HEWLETT PACKARD

Success with DDS Media

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In This Book

This booklet is intended to help you get the most from DDS cassettes, so that you can rely on the integrity of data backed up or archived using DDS-format tape drives.

DDS-format drives use very sophisticated error-correction techniques. These check that data is written to tape correctly, and help the drives to recover data even if a tape is slightly damaged. But the drive cannot control what you do with the tape outside the drive. The correction techniques need good quality tape which is cared for correctly if they are to ensure the integrity of your data.

The care that needs to be taken is not extensive. Only you can imagine the crisis that would occur if a disk crashed and you found you could not retrieve data from a backup tape. Read through this booklet and check that you know what you must do to ensure that the crisis never occurs.

- ☐ Chapter 1 helps you to ensure that you are using and storing tapes under proper environmental conditions.
- ☐ Chapter 2 explains the correct way to clean tape heads and to handle cassettes so that the tape drive can use them effectively.
- ☐ Chapter 3 looks at the DDS cassettes you can buy and how you can check that they are of a standard suitable for data storage. It also explains three possible models of backup routine so as to streamline the operation.
- ☐ Chapter 4 outlines a troubleshooting process, and answers questions that are often asked about DDS cassettes.

Contents

1

Environmental conditions have a major impact on the performance of a tape drive and the physical preservation of the magnetic tape. This chapter looks at the conditions under which tape drives should be operated and tape cassettes should be stored in order to maximize your drive performance and tape life.

Environmental Considerations

Environment for Tape Drives

DDS-format tape drives will tolerate being used in almost any environment, because they are based on DAT technology which was designed for domestic use. The cassettes, too, are designed to survive the rigors of the domestic environment. However, it should be remembered that the storage of computer data demands far higher guarantees of integrity than music. The penalty for loss can be immeasurably greater. It follows that data storage requires a certain amount of care on the part of the user in order to ensure that the data is stored and recovered reliably. There are four main areas in which you need to take care: heat, dirt, water, and electrical discharge.

Heat

Excessive heat can occur if the drive is positioned badly, or if it does not have adequate ventilation. Cold conditions can also cause problems through the formation of condensation. Guard against heat problems by following these conditions:

- Avoid positioning the drive close to a heater or heating system outputs.
- Avoid positioning the drive in direct sunlight. A window-sill or a desk under a window may be convenient, but should be avoided.
- Leave a minimum of three inches (7.5 cm) behind the rear of the drive to allow air to circulate.
- If the drive is installed in a cabinet with other equipment, check that the temperature remains within the range recommended by the manufacturer (see the specifications in the drive's documentation).

Dirt

Dirt (dust particles and so on) in the drive can cause loss of data through forming head clogs, in which dirt adheres to the read or write head, or through causing scratches on the tape. Drives possess error-correction routines to overcome most problems in this area, but only at the expense of capacity—the more scratches the drive has to cope with, the less data it can fit on the tape. It makes sense to keep dirt to a minimum by keeping to the following guidelines:

- Don't position the drive near doors and walkways which are used frequently.
- Don't place the drive on or near the floor.
- Don't position the drive near stacks of supplies covered in dust.
- Don't place the drive near printers or paper products that create dust.
- Don't smoke, eat or drink near the drive and cassettes.
- Limit personal access to the site.
- Have the room cleaned regularly.
- If the general environment is dirty, consider installing some form of air cleaner or conditioning to benefit all the equipment.

Water

Dangers exist not only from liquids, but also from extremes of humidity. Keep to the following guidelines:

- Make sure that only responsible personnel clean the tape drive and that they follow the maker's instructions.
- Avoid excessively damp or dry environments—see the humidity limits in the drive's specification.

Electrical Discharge

Because it is invisible, electrical discharge from build-up of static is not an obvious danger. The effects, however, can be very damaging to magnetic media such as tape, and the following steps should be taken to avoid possible causes:

- Avoid carpets if possible in the area where the drive is positioned, particularly of synthetic materials. If you cannot avoid carpets, use special low-static tiles. If static is likely to be a problem, place anti-static mats around the working area.
- Avoid low humidity; low humidity increases the chance of static occurring.
- Be wary of bringing objects near the drive which can hold a large static charge; avoid unnecessary plastic or paper products in the area.

Environment for Tape Storage

Proper storage of the tapes contributes to the quality of their performance and reliability. The following points should help you to store cassette tapes safely. The ideal place for offsite storage is a fire-proof safe in another building.

Do

- Do protect cassettes from extremes of heat.
- Do keep cassettes in their cases when not in use.
- Do replace cassettes before they reach the end of their useful life.

