

HP 9000
Series 700, 800

HP 9000
V Class

HP 3000
Series 900

A3542A DDS-3 Tape Drive User's Guide

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

Print History

© 1997, Hewlett-Packard Company. All rights reserved.
Edition 2, November, 1997

This document contains proprietary information, which is protected by copyright. No part of this document may be photocopied, reproduced or translated into another language without the prior written consent of Hewlett-Packard Company. The information contained in this document is subject to change without notice.

Hewlett-Packard Company makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this material.

Safety Considerations

The product and related documentation must be reviewed for familiarization with safety markings and instructions before installation and operation.

Safety Symbols



Instruction Manual Symbol. If the product is marked with this symbol, refer to the manual to protect the product against damage.

WARNING A **WARNING** denotes a hazard that can cause personal injury.

Caution A **Caution** denotes a hazard that can damage equipment.

Do not proceed beyond a **WARNING** or **Caution** notice until you have understood the hazardous conditions and have taken appropriate steps.

Grounding

The computer in which this product is installed is a safety Class I product and has a protective earthing terminal. There must be an uninterruptible safety earth ground from the main power source to the product's input wiring terminals, power cord or supplied power cord set. Whenever it is likely that the protection has been impaired, disconnect the power cord until the ground has been restored.

Servicing

Any servicing, adjustment, maintenance or repair must be performed only by authorized service-trained personnel.

Warranty

If you have any questions about the warranty for this product, contact your dealer or your local Hewlett-Packard sales representative.

Regulatory Statements

FCC Radio Frequency Interference Statement (USA)

Caution This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used in accordance with the instruction manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of FCC rules, which are designed to provide reasonable protection against interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference. If this equipment causes interference to radio reception (which can be determined by turning the equipment off and on) try these measures: Reorient the receiving antenna. Relocate the computer with respect to the receiver. Move the computer equipment away from the receiver. Plug the computer and the receiver into different branch circuits. Consult your dealer or an experienced technician for additional suggestions.

VCCI Class 1 (Japan)

注意

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づく第一種情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Declaration of Conformity

DECLARATION OF CONFORMITY
According to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Hewlett-Packard Company
Manufacturer's Address: 8000 Foothills Boulevard
Roseville, CA 95747
USA

Declares, that the product

Product Name: HP DDS-3 Tape Drive
Model Number(s): A3742x (where x is any alpha character)
Product Options: All

Conforms to the following Product Specifications:

Safety: IEC 950:1991 + A1, A2, A3 / EN 60950:1992 + A1, A2, A3
EMC: CISPR 22:1993 / EN 55022:1994 - Class A¹
EN 50082-1:1992, Generic Immunity, including:
IEC 801-2:1991 / prEN 55024-2:1992, 4 kV CD, 8 kV AD
IEC 801-3:1984 / prEN 55024-3:1991, 3 V/m
IEC 801-4:1988 / prEN 55024-4:1992, 0.5 kV Signal Lines
1 kV Power Lines

Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC and carries the CE marking accordingly.

1 The Product was tested in a typical configuration with a Hewlett-Packard computer system.

Roseville, November 1, 1996



Dan Blount, Quality Manager

European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department TRE, Herrenberger Straße 130, D-71034 Böblingen (FAX: + 49-7031-14-3143)

In This Book

This book is the user manual for the A3542A DDS-3 tape drive. It contains three chapters and an index.

Chapter 1, Installation, describes installing the tape drive in HP 3000 and HP 9000 systems.

Chapter 2, Operation, describes how to operate the tape drive, including using its front panel and loading and unloading tapes.

Chapter 3, Service, contains information about diagnosing tape drive problems and obtaining service for the drive. It also lists tape drive specifications.

Index

Tabs on the edges of pages show the chapter titles and assist in the quick location of information.

Safety Considerations	iii
Safety Symbols	iii
Grounding	iii
Servicing	iii
Warranty	iii
Regulatory Statements	iv
In This Book	vi
Chapter 1 - Installation.....	1-1
1. Preparing to install the device	1-2
2. Peripheral Upgrade Rules	1-3
3. Setting the configuration switches for data compression and MRS	1-3
4. Setting the SCSI address	1-5
5. Installing the device	1-6
6. Configuring and verifying the drive	1-7
Configuring and verifying for HP-UX	1-7
Configuring and verifying for MPE/iX	1-7
Run the IO Configurator from SYSGEN	1-7
Add the transparent manager	1-8
Add the tape device Logical Device Number (LDEV)	1-8
Save the configuration	1-8
Reboot with the new configuration	1-9
Create a System Load Tape (SLT)	1-9
Chapter 2 - Operation.....	2-1
Features	2-2
Front Panel	2-2
Operating the tape drive	2-3
Power on	2-3
Loading tape cartridges	2-3
Unloading tape cartridges	2-3
Forcing a tape cartridge to eject	2-4
Write-protecting tape cartridges	2-4
Handling and storing tape cartridges	2-5
Tape Cartridge Do's	2-5
Tape Cartridge Don'ts	2-5
Temperature	2-6
Tape LED and Clean/Attention LED	2-6
Cleaning the read/write heads	2-7
To clean the tape heads:	2-7
Backup routines	2-8
Model 1: Daily backup	2-8
Model 2: Weekly rotation with daily backup	2-8
Model 3: Monthly and weekly rotation with daily backup	2-9
Number of cartridges needed	2-9
Cartridge storage life	2-9
Head cleaning routine	2-9
Success with DDS media	2-10



