exposed to temperatures or humidities outside the specified operating environment, expose them to the operating environment for a time equal to the period that the cartridges were exposed to the out-of-specification environment (up to a maximum of 24 hours).	Do not read from or write to cartridges when a temperature change of 10° C per hour is occurring.

# Loading a Cartridge

Seagate DDS drives have a front-loading cartridge bay for easy operation. To load a cartridge:

1. Hold the cartridge so the label is facing up and the exposed media is facing the drive.
2. Gently insert the cartridge into the drive (see Figure 13 on page 42). The drive-bay door opens automatically when a cartridge is inserted.

After you insert the cartridge, there is a brief delay while the drive identifies the cartridge type and state, and moves the tape to the data area. Then the Media LED turns ON.



**FIGURE 13.** Loading a Cartridge

## Initializing a Blank Cartridge

When you insert a blank cartridge into the drive for the first time, the drive takes from 10 to 12 seconds to determine that the tape is blank. The drive automatically initializes the tape as soon as it receives a SCSI "Write" command from the host computer. Initializing a blank tape takes about 30 seconds.

# Unloading a Cartridge

To unload a cartridge:

1. Be sure the Drive LED is OFF.

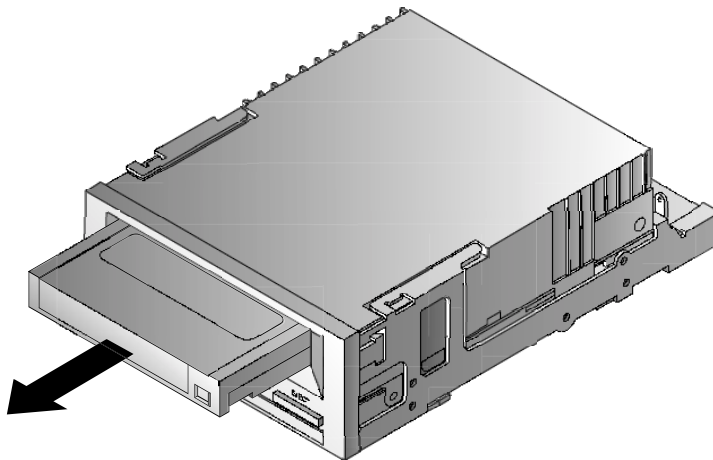


**CAUTION:** To ensure integrity of your backups and restores, do not press the Eject button when the Drive LED is ON.

2. Press the Eject button on the front panel of the drive to unload the cartridge (see Figure 14 on page 43). The drive automatically flushes the drive buffer to tape, rewinds the cartridge, updates the system log, and ejects the cartridge. This may take up to three minutes. Do not power-down the tape drive or host computer during this time.



**NOTE:** The backup software may issue a command to the drive that prevents the Eject button from ejecting the tape. If the tape does not eject, try ejecting it using your backup software commands.



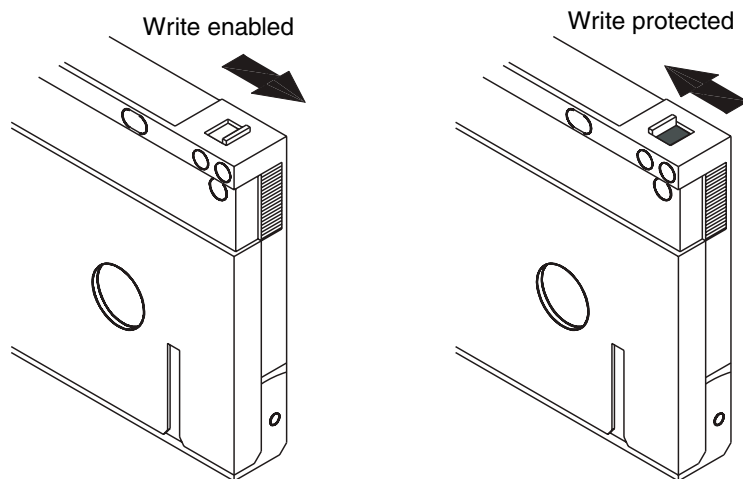
**FIGURE 14.** Eject Button on Front Panel of Drive