Do not

- Do not drop cassettes or handle them roughly.
- Do not use cassettes that are at a different temperature from the drive. Leave them for at least two hours so that the temperatures are the same.
- Do not let cassettes get dirty.
- Do not leave cassettes in very dry or humid conditions.

- Do not touch the tape inside the cassette.
- Do not attempt to clean the tape path or the tape guides inside the cassette.
- Do not store cassettes in direct sunlight.
- Do not use or store cassettes near a strong magnetic field, such as under telephones or near transformers.
- Do not stick more than one label onto cassettes; extra labels can cause the cassettes to jam.

Temperature

Only use cassettes at temperatures between 5°C (40°F) and 40°C (113°F). You can, however, store them at temperatures down to – 40°C (– 40°F).

If you expose a cassette to temperatures outside the operating limits, stabilize the cassette before you use it. To do this, leave the cassette in the operating temperature for a minimum of two hours.

To avoid temperature problems, observe these guidelines:

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

Environmental and Usage Limits

Operating Environment:

Temperature:	5°C to 45°C (42°F to 113°F)
Humidity:	20% to 80% relative humidity, non-condensing. Maximum wet bulb temperature 26°C (79°F)

Storage Environment: *conditions for long-term storage (archiving)*

Temperature:	5°C to 32°C (41°F to 90°F)
Humidity:	20% to 60% relative humidity, non-condensing. Maximum wet bulb temperature 26°C (79°F)

Transporting Environment:

Temperature:	– 40°C to 45°C (– 40°F to 113°F)
Humidity:	5% to 80% relative humidity, non-condensing. Maximum wet bulb temperature 26°C (79°F)
Usage Guide:	The recommended useful life of a cassette is 300 insertions into the tape drive

2

While the environment in which you use your tape drive and store the cassettes helps provide optimum conditions for good performance, it is also vital that you take care to ensure that the reliability continues. You can do this through regular cleaning of the tape heads in the drive, and through correct handling of the cassettes. This chapter provides important information on how to do this.

Tape Head Cleaning and Cassette Handling

Cleaning the Tape Heads

Cleaning the heads helps prevent problems of data integrity in two areas:

- Head clogs, when a speck of dirt adheres to the tape head and prevents data being read or written correctly.
- Scratches on the tape, usually caused by dirt particles becoming trapped between a tape guide and the tape and scratching the surface as the tape passes by.

You should clean the tape heads at the following times:

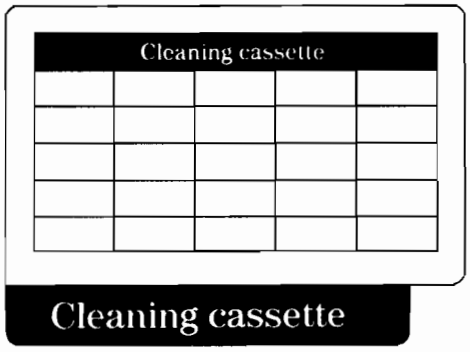
- After every 25 hours of use.
- If the tape drive indicates that it is correcting an excessive number of errors (see your tape drive manual for further details).

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

For Hewlett-Packard DDS-format drives, clean the heads as follows:

1 Insert the cleaning cassette into the drive. The tape drive automatically loads the cassette and cleans the heads. At the end of the cleaning cycle, the drive ejects the cassette.

2 Note the date on the label on the cleaning cassette so that you know how many times you have used it. The cassette can only be used 25 times; discard it after this.

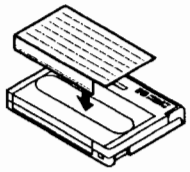


The label of a cleaning cassette

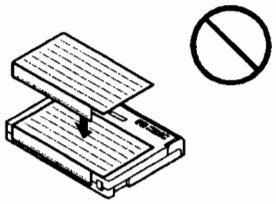
Handling DDS Cassettes

Caution Only use cassettes labeled "DDS" in your DDS-format drive. *Do not* use cassettes labeled "DAT", because the media is not certified and therefore integrity cannot be guaranteed. In addition, DAT cassettes have a different mechanical specification which may cause them to jam in the mechanism. Damage caused by the use of non-DDS media may invalidate the warranty on your tape drive.

Ensure that only one label is stuck to the cassette.

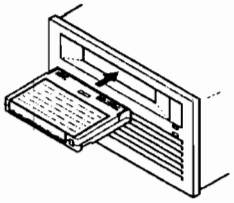


Do not use non-standard labels, and never stick anything to the cassette other than in the label area.