Chapter 3 - Service	3-1
Maintaining the device	3-2
Environmental limits	3-2
Drive life	3-2
Tape life	3-2
Preventive maintenance	3-3
Cleaning the read/write heads	3-3
Troubleshooting	3-4
SupportWave and other troubleshooting software	3-5
If the drive has a problem which cannot be solved	3-5
Preparing for a service call	3-6
Reshipment guidelines	3-7
Media specifications	3-8
Required patches	3-8
Specifications	3-9

Chapter 1 – Installation

Installation

This chapter describes installation and configuration of the A3542A DDS-3 tape drive, including the following:

1. Preparing to install the device.
2. Peripheral upgrade rules.
3. Setting the configuration switches.
4. Setting the SCSI address.
5. Installing the device.
 - HP 3000 Series 9xx
 - HP 9000 Series 7xx, 8xx, and D/E/F/G/H/I/K/L/C Series
 - HP 9000 V-Class
6. Configuring and verifying the device.
 - HP-UX
 - MPE/iX

To install the device in the HP 3000/9x9KS and HP 9000/Kx00 system units, use this book in conjunction with the *HP 3000/9x9KS and HP 9000/Kx00 Internal Peripherals Upgrade Guide* (Part No. A2375-90008), which describes the physical installation of various peripherals. Read steps 1-4 in this chapter before installing the device. In particular, it is essential to set the configuration switches and the SCSI address before inserting the device in the system.

To install the device in the HP 9000 V Class units, use this book in conjunction with the *Service Manual, HP 9000 V Class Server* (Part No. A3725-90006), which describes the physical installation of various peripherals.

1. Preparing to install the device

- A. Observe antistatic precautions. The device contains electronic components which can easily be damaged by small amounts of static electricity. To avoid damage, use a grounding wrist strap during installation.
- B. Inspect the items for physical damage. If any items are missing, contact your Hewlett-Packard representative.
- C. Record information. Record the device's serial number. Record the SCSI bus and SCSI address to be used during installation.

HP Serial Number:

SCSI Bus and Address:

- D. Gather tools and accessories. The system installation requires a Torx 10 screwdriver, antistatic foam pad, and grounding wrist strap. The screwdriver is not supplied with the device.
- E. To install on a V Class, you must have the install kit (A4803-62001) which includes required brackets. This kit is a separate order and is not included with the drive.

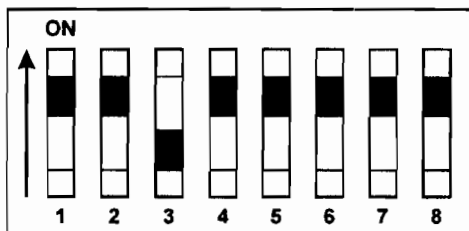
2. Peripheral Upgrade Rules

Refer to your system installation manual for instructions and guidelines for internal peripheral installation.

For V Class servers, see the *Service Manual, HP 9000 V Class Server* (Part No. A3725-90006).

3. Setting the configuration switches for data compression and MRS

There is an eight-switch DIP switch on the bottom of the tape drive. Use switches 1, 2, and 3 to set the drive's data compression and Media Recognition System (MRS) characteristics.



- Use switches 1 and 2 to configure the drive's data compression mode:

Switch 1	Switch 2	Meaning
OFF	OFF	Compression disabled. No host control.
OFF	ON	Compression disabled. Host is allowed to control compression.
ON	OFF	Compression enabled. No host control.
ON	ON	Compression enabled, with host control.

With switch 1 ON, data written to the tape will be compressed without the knowledge of the host.

- Use switch 3 to configure the drive's response to DDS MRS tapes. The Media Recognition System (MRS) is a method by which a tape drive can recognize a data-grade tape. The tape has a series of stripes on its transparent leader tape which the drive can detect. By default, the drive treats a non-Media Recognition System tape as read-only and will not write data to it. However, it is possible to switch the recognition system off using the configuration switches on the underside of the tape drive. If switch 3 is set to ON, the drive will treat all DDS tapes the same.

Switch 3	Meaning
ON	The Media Recognition System is disabled. All DDS tapes will be treated the same, whether they possess media recognition stripes or not.
OFF	The Media Recognition System is enabled. Non-MRS tapes are treated as if they were write-protected.

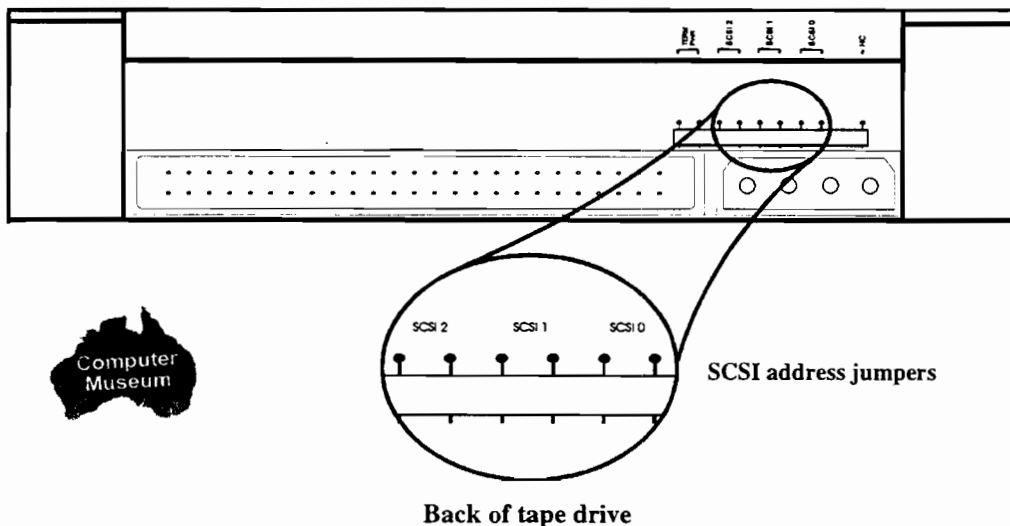
- Leave switches 4-8 in their default positions (ON).