# Write-Protecting a DDS Cartridge

Write-protecting a DDS cartridge protects the data on the cartridge from being changed, overwritten, or deleted. To write-protect a cartridge, slide the write-protect tab on the back of the cartridge to the open position (see Figure 15 on page 44). To write-enable the cartridge, slide the write-protect tab so the hole is closed (see Figure 15 on page 44).



**CAUTION:** Write-protecting a cartridge does not protect the data on the cartridge from bulk-erasure or degaussing. Do not bulk erase DDS cartridges; otherwise, you will lose all of your data on the cartridge and your data will not be recoverable.



**FIGURE 15.** Write-protecting a DDS Cartridge

# Cleaning the Tape Heads

If excessive dust or debris collects at the tape heads, your drive may not be able to read from or write to tape. To avoid this situation, clean the drive's tape heads:

- After every 50 hours of operation.
- If the Clean LED goes ON or flashes.
- If the Media LED flashes when the drive is operating.

To clean tape heads, use a Seagate-qualified DDS cleaning cartridge. Certance offers a cleaning cartridge, Model STDMCL, that can be ordered from <http://shop.certance.com>.



*NOTE: Do not use an audio DAT cleaning cartridge, as the drive cannot recognize it. Also, avoid liquids, swabs, and other methods other than those recommended in this section.*

To clean the tape heads:

1. Insert a Seagate-qualified DDS cleaning cartridge into the drive. The drive loads and runs the cleaning cartridge for about 30 seconds.



*NOTE: If the cleaning cartridge runs for less than 30 seconds and the Clean LED is flashing, the cartridge has expired. Replace the cleaning cartridge with a new one and repeat step 1.*

2. When the cleaning cartridge finishes cleaning the heads, the drive ejects the cartridge automatically.
3. Remove the cleaning cartridge from the drive and store the cartridge in a safe place.

Most cleaning cartridges are good for roughly 30 cleaning cycles. When the cleaning cartridge is used up, the Clean LED will flash rapidly and the cleaning cartridge should be replaced.

Observe the following guidelines when cleaning tape heads:

- Each time the cleaning cartridge is loaded, a new, unused portion of cleaning tape is advanced over the entire tape path. The drive does not rewind a cleaning cartridge. After about 30 cleaning cycles, the entire tape is used up and should be replaced. The Clean LED flashes when the cleaning cartridge needs to be replaced.
- The DDS-4 and DAT 72 drives have a TapeAlert feature that notifies your backup software application when the tape heads need to be cleaned or when a cleaning cartridge needs replacement.

# 6 Understanding the Drive LEDs

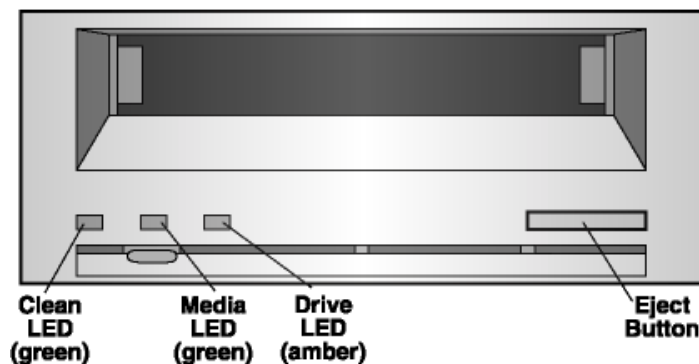
This chapter describes the LEDs on the front panel of the DDS-4 and DAT 72 drives. These LEDs provide information about both normal and error conditions.