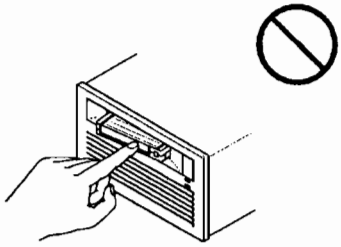


To load a cassette into the drive

1 To load the cassette, insert it squarely into the slot in the front of the tape drive with the label uppermost, as shown below.

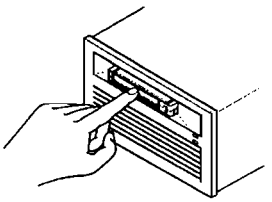


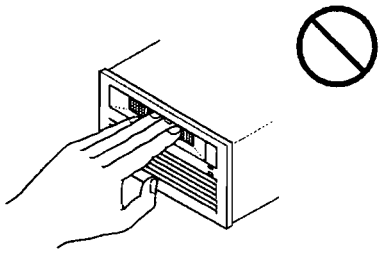
Do not insert the cassette at an angle.



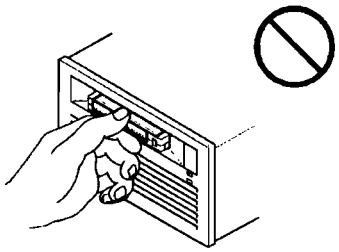
2 Apply steady pressure with one finger on the back of the cassette until the auto-loading mechanism takes the cassette and loads it into the drive.

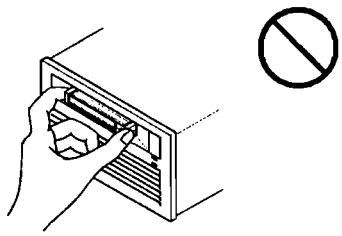
If the cassette appears not to load correctly, do not use additional force.



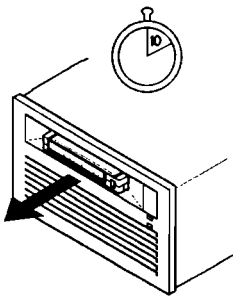


Do not restrain the cassette when pushing it into the drive. This may cause it to jam in the mechanism.





If the cassette appears not to load correctly, the drive will eject it automatically after about 10 seconds, so it can be reloaded.



Note Do not try to load another cassette when a cassette is already in the drive. Check for a "cassette loaded" indication on your tape drive if you are not sure whether or not a cassette is loaded.

To unload a cassette

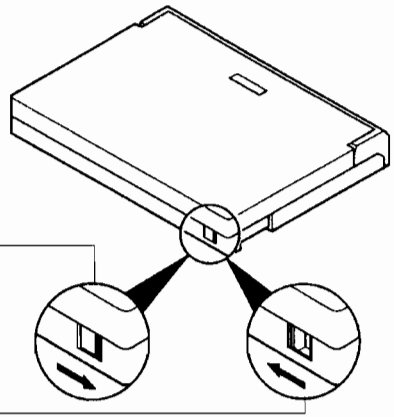
1 A cassette can be unloaded by pressing the Unload button on the front panel of the drive. In the case of a drive with a SCSI interface, it can also be unloaded by the host computer issuing a SCSI UNLOAD command.

2 When either of these occurs, the drive automatically winds the tape to the beginning, unthreads the tape and ejects the cassette. This takes about 10 seconds. Once the drive has ejected the cassette, you can take it from the drive and store it in its plastic case.

To write-protect a cassette

If you want to protect the data on the cassette from being over-written or altered you can write-protect it. To do this, slide the tab on the rear of the cassette so that the hole is *open*, as shown in the figure.

Caution Write-protection does not prevent a cassette being erased through bulk-erasure or degaussing.



The Tape log, which contains a history of usage of the tape, cannot be updated if the tape is write-protected. It follows that the Tape log becomes inaccurate if a cassette is used when write-protected. This means that the drive cannot reliably tell you that the cassette is nearing the end of its useful life and needs replacing.

3

This chapter explains why you must only use cassettes labeled DDS and how to check the quality of cassettes you buy. It provides details of three possible routines for organizing your backup, so that it becomes painless, trouble-free and reliable, and it looks at how cleaning can be built into your chosen routine.

Choosing Cassettes and Organizing Backup

Choosing Cassettes

Caution To avoid loss of data and damage to your drive, use only cassettes labeled DDS.

DDS and DAT Cassettes

It is often thought that all DAT and DDS tapes are of a standard that can be used for computer data storage. This is *not* the case.

The way tapes are used for data storage is fundamentally different from audio use. Audio tapes only play in streaming mode; that is, the drive reads the tape continuously. It does not go back and try a piece of tape again if it has trouble reading it. As a result, repositions (sequences of stop–rewind–play) are very infrequent.