4. Setting the SCSI address

To set the tape drive's SCSI address, see the figure below. The default address is set to 0 for Series 800 systems and 3 for Series 700 systems.

For V Class servers, the SCSI ID default is set to 1.

Note Your tape drive firmware may be corrupted by assigning to a tape mechanism a SCSI ID previously assigned to another device.



The SCSI address jumpers are shown below. Set the jumpers for one of the values shown below. **Do not use SCSI address 7**, as it is reserved for the host.

	SCSI 2 (VALUE 4)	SCSI 1 (VALUE 2)	SCSI 0 (VALUE 1)		SCSI 2 (VALUE 4)	SCSI 1 (VALUE 2)	SCSI 0 (VALUE 1)
0	● ●	● ●	● ●	4	■	● ●	● ●
1	● ●	● ●	■	5	■	● ●	■
2	● ●	■	● ●	6	■	■	● ●
3	● ●	■	■				

Jumper positioning

5. Installing the device

HP 3000/9x9KS and HP 9000 Models K100/K200/K400

Use the manual *HP 3000/9x9KS and HP 9000/Kx00 Internal Peripherals Upgrade Guide* (Part No. A2375-90008) to install the device in the system unit.

See the installation manual for your system for installation instructions for internal peripherals.

For V Class servers, see the *Service Manual, HP 9000 V Class Server* (Part No. A3725-90006).

WARNING **Before beginning the installation, follow the shutdown procedure described in the HP 3000 or HP 9000 System User's Guide. For V Class procedures, follow the shutdown procedure described in the Operator's Guide, HP 9000 V Class Server. Power off and unplug the system. Put on the grounding wrist strap and place the antistatic foam pad in front of the unit.**

6. Configuring and verifying the drive

Configuring and verifying for HP-UX

References:

- *System Administration Tasks* manual for HP 9000 Series 800 Computers (B2437-90006)
- *Installing Peripherals* manual (B2437-90005)

The tape drive will auto-configure on HP-UX systems, version 9.04 or later. When the operating system reboots, it determines that the DDS-3 tape drive has been installed, and installs the correct software device file to communicate with the tape drive. For more information refer to the manuals referenced above. Once the system finishes rebooting, use the `ioscan` command to list all tape devices.

Configuring and verifying for MPE/iX

Reference:

- *System Startup, Configuration and Shutdown* reference manual for HP 3000 Series 900 Computers (32650-90042)

After installing the device, configure the system to recognize it. The HP 3000 Series 900 system must be using MPE/iX version 5.5 (with Patch C.55.01) or later. Refer to the MPE/iX manuals.

The following procedure includes adding paths. Prior to adding any paths, run IOMAP or MAPPER from the ISL prompt to display the paths of all configured devices.

Run the IO Configurator from SYSGEN

Log on as `MANAGER.SYS` by entering:

```
:HELLO MANAGER [/userpass] .SYS [/acctpass]
```

Activate the SYSGEN global module by entering:

```
:SYSGEN
```

or by entering:

```
RUN SYSGEN . PUB . SYS
```

At the `sysgen` prompt, start the IO configurator by entering:

```
sysgen> IO
```

Add the transparent manager

Using the SCSI address of the tape drive, enter the following to add the transparent manager to the path. Use the SCSI address the tape drive was set to during installation.

This example assumes the SCSI address is 0.

```
io>APATH PATH=52.0 ID=PSEUDO
```

Add the tape device Logical Device Number (LDEV)

To add the device to the configuration, the Logical Device Number (LDEV) is used. The example assumes the LDEV address is 0 and the MPE/iX ldev number is 8.

```
io>ADEV LDEV=8 PATH=52.2.0 ID=HPC1537A
```

Save the configuration

Hold the changes by entering

```
io>HOLD
```

Exit the IO configurator by entering:

```
io>EXIT
```

```
sysgen>
```

Save the changes in the permanent file by entering:

```
sysgen>KEEP
```

Save the changes made in the IO configurator to the default configuration group. Respond with Y when SYSGEN asks whether or not to overwrite this group.

For best performance, keep disk drives and tape drives on separate busses if possible. Significant performance degradation and reduced reliability may occur if more than X devices are written to or read from simultaneously.

Reboot with the new configuration

Shut down the system by entering:

```
CNTRL-A
```

The cursor will return to the first column in the next line. Now enter:

```
SHUTDOWN
```

and press the RETURN key.

When the system is completely shut down, it will respond:

```
Shutdown of operating system complete.
```

Now the system can safely be powered down or rebooted. Reboot the system by entering:

```
START NORECOVERY
```

Create a System Load Tape (SLT)

This is an optional procedure. Mount a write-enabled tape on the system tape drive (DAT or 1/2" tape). Ensure the tape is online.

Generate a customized SLT that includes the new configuration by entering the command:

```
sysgen>TAPE
```

Reply to the tape request.