Topics in this chapter are:

- "Front Panel LEDs" on page 46
- "LED Summary" on page 47
- "Clean LED" on page 47
- "Media LED" on page 48
- "Drive LED" on page 48

## Front Panel LEDs

Figure 16 on page 46 shows an example of the LEDs on the drive front panel of the DDS-4 and DAT 72 drives. The external tape drive has the same front-panel LEDs, plus a green Power-On LED.



**FIGURE 16.** Front Panel LEDs on Internal Drive (external drive is similar)

# LED Summary

Table 8 on page 47 summarizes the actions of the front-panel LEDs.

**TABLE 8. LED Quick Summary**

LED	Color	Action	Description
Clean	Green	ON (Lit)	Cleaning is required.
		Slow Flashing	Internal error rate threshold has been exceeded and cleaning is required.
		Flashing	Cleaning cartridge in the drive has exceeded its useful life. Replace the old cleaning cartridge with a new one.
Media	Green	ON (Lit)	An inserted cartridge is operating properly.
		Flashing	Drive could not write the tape correctly (write error). Use a DDS cleaning cartridge to clean the drive.
Drive	Amber	ON (Lit)	Drive is reading or writing the tape normally.
		Rapid Flashing	A hardware fault has occurred.

## Clean LED

The Clean LED indicates whether a drive needs to be cleaned.

**TABLE 9. Clean LED**

LED Status	Description
ON continuously	Drive requires cleaning. Use only an approved DDS cleaning cartridge.
Flashing slowly (approximately ON 2 seconds, OFF 1 second)	Tape cartridge in use has exceeded a predefined soft-error threshold. This signal is a warning only and does not indicate that data has been compromised. Remove the tape and clean the drive using an approved DDS cleaning cartridge. If the Clean LED still flashes after cleaning and reinserting the original data cartridge, use a new cartridge for future backups.
Flashing rapidly	A cleaning cartridge that has exceeded its useful life has been inserted into the drive. Replace the cleaning cartridge with a new approved DDS cleaning cartridge.

# Media LED

The Media LED indicates whether a DDS cartridge is operating normally.

**TABLE 10. Media LED**

LED Status	Description
ON continuously	A DDS cartridge has been inserted and the drive is operating normally.
Flashing rapidly	Drive could not write the tape correctly (maximum rewrite count exceeded) and the write operation failed. Clean the drive heads using an approved DDS cleaning cartridge. If you reinsert the original data cartridge and the LED continues flashing, insert a new data cartridge and retry the operation.



**NOTE:** As routine maintenance, clean the drive heads after every 50 hours of operation.

# Drive LED

The amber Drive LED lets you know when data is being read from or written to tape. It also informs you when a hardware fault occurs.

**TABLE 11. Drive LED**

LED Status	Description
ON continuously	The drive is reading or writing the tape (SCSI or tape movement is present).
Flashing rapidly	A hardware fault occurred. If the fault occurs immediately after powering on the drive, the Power-On Self-Test switch (switch 4) is enabled and a Power-On Self-Test has failed. If the front panel LEDs are flashing together, contact the Technical Support department.  If the Drive LED is flashing rapidly during drive operation, press the Eject button to remove the tape. If the tape does not eject within 2 minutes, press and hold the Eject button for more than 5 seconds. The tape should eject within 40 seconds. Contact Technical Support for more information.



**NOTE:** If your backup software issues a SCSI "Prevent Media Removal" command, the Drive LED remains ON and the Eject button is disabled, so that the tape cannot be ejected accidentally. To eject the tape, use your backup software's Eject command.



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# 7 Troubleshooting

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This chapter provides suggestions for troubleshooting your drives in the unlikely event you encounter a problem with them.