In data storage use, however, repositions are far more frequent, particularly if the host computer is only capable of slow data transfer. In such a case, the drive is constantly having to stop or reposition while waiting for the drive to transfer more data. Even when the host is fast enough to maintain streaming, if the drive has difficulty reading a section of tape, it will try the section again, involving at least one reposition. Fast-searching for data can also cause several passes over an area of tape.

These repositions are the greatest cause of physical strain on the tape. Because computer data storage involves so many more, it is vital to ensure that the tapes can stand this extra strain and will have a reasonable working life.

In order to provide this extra guarantee of quality and ruggedness for computer use, a standard for DDS media was developed. This stipulates more stringent mechanical, environmental, reliability and durability specifications than the DAT standard.

For these reasons, it is vital that you use only properly certified DDS tapes in your drive, not DAT tapes which are only tested for audio use.

In order to identify data-grade tapes, look for the DDS logo on the cassette shell. There are two variants:

The DDS logo and its variant form

The logo may be used by any media manufacturer, provided that its tapes meet the DDS specification. Hewlett-Packard recommends that you use Hewlett-Packard DDS cassettes with your DDS-format drive. Hewlett-Packard cassettes have been designed and tested to give maximum data reliability and mechanical durability.

The Quality of Cassettes

To ensure the integrity of your data, you need to check the quality of DDS cassette tapes if you decide to use a vendor other than Hewlett-Packard. The following procedure will help you select safely:

1. Choose a supplier or a group of suppliers whose cassettes are labeled with the DDS logo. Buy a small number of cassettes initially, say 10.
2. Clean the tape heads in the cassette drive.
3. Store live data onto one of the cassettes from the batch, and then immediately verify the data.
4. Repeat step 3 with another cassette from the batch.
5. Leave the cassettes for one week and then verify the data again.
6. If the verifications have proved fault-free, use the cassettes for your usual backup routine.

If you only buy cassettes at long intervals, test a sample from each batch when you buy them, even if you always buy from the same vendor.

DDS Cassette Part Numbers

Hewlett-Packard cassettes can be ordered through the following part numbers:

Hewlett-Packard DDS Cassettes (60 meter, box of 5)	**HP 92283A**
Hewlett-Packard Cleaning Cassette	**HP 92283K**

Backup Routines

How you organize backup depends very much on how frequently the data changes, how extensive it is, and how valuable you consider it. What is essential is that you follow a routine, so that backup is regular and trouble-free. The following three models present routines which are commonly used. In each, a "set" of cassette tapes is the smallest number of tapes that will hold a full backup or partial backup.

Keep a record of the number of times each set is used, so that when the recommended write-life is reached (300 insertions), a set can be replaced by new cassettes. The 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, in which you have one set of tapes on which you back up all your data at the end of each working day. If you lose data, you simply restore it from the previous day's backup. It is the least secure model of backup, because if the cassette is lost, destroyed or damaged, the data is lost for ever.

Number of cassettes 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 each of Monday, Tuesday, Wednesday and Thursday. A partial backup is only of those files which have changed since the previous backup.

Two sets of tapes, A and B, are used in rotation for the weekly full backup. On the first Friday, you make a full image copy of your disks on Set A. Next 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 that if there is a fire or equipment is stolen from the site, the backup is unaffected.

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

Total number of cassettes needed: 2 sets for full backup
4 sets for partial backup

Model 3: Monthly and Weekly Rotation with Daily Backup

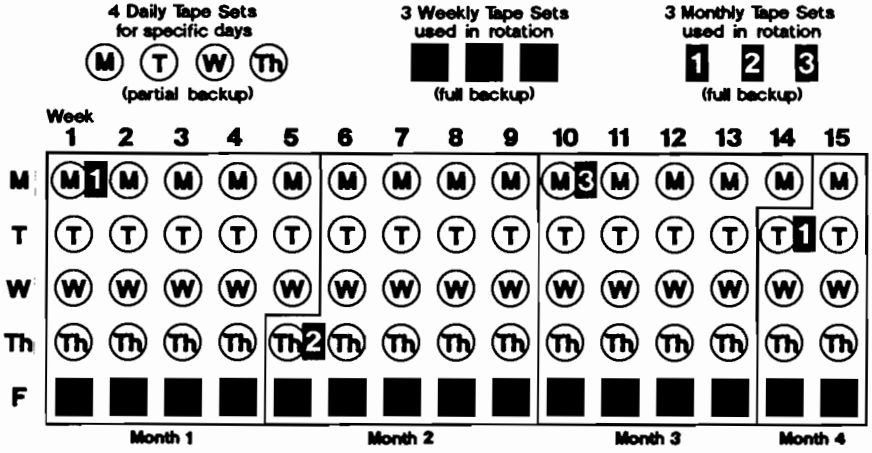
The backup model which offers optimum data protection uses six full backup sets (three monthly and three weekly), and four sets for partial backup daily. This model is recommended if you compile large quantities of data where loss would be disastrous. It also provides the best method of securing data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

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

Three sets of tapes are used in rotation for weekly full backup on Fridays. Two of the 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 that the normal weekly 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 fifteen-week period.