The system responds when it has finished generating the SLT by displaying the following message:

```
** Boot tape is successfully built **
```

Exit SYSGEN by entering:

```
sysgen>EXIT
```


Operation

This chapter describes the features and operations of the DDS-3 tape drive, including the following:

- Features
- Front panel
- Operating the tape drive
- Handling and storing tape cartridges
- Cleaning the tape heads
- Backup routines

Features

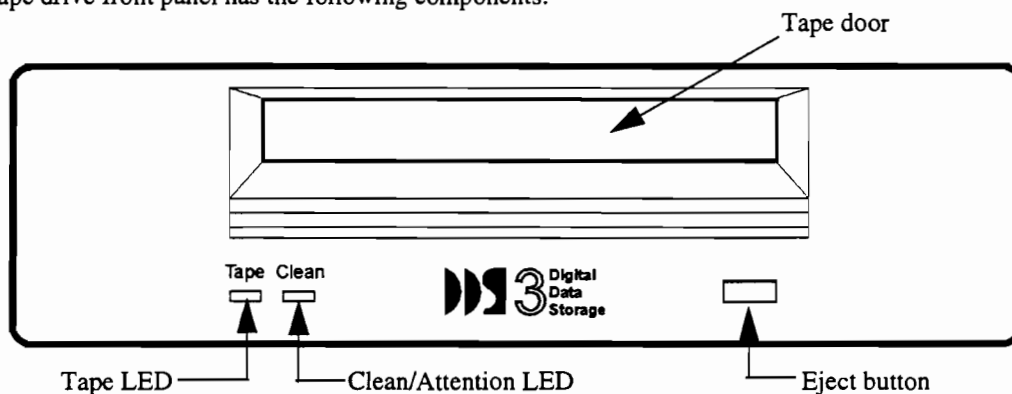
The HP A3542A DDS-3 tape drive is a storage device which uses 4 mm DDS certified cartridge tapes. Some features include

- Up to 12 gigabytes storage capacity (uncompressed mode)
- Read and write compatibility with DDS-1 and DDS-2 tapes
- 5 1/4 inch, half-height form factor
- Industry leading performance and reliability
- Built-in self-test diagnostic routines

HP DDS tape drives are designed for optimum performance with HP's DDS media. Use of HP media assures maximum reliability and performance.

Front Panel

The tape drive front panel has the following components:



Tape LED	The Tape LED is green when the tape cartridge is loaded. A flashing green LED indicates normal activity.
Clean/Attention LED	The Clean/Attention LED is amber. When lit, it indicates a fault. When flashing, it indicates a caution condition, usually that the tape drive's read/write heads need cleaning.
Tape door	The door flips in and up to allow insertion of a tape cartridge into the drive.
Eject button	Press this button to eject a tape cartridge from the drive.

Operating the tape drive

Once the system is powered on, normal tape drive operation consists of loading and unloading tape cartridges.

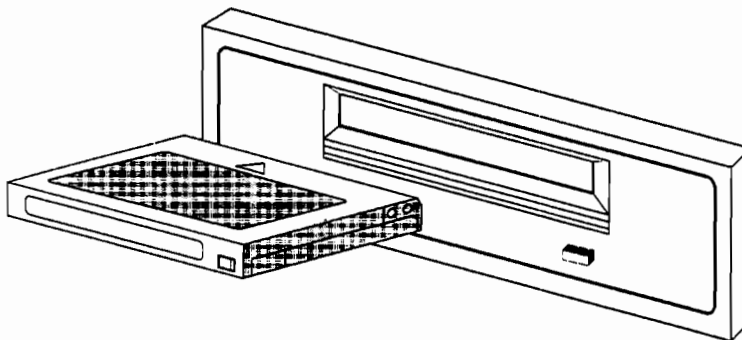
Power on

- The device is powered on when the host system is powered on.
- The tape drive automatically begins a self-test. The green Tape LED flashes slowly during the test.
- If the Clean/Attention LED light shows steady amber, a problem has occurred. See the troubleshooting section in the next chapter.

When the self-test is complete, normal tape operations can begin.

Loading tape cartridges

- To write to the tape, set the write-enable tab. If the Media Recognition System (MRS) is enabled (switch 3 is off), non-MRS tapes are treated as if they are write-protected whether or not the write-enable tab is set to the enable or disable position. By default, MRS is enabled (switch 3 is off).
- Hold the tape cartridge with the label side up and the arrow pointing toward the drive.
- Gently insert the tape cartridge until the drive's loading mechanism takes the cartridge and pulls it into the drive. **Do not slide the tape past the front bezel.** Doing so or using unnecessary force could damage the load/unload mechanism, causing load/unload problems and tape jams.



The drive threads the tape and performs a short test. This test takes about 14 seconds. When the Tape LED is a steady green, the tape is ready for use.

Unloading tape cartridges

- Wait for tape drive activity to stop.
- Press the Eject button. The Tape LED will flash slowly as the tape rewinds.
- The tape drive door will open and the tape will be ejected. Remove the tape from the drive.
- If the tape is not to be written over, set the write-protect tab.

- Put the tape cartridge in its box and store it in a safe place.

Note Some application software can be configured to prevent unloading a tape until the program ends. If the cartridge will not eject, check the software.

Forcing a tape cartridge to eject

Caution Data may be irretrievably lost if a tape is forced to eject.

There may be a need to unload a tape cartridge immediately, even if data is lost. To do this, force the tape cartridge to eject.

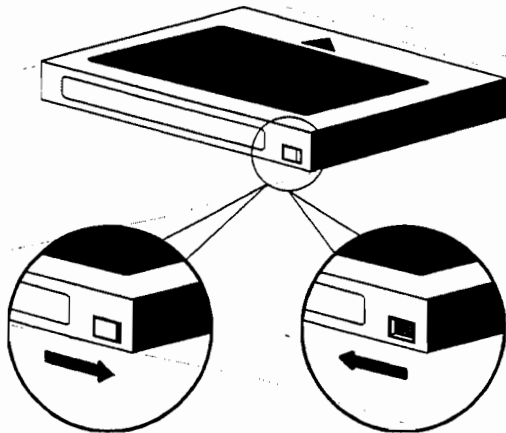
- Press the Eject button three times within a five-minute period, OR
- Hold the Eject button down for at least five seconds.