Topics in this chapter are:

- "Missing or Damaged Parts" on page 49
- "SCSI ID Problems" on page 50
- "SCSI Termination Problems" on page 50
- "Mounting Hardware Problems" on page 50
- "Drive Does Not Work" on page 50
- "Power-On Self-Test Fails" on page 51
- "Computer Does Not Boot" on page 51
- "Computer Does Not Recognize Drive" on page 51
- "Backup Program Does Not Recognize Drive" on page 52
- "Write Error" on page 52
- "Hardware Error" on page 52

## Missing or Damaged Parts

If any of the contents included with your DDS-4 or DAT 72 drive are missing or damaged, contact your place of purchase immediately.

# SCSI ID Problems

Each SCSI device on the same SCSI bus must have a unique SCSI ID. The default SCSI ID for internal and external DDS-4 and DAT 72 drives is 6. You should leave this default SCSI ID unchanged unless another device on the SCSI bus is already using this ID.

If the default SCSI ID is already in use, you can change the default SCSI ID on the drive using either jumpers on the back of the internal tape drives or the SCSI ID Selector switch on the back of the external SCSI drives. After you set the SCSI ID, record your setting. For more information about SCSI IDs, see "SCSI ID" on page 21 if you have an internal tape drive or "SCSI ID" on page 35 if you have an external tape drive.

# SCSI Termination Problems

If an external DDS-4 or DAT 72 drive is the last device or the only device in a SCSI chain, you must install a terminating plug on the unused SCSI connector. For more information, see "Checking SCSI Termination" on page 38.

The internal DDS-4 and DAT 72 drives do not provide SCSI termination. Therefore, do not install these drives as the last devices in the SCSI chain. If the drive is the only SCSI device, attach the drive to the connector which is next to last on the SCSI chain and attach a multi-mode terminator to the last connector in the chain. For more information, see "Checking SCSI Termination" on page 30.

# Mounting Hardware Problems

The internal DDS-4 and DAT 72 drives are designed to install in most servers using the hardware accompanying the drives, without requiring additional items. However, if your server requires additional items to install the internal DDS-4 or DAT 72 drives, or if any original server components are damaged or lost, contact your server manufacturer or vendor.

# Drive Does Not Work

If the green Power-On LED on the external tape drive does not go ON, or if the internal tape drive does not work:

1. Check the power connection to the drive.
2. If the connection is secure, replace the power cable with one that is known to work.
3. If the drive still does not work, contact the Technical Support department.

# Power-On Self-Test Fails

If the drive fails its Power-On Self-Test:

1. Check for a cartridge in the drive. If you find one, eject it.
2. Power-down the drive and power it up again.
3. If the drive still fails its Power-On Self-Test, contact the Technical Support department.

# Computer Does Not Boot

If the computer does not boot after you install the drive:

1. You may have forgotten to reattach the computer's power cable, which you removed when you installed the drive. Be sure all cables are connected properly to the computer.
2. Be sure the computer's power cable is connected to a power outlet that is known to work. Plug into the outlet another appliance, such as a lamp, that you know to work. If the appliance does not work, the problem is with the outlet.
3. The power outlet connected to the computer is controlled by a wall switch that is removing power from the outlet. Either switch outlets or set the wall switch so that power is applied to the outlet.
4. The computer has two SCSI host adapters installed whose resources are conflicting with each other. Remove the conflicting device or consult the documentation that came with the device for suggestions about resolving the problem.

# Computer Does Not Recognize Drive

If your computer does not recognize the drive:

1. Verify that the SCSI and power cables to the drive are installed properly.
2. The drive may be using a SCSI ID assigned to another SCSI device on the SCSI bus. If so, reassign a unique SCSI ID to the drive or to the conflicting device.
3. Check that the SCSI bus is terminated properly. Note that the internal DDS-4 and DAT 72 drives do not provide SCSI termination and, therefore, should not be the last devices on a SCSI chain.

# Backup Program Does Not Recognize Drive

If your backup application program does not recognize the drive:

1. Use the Windows Device Manager to determine whether the operating system has recognized the drive. If the tape drive is recognized properly, it appears under the **Tape Drive** category. If the tape drive was recognized, but native drivers are not installed, it appears under **Other Devices**. The backup software supplies the necessary drivers for the tape drive and native drivers are not required.
- If the Device Manager shows the drive, check the documentation that came with your backup program to determine whether the program needs a particular driver to be installed.
- If the Device Manager does not list the drive, the drive may not be installed or configured properly. Check your drive installation and configuration.

## Write Error

If the Media LED is flashing, a write error has occurred.

1. Use a Seagate-qualified DDS cleaning cartridge to clean the tape heads (see "Cleaning the Tape Heads" on page 45).
2. Try to run a short backup and verify.
3. If the Media LED continues to flash, contact the Technical Support department.

## Hardware Error

If the Drive LED is flashing rapidly, a hardware error has occurred. If the fault occurs immediately after powering on the drive, the Power-On Self Test switch (switch 4) is enabled and a Power-On Self-Test has failed. If the front panel LEDs are flashing together, contact the Technical Support department.

If the Drive LED is flashing rapidly during drive operation:

1. Press the Eject button to remove the tape.
2. If the tape does not eject within 2 minutes, press and hold the Eject button for more than 5 seconds. The tape should eject within 40 seconds.
3. Contact Technical Support for more information.

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# A Loading Revised Firmware

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Your DDS-4 or DAT 72 tape drive includes permanently installed, electrically upgradeable flash memory. This memory allows qualified OEMs to revise DAT 72 and DDS-4 SCSI firmware quickly and easily. It also prolongs the life of the tape drive by allowing the drive to inherit leading technologies as soon as those technologies become available.

This appendix describes how to load firmware onto your tape drive. Topics in this appendix are:

- “Firmware Upgrade Methods” on page 53
- “Using Firmware Cartridges” on page 54

## Firmware Upgrade Methods

You can upgrade your tape drive’s firmware two ways:

- Using the diagnostic software provided on your Tape Resource CD or available at <http://support.certance.com>. This software uploads a firmware file via SCSI from your host computer to the tape drive.
- Using Seagate OEM firmware cartridges

# Using Firmware Cartridges

The following procedure describes how to upgrade the tape drive firmware using a firmware upgrade tape cartridge. Firmware upgrade cartridges are available only to qualified Seagate OEM customers. Contact your sales representative for information.



*NOTE: The firmware can also be upgraded from a host computer via the SCSI connection using software available at <http://support.certance.com>.*

1. Power on the host system with the DDS-4 or DAT 72 drive installed.
2. Close all applications that might try to communicate with the drive during the firmware upgrade procedure.
3. Insert the firmware upgrade cartridge. The drive automatically recognizes the firmware upgrade cartridge and begins downloading the firmware from the cartridge into DRAM. When the firmware has been downloaded into DRAM, the drive ejects the firmware upgrade cartridge and the drive LEDs blink in a progressive pattern. When the blinking pattern stops, the firmware upgrade operation is complete.



**WARNINGS: Once the firmware upgrade cartridge is inserted into the drive, no power interruption can occur while the firmware is loading. Do not power off the drive. If a power interruption occurs, the firmware may not be loaded correctly and the drive may not operate properly.**

**Do not power down the host system or disconnect power to the drive until the drive LEDs stop flashing. Otherwise, the drive may be rendered inoperative.**

4. It may be necessary to reboot the system to ensure that your backup software application continues to recognize the tape drive.

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# B Technical Support Information

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Seagate provides a number of ways for you to obtain technical support. This appendix describes these methods.

Topics in this appendix are:

- "World-wide Services" on page 55
- "Regional Services" on page 56
- "Support Services in the Americas" on page 56
- "Support Services in Europe" on page 57
- "Support Services for Africa and the Middle East" on page 57
- "Support Services in Asia and the Western Pacific" on page 58

## World-wide Services

### World-wide Web

A wide variety of technical support services are available on the World Wide Web site, located at <http://support.certance.com>

### E-mail Technical Support

You can e-mail questions or comments to: [tapesupport@certance.com](mailto:tapesupport@certance.com).