The tape unthreads and the drive ejects the tape cartridge, regardless of the operation the drive was performing. The drive then resets.

Write-protecting tape cartridges

If the Media Recognition System (MRS) is enabled (switch 3 is off), non-MRS tapes are treated as if they are write-protected whether or not the write-enable tab is set to the enable or disable position. By default, MRS is enabled (switch 3 is off).

Protect the data on a tape cartridge from accidental erasure by setting the write-protect tab. This prevents the data on the tape from being written over.



Handling and storing tape cartridges

Tape Cartridge Do's

- Always store the cartridge in its protective case.
- Always keep the cartridges in a clean environment.
- Rewind the tape before removing the cartridge for storage.
- Operate the cartridge at temperatures between +5° to +45° C (41° to +104° F)
- After moving the cartridge from one temperature extreme to another, allow it to stabilize for a minimum of two hours before using.
- Keep the cartridge away from magnetic sources.
- Replace damaged or contaminated cartridges.
- Use data grade cartridges, marked DDS-3, DDS-2, or DDS-1. Always label the tape cartridge and record the number of uses. Discard after 50 uses.
- Write on the label before adhering the label to the cartridge. Always remove the old labels before adhering new ones.
- Be consistent with the type of media used. The heads need to adjust to the characteristics of each different kind of media.

Tape Cartridge Don'ts

- Don't drop the cartridges or handle them roughly.
- Don't expose the cartridge to dirt, moisture, or high humidity.
- Don't place the cartridge in direct sunlight or in places where magnetic fields are present (under telephones or near transformers).
- Do not touch the tape, or attempt to clean the tape path or tape guides inside the cartridge.
- Don't use excessive force in inserting or removing the cartridge from the drive.
- Don't use DAT cartridges; they are intended for audio, not data.
- Don't place the label outside the recessed area provided on the tape cartridge. Doing so may cause interference with the smooth loading and unloading of the tape cartridge.
- Don't use the tape cartridges beyond their useful life.

Temperature

Only use cartridges at temperatures between 5° C (40° F) and 40° C (113° F). The cartridges can be stored at temperatures down to -40° C (-40° F), but Hewlett-Packard does not recommend this practice.

If the cartridges are exposed to temperatures outside the operating limits, stabilize them before using them. Do this by leaving the cartridge in a room at operating temperature for a minimum of two hours.

To avoid temperature problems, observe these guidelines:

- Avoid leaving the cartridges in severe temperature conditions, for example in a car standing in bright sunlight.
- Avoid transferring data (reading from and writing to cartridges) when the temperature is changing by more than 10° C per hour.

Tape LED and Clean/Attention LED

The drive's two LEDs indicate that the drive is busy, not busy, or has a problem.

Table 1-1.

Tape LED (Green)	Clean/Attention LED (Amber)	Explanation
FLASHING SLOW		Self-test in progress, OR loading or unloading a tape.
STEADY		Cartridge loaded, drive on line.
FLASHING FAST		Read or write activity.
	FLASHING SLOW	Caution. Head cleaning needed, or cartridge is nearing the end of its useful life.
	STEADY	Fault. See the troubleshooting section in the next chapter.
LEDs not illuminated		No tape cartridge loaded.

Cleaning the read/write heads

Use the following table as a guide for cleaning the tape's read/write heads. You should also clean the tape heads if the Clean/Attention LED is lit.

Caution Only use an HP Cleaning Cartridge (HP 92283K) to clean the tape heads. Do not use swabs or other means of cleaning the heads.

The cleaning requirements for the DDS-3 tape drives are significantly different from those for HP's previous DDS products.

Once your backup routine has been established, you should have an idea how many tapes are used each day. Remember that HP recommends cleaning the drive's tape heads using the intervals shown in the following table, or if the Clean/Attention LED is lit. Using this table, you can estimate how often the heads will need cleaning and build the cleaning operation into the backup routine.:

Number of DDS Cartridges Used Each Day	1	2	3	4+
Cleaning Interval	8 weeks	4 weeks	3 weeks	weekly

To clean the tape heads:

1. Slide the cleaning cartridge into the drive. To tape drive automatically loads the cartridge and cleans the heads. At the end of the cleaning cycle, the drive ejects the cleaning cartridge.
 2. Note the date on the label on the cleaning cartridge so you know how many times it has been used. Discard the cleaning cartridge after it has been used 50 times.
-

Note The cleaning cycle takes about 30 seconds. If the cleaning cartridge ejects in less than 20 seconds (and the Clean/Attention LED is still lit) it probably has expired and no cleaning occurred. Replace the cleaning cartridge and repeat the process.

3. After the tape heads have been cleaned, take the cleaning cartridge out of the drive and write the date on the cartridge label. This record tells you how many times the cleaning cartridge has been used. Cleaning cartridges have a typical lifespan of 50 cleaning cycles.

Backup routines

Your backup routine depends on how frequently the data changes, how extensive the changes are, and how valuable the data is. It is essential that you follow a routine, so data backup is regular and trouble-free. The following three models present routines which are commonly used. In each model, a “set” of cartridges is the smallest number of tapes that will hold a full or partial backup.

Keep a record of the number times each set is used, so a set can be replaced when its recommended write life (100 insertions) is reached. The replaced set can still be kept for read-only use, but should not be used for writing.

Model 1: Daily backup

This is the simplest backup model. All of the data is backed up onto a single set of tapes at the end of each work day. If data is lost, it is simply restored from the previous day’s backup. It is the least secure model of backup, because if the cartridge is lost, destroyed or damaged, the data is lost forever.

Number of cartridges needed: 1 set for full backup

Model 2: Weekly rotation with daily backup

In this model, you perform a full backup every Friday, and a partial backup on Monday, Tuesday, Wednesday, and Thursday. Partial backups are made only on those files which have changed since the previous backup.

Two sets of tapes, A and B, are used in rotation for the weekly full backups. On the first Friday, you make a full image copy of your disks on tape set A. On the second Friday, use set B for a full backup. On the third Friday, use set A again. This way, there are always two generations of full backup in existence. Store the sets off-site, preferably in a fire-proof safe, so if there is a fire or equipment is stolen from site, the backup is unaffected.

Four sets of tapes are used for the daily backups, one set for each day. Because only changed files are saved, these backups are very quick.

Number of cartridges needed: 2 sets for full backup
4 sets for partial backup

Model 3: Monthly and weekly rotation with daily backup

The backup model which offers optimum data protection uses six full backup sets (three monthly and 3 weekly), and four sets for daily partial backups. This model is recommended if you compile large quantities of data where loss would be disastrous. It also provides the best method of securing data from software viruses.

The four sets of tapes for daily partial backup are labeled Monday, Tuesday, Wednesday, and Thursday as in model 2.

Three set of tapes are used in rotation for weekly full backup on Fridays. Two of these sets are stored off-site. After a full backup is made on Friday, the set of tapes is taken off-site and exchanged for the oldest backup set in storage. Next Friday, the backup is made using this oldest set of tapes. In this way, at any moment, three generations of full weekly backup exist; the two most recent are off-site, the oldest is on-site ready for the next backup.

The final three sets of tapes are used for full backup on the first working day of each month, again in rotation. This is in addition to the usual backup that would be made that day, so the normal routine is maintained. As with the weekly tapes, the monthly sets should be stored off-site.

The figure shows how this model works over a typical 15-week period.

Number of cartridges needed	6 sets for full backup
	4 sets for partial backup

Number of cartridges needed

The total number of cartridges needed depends on your backup routine, as described in the preceding models. In addition to the numbers mentioned there, it is advisable to keep extra cartridges on hand, as follows:

- A spare set for full backup
- A spare cartridge for use for diagnostics by your Service Engineer
- Cartridges for file transfers
- Cartridges for any archival storage you may require



Cartridge storage life

Tests show that data can be successfully stored on DDS cartridges for period of 10 years. You should give each cartridge a full pass in the tape drive at least once a year to prevent sticking. Store the cartridges according to the environmental specifications given in Chapters 2 and 3.

Head cleaning routine

Once your backup routine has been established, you should have an idea how many tapes are used each day. Remember that HP recommends cleaning the drive's tape heads using the intervals shown in the table on page page 2-7, or if the Clean/Attention LED is lit. Using this table, you can estimate how often the heads will need cleaning and build the cleaning operation into the backup routine.

For example, if it happens that you use 3 cartridges each day, then cleaning is required every three weeks. In that case, if you are using backup model 3, you should store a cleaning cartridge with one particular set of weekly full backup cartridges, so the heads are cleaned every time that set is used.

Success with DDS media

Because of the crucial importance of data integrity in computer environments, Hewlett-Packard strongly recommends that you only use Hewlett-Packard DDS cartridges labeled "DDS Media Recognition System." Hewlett-Packard's DDS tape drives are designed for optimum performance using these tape cartridges. Please pay particular attention to the media handling and drive cleaning instructions set out earlier in this chapter.

Service

This chapter describes service and troubleshooting procedures for the DDS-3 tape drive, including the following:

- Maintaining the device
- Troubleshooting
- Preparing for a service call
- Reshipment guidelines
- Media specifications
- Required patches
- Specifications

Maintaining the device

The device is designed to give years of trouble-free service. With regular maintenance, the drive should produce consistent results with minimal errors. This tape drive is designed for best performance with HP DDS-3 tapes. Case studies have shown that tape mechanism failures can be reduced by 80% using a strict tape management and cleaning regimen.

Environmental limits

The performance and reliability of the drive depend on the operating environment. Be sure to operate the drive within the environmental limits listed in the table of technical specifications located at the end of this chapter.

Drive life

The lifespan of the tape drive can be significantly lengthened by keeping the tape drive streaming (keeping the tape moving smoothly in one direction). This requires a sustained transfer rate of greater than 1 Mbyte/second.

Minimizing repositions can extend both tape and mechanism life.

Tape life

A tape cartridge should be reliable for about 100 insertions for writing. When using the tape drive for backups, it's valuable to keep a record of how many times the backup tapes are overwritten.

As the backup set reaches about 100 uses, replace the tapes with new tapes. The old tapes can still be used reliably for read-only operations, but they should no longer be used for writing.

Preventive maintenance

The tape drive requires regular preventive maintenance, which consists of cleaning the tape drive's read/write heads with a cleaning cartridge. Clean the heads regularly and also any time the Clean/Attention LED is flashing.

The frequency of cleaning varies according to how much the tape drive is used. See the following table:

Number of DDS Cartridges Used Each Day	1	2	3	4+
Cleaning Interval	8 weeks	4 weeks	3 weeks	weekly

Note It is better to clean the tape heads regularly than to wait for the Clean/Attention LED to flash amber. By the time the signal appears, the performance of the tape drive may already be diminished.

Cleaning the read/write heads

The read/write heads must be free of contamination for proper tape-to-head contact. Clean the heads when the data errors or retries increase in number. These can be checked by accessing the system logs or using the diagnostics and targeting the tape drive.