# Regional Services

We provide technical support through several regional centers worldwide. These services may include the following.

## Phone Technical Support

For one-on-one help, you can talk to a technical-support specialist during local business hours. Before calling, note your system configuration and drive model number. If you recorded this information as suggested, have it handy.

## Technical Support FAX

You can FAX questions or comments to technical support specialists. Responses are sent during local business hours.

# Support Services in the Americas

## Telephone Support

By dialing telephone support, you will be directed to a product-specific phone or fax number.

- US customers: 1-800-SEAGATE
- International customers: +1-405-936-1400

## Technical Support FAX (US and International)

Seagate's 24-hour technical-support FAX number for US and international customers is:  
1-405-936-1683

## SeaTDD

Seagate provides telephone support for the deaf. US and international customers can dial 1-405-936-1687.



# Support Services in Europe

For European customer support and SeaFAX, dial the toll-free number for your specific country from Table 12 on page 57. The Seagate Technical Support FAX number for all European countries is: 31-20-653-3513.

**TABLE 12. European Toll-Free Numbers**

<b>Country</b>	<b>Phone/SeaFAX</b>	<b>Country</b>	<b>Phone/SeaFAX</b>
<i>Austria</i>	<i>0 800-20 12 90</i>	<i>Norway</i>	<i>0 800-732 4283</i>
<i>Belgium</i>	<i>0 800-74 876</i>	<i>Poland</i>	<i>00 800-311 12 38</i>
<i>Denmark</i>	<i>80 88 12 66</i>	<i>Spain</i>	<i>900-98 31 24</i>
<i>France</i>	<i>0 800-90 90 52</i>	<i>Sweden</i>	<i>900-98 31 24</i>
<i>Germany</i>	<i>0 800-182 6831</i>	<i>Switzerland</i>	<i>0 800-83 8411</i>
<i>Ireland</i>	<i>1 800-55 21 22</i>	<i>Turkey</i>	<i>00 800-31 92 91 40</i>
<i>Italy</i>	<i>800-790695</i>	<i>United Kingdom</i>	<i>00 800-31 92 91 40</i>
<i>Netherlands</i>	<i>0 800-732 4283</i>		

If your country is not listed in Table 12 on page 57, dial our European call center in Amsterdam at 31-20-316-7222 between 8:30 A.M. to 5:00 P.M. (European central time) Monday through Friday or send a FAX to 31-20-653-3513.

## Support Services for Africa and the Middle East

For presales, technical support, warranty repair, and FAX services in Africa and the Middle East, dial our European call center in Amsterdam at 31-20-316-7222 between 8:30 A.M. to 5:00 P.M. (European central time) Monday through Friday, or send a FAX to 31-20-653-3513.

# Support Services in Asia and the Western Pacific

Various technical support services are available from different regional centers, as shown in Table 13 on page 58. SeaFAX is available in Australia at 61-2-9756-5170.

**TABLE 13. Asia and Western Pacific Numbers**

<b>Technical Support</b>	<b>Phone</b>	<b>FAX</b>
<i>Australia</i>	<i>61-2-9725-3366</i>	<i>61-2-9725-4052</i>
<i>Hong Kong</i>	<i>852-2368 9918</i>	<i>852-2368 7173</i>
<i>Japan</i>	—	<i>81-3-5462-2979</i>
<i>Singapore</i>	<i>65-488-7584</i>	<i>65-488-7528</i>
<i>Taiwan</i>	<i>886-2-2514-2237</i>	<i>886-2-2715-2923</i>

If your country is not listed in Table 13 on page 58, dial our Asia/Pacific headquarters in Singapore at 65-488-7584 during business hours (9:00 A.M. to 5:00 P.M. Singapore time).

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## Free Manuals Download Website

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<http://auto.somanuals.com>

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