Use only a Hewlett-Packard Cleaning Cartridge (part number HP92283K). Do not use liquids, swabs, or any other method.

1. Insert the cleaning cartridge into the drive.
2. The tape drive loads the cartridge automatically and cleans the heads. Cleaning takes about 30 seconds.
3. At the end of the cycle, the drive ejects the cleaning cartridge.
4. Write the date on the cartridge label. Discard the cleaning cartridge after using it 50 times.

Note If the cleaning cartridge ejects in less than 20 seconds, it has probably expired. Replace the cleaning cartridge.

If the tape drive does not automatically eject the cleaning cartridge and the Clean/Attention LED flashes, the clean cartridge has expired. Eject and discard the cleaning cartridge. Repeat the cleaning procedure with a new cleaning cartridge.

Troubleshooting

The first indication of a problem with the tape drive will probably be in the form a message from the application using the tape drive. If a problem occurs, check the tape drive's status LEDs.

Condition	Probable Cause	Action
No LEDs on	No tape in drive.	Insert a tape in the drive.
	No power to drive.	Be sure the system is powered on.
Tape LED is steady green	Indicates normal activity. A tape cartridge is loaded and the drive is on line.	None.
Tape LED is flashing green	Indicates loading, unloading, reading, writing, or performing a self-test.	None.
Clean/Attention LED is flashing amber	Caution condition. The tape drive heads may require cleaning or the cartridge is nearing the end of its useful life.	Clean the tape drive heads and try the operation again. If the Clean/Attention LED is still on, try writing to and reading from a new tape cartridge. If the signal reappears with the new cartridge, repeat the process. If the condition persists, call your HP service representative. If the condition clears up, then the first tape is suspect. If the data on that tape is critical, attempt to recover the data. If the data is unrecoverable, call HP for help.
Clean/Attention LED is steady amber	Fault condition. The tape cartridge may be damaged or incorrectly loaded. The drive may have failed its self-test.	Eject the tape cartridge. Reload the tape cartridge and try again. If the message appears again, try the operation again with a new tape cartridge. If this condition persists, the drive indicates a hardware fault and should be replaced.

SupportWave and other troubleshooting software

The computer may be supplied with a tool called Support Tools Manager, which a system administrator can use to troubleshoot problems. Find out more about using Support Tools Manager in the manual *Support Media Manual* (part number 92453-90010).

The system may also include other on-line or off-line troubleshooting utilities to aid in the diagnosis of the drive. For more information about troubleshooting utilities in general, refer to the documentation included with the computer system. For V Class, refer to the see the *HP Diagnostics Guide: S Class, X Class and V Class Servers* (Part No. A3725-90009) and the *Service Manual, HP 9000 V Class Server* (Part No. A3725-90006).

If the drive has a problem which cannot be solved

If the drive has a problem which cannot be solved, contact the Hewlett-Packard service provider. See the following sections for information about preparing for a service call and repackaging the drive for shipment.

Preparing for a service call

If the tape drive requires service, there are several things to do to help the Hewlett-Packard service provider identify and solve a problem quickly. Do the following before calling for assistance. If you have a V Class servers, see your service contract for information needed for service calls. Only trained personnel should service V Class servers.

1. Locate the drive's serial number. Check the serial number written in the front of this manual when the drive was installed. If the serial number was not previously recorded, open the system or peripheral enclosure to find the serial number.
2. Record any error messages displayed by the operating system or the software application in use when the trouble occurred.
3. Record any details about the operation which was being performed when the problem occurred.
4. Record the condition of the Tape LED and Clean/Attention LED. Are the LEDs off, flashing, or lit steadily?
5. Contact the Hewlett-Packard service provider for assistance in solving the problem

Reshipment guidelines

To send the drive to a repair facility, follow these repackaging instructions. These do not apply to V Class servers; see your service contract. Only trained personnel should service V Class servers.

1. Contact the Hewlett-Packard Sales and Support Office or service provider to coordinate the return.
2. Attach a label to the drive, identifying the owner and indicating the reason for the return. Record the drive's part number and serial number on the label.
3. Repack the drive in its original shipping container, anti-static bag, and packing material.
If the original container and packing material are not available, order a replacement container and packing material from Hewlett-Packard.

Hewlett-Packard reserves the right to reject a warranty claim for a product that was improperly repacked before shipment.

Media specifications

Data cartridges	Capacity (uncompressed)	HP Part Number
	60m (approx 1.3 GB)	HP92283A (box of 5 tapes)
	90m (approx 2.0 GB)	HP92283B (box of 5 tapes)
	120m (approx 4.0 GB)	HP92300A (box of 5 tapes)
	125m (approx 12.0 GB)	HP C1517A (box of 5 tapes)
Cleaning cartridges	N/A	HP92283K (box of 2 cartridges)
Lockable tape storage box, stackable, with clips for attachment to file cabinet rails	12 cartridges	HP92283L

Required patches

OS	Platform	Kernel Patch	Diagnostic Patch	Diagnostic Interface
HP-UX 9.04	S800	PHKL_7643	PHSS_6683	
HP-UX 10.01	S800	TBD	PHSS_7895	GUI
			PHSS_7584	Command Line
	S700	N/A	PHSS_7894	GUI
			PHSS_7583	Command Line
HP-UX 10.10	S800	PHKL_7568	PHSS_6797	GUI
	S700	N/A	PHSS_7071	GUI
HP-UX 10.20	S800	PHKL_8118	PHSS_7760	GUI
	S700	N/A	PHSS_7759	GUI
MPE/iX 5.5	S900	C.55.01		Command Line

Specifications

General	Supported Systems	HP 9000 Series 700 Systems, HP-UX 10.X. Some Series 700 Systems not supported (contact your local HP representative) HP 9000 Series 800 systems, HP-UX 9.04 and later HP 3000 Series 900 systems, MPE/iX 5.5 with Patch Number C.55.01
	Capacity	12 GB (native)
	Connector	50-pin single-ended SCSI
Transfer rates	Sustained Asynchronous burst Synchronous burst	1 Mbyte/sec (native) 3 Mbytes/sec 10 Mbytes/sec (mechanism only, system limitations may apply)
Electrical	Voltage and current	+5V, 1.2 amps +12V, 0.2 amps
	Power consumption	7.5 watts operating
Physical	Form factor Depth Width Height Weight	5.25 in wide x 1.625 in high 150 mm (5.9 in) 102 mm (4.0 in) 41 mm (1.625 in) 1.1 kg (2.4 lbs)
Environmental	Temperature	+5° to +40° C (+41° to +104° F), operating -40° to +70° C (-40° to +158° F), storage (mech) -40° to +45° C (-40° to +113° F), storage (media)
	Relative Humidity	20% to 80% non-condensing, operating 5% to 95% non-condensing, storage (mech) 5% to 80% non-condensing storage (media)
	Wet bulb	26° C (79° F) max
	Altitude	0 ft to +15,000 ft operating
Electromagnetic Compatibility	USA	FCC Class A
	Europe	CISPR 22 / EN 55022 - Class A EN 50082-1 -ESD: IEC 801-2/pr EN 55024-2 (3kV CD, 8kV AD) -RI: IEC 801-3/pr EN 55024-3 (3 V/m) -FT: IEC 801-4/pr EN 55024-4 (0.5 kV SL, 1 kV PL)

Service

Index

A

adding drives to V Class 1-2

B

backup

daily 2-8

monthly 2-9

weekly 2-8

backup routines 2-8

C

cartridge storage life 2-9

Clean/Attention LED 2-2, 2-6, 3-3, 3-4

cleaning

frequency 3-3

read/write heads 2-7, 3-3

cleaning cartridges 3-3, 3-8

configuring

HP-UX 1-7

MPE/iX 1-7

D

daily backup 2-8

data cartridges 3-8

drive problems 3-5

E

eject button 2-2

environmental limits 3-2, 3-9

F

features 2-2

front panel 2-2

G

grounding iii

H

handling and storing tape cartridges 2-5

I

installation 1-1

installing on V Class 1-1

L

LEDs 3-4

Clean/Attention LED 2-2, 2-6

Tape LED 2-2, 2-6

loading tape cartridges 2-3

M

maintenance 3-2

media specifications 3-8

monthly backup 2-9

O

operation 2-1, 2-3

P

patches 3-8

power on 2-3

preventive maintenance 3-3

print history iii

R

read/write heads

cleaning 3-3

regulatory statements iv-v

reshipment guidelines 3-7

S

safety considerations iii

safety symbols iii

service 3-1

service call, preparing for 3-6

servicing iii

setting SCSI ID on V Class 1-5

shipping drives for V Class 3-7

shipping the drive for service 3-7

specifications 3-9

media 3-8

status LEDs 3-4

SupportWave 3-5

T

tape cartridges

forcing to eject 2-4

handling and storing 2-5

loading 2-3

specifications 3-8

storage life 2-9

unloading 2-3

write-enabling 2-4

write-protecting 2-4

Tape door 2-2
Tape LED 2-2, 2-6, 3-4
tape life 3-2
troubleshooting 3-4
 and status LEDs 3-4
Troubleshooting drives on V Class 3-5

U

unloading tape cartridges 2-3

V

V Class

 adding drives 1-2
 installing on 1-1
 reshipping drives 3-7
 setting SCSI ID 1-5
 troubleshooting drives 3-5

W

warranty iii
weekly backup 2-8
write-enabling 2-4
write-protecting 2-4

Reader Comment Sheet

A3542A DDS-3 Tape Drive User's Manual

We welcome your evaluation of this manual. Your comments and suggestions will help us improve our publications. Remove this page and mail or FAX it to 916-785-2875. Use and attach additional pages if necessary.

	Agree				Disagree	N/A
The manual is well organized.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The information is technically accurate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information is easy to find.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Step-by-step procedures are easy to perform.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are enough examples and pictures.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The examples and pictures are useful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Comment: _____

Name: _____	Phone: _____
Title: _____	Fax: _____
Company: _____	E-mail: _____
Address: _____	Zip: _____
City & State: _____	Country: _____

___ Check here if you would like a reply.

Hewlett-Packard has the right to use submitted suggestions without obligation, with all such ideas becoming property of Hewlett-Packard.

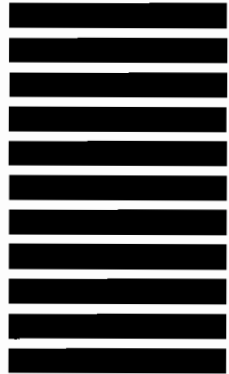


NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 256 ROSEVILLE, CA

POSTAGE WILL BE PAID BY ADDRESSEE



Attention: Learning Products (MS5601)

Hewlett-Packard Company
Enterprise Storage Solutions Division
8000 Foothills Boulevard
Roseville, CA 95747-9987



Fold Here

Tape

Please do not staple

Tape

Copyright © 1996
Hewlett-Packard Company
Printed in USA



**Manual Part Number
A3542-90001 E1296**

A3542-96003
For Internal Use Only