Total number of cassettes needed: 6 sets for full backup
4 sets for partial backup.

Number of Cassettes Needed

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

- A spare set for full backup
- A spare cassette for use for diagnostics by your Customer Engineer
- Cassettes for file transfers
- Cassettes for any archival storage you may require

Storage Life

Tests show that data can successfully be stored on DDS cassettes for a period of 10 years. You should give each cassette a full pass in the drive at least once a year to prevent sticking. Store the cassettes according to the environmental specifications given in Chapter 1.

Cleaning Routine

Once your backup routine has been established, you should have an idea of the number of hours the tape drive is used each day. Remember that it is recommended to clean the drive's tape heads after every 25 hours use, or if the drive displays a Caution signal. From this, 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 the drive about 8 hours each week, then cleaning is required every three weeks. In that case, if you are using backup model 3, you could store a cleaning cassette with one particular set of weekly full backup cassettes, so that the heads are cleaned every time that set is used.

4

The previous chapters tell you how to care for DDS tapes and so avoid trouble that could occur. However, if a problem does occur, this chapter tells you how to deal with it. It also answers some questions which are often asked about DDS tapes.

Problem Solving

Basic Troubleshooting Process

If a problem occurs, the first step is to try to establish whether the problem lies with the tape, the drive, the host computer and connections, or with the way the system is being operated.

☐ *Are you using new tapes, or a different brand of tapes? Is the Caution signal being displayed by the drive? Have you been using the particular tape for a very long time? Then the problem could lie with the tape.*

If you suspect the problem is the tape:

1 Clean the tape heads with the cleaning cassette.
2 Try the operation again.
3 If the problem still occurs, try using a different cassette.
4 If the problem is still there, the problem probably lies with the drive or the host computer.

☐ *Has the tape drive been moved recently? Has the environment changed—unusually hot, cold, damp or dry? Has there been dust or dirt near the drive? Have reasonable precautions against static been taken? Then the problem could lie with the drive.*

If you suspect the problem is with the drive:

1 Clean the tape heads and try the operation again.
2 If the problem persists, check the environmental conditions against the drive's specified limits, and try to correct the conditions if they are outside the limits. Perhaps move the drive to a more suitable site.
3 If the problem is still there, call a customer engineer.

☐ *Has a new operating system been installed in the host computer? Have any cables been disconnected and reconnected? Then the problem could lie with the host or the connections.*

If you suspect the problem lies with the host, consult the computer's operating manuals or seek help from a customer engineer.

☐ *Is someone new operating the system? Has the operator just returned after a long absence? Then the problem may lie with incorrect operation.*

In this case, ask the person to repeat the operation while you watch, to check that they are not omitting some vital step.

Common Questions and Answers

☐ *How do I recognize a Caution signal on Hewlett-Packard DDS-format drives?*

The Caution signal is indicated by the Cassette (upper) light alternating green for 4.5 seconds and off for 0.5 seconds. It means the drive is having to correct an excessive number of errors while reading or writing.

Clean the tape heads and see if the signal is still displayed. If it is, discard the tape.

☐ *How often should I clean the tape drive heads?*

You should clean the tape heads after every 25 hours of use, or if the Caution signal is displayed. Only use the HP Cleaning Cassette to clean the heads.

☐ *What should I avoid when positioning the tape drive?*

Do not place the drive in a dirty environment, for example on the floor, or near a door or walkway. See chapter 1.

☐ *How many times can I use a DDS cassette?*

The recommended number of tape passes is 2000. This is equivalent to approximately 300 insertions of the cassette, given that on each insertion the tape is likely to pass the heads an average of six times.

☐ *What is the correct way to handle the cassettes?*

Handle cassettes with care. DDS-format drives have an auto-load mechanism which will automatically take the cassette when you gently insert it the correct way round. Unlike quarter-inch cartridge drives, you do not need to push tapes in forcefully. See chapter 2.

☐ *For how long can I archive tapes?*

Ten years is the maximum recommended storage time for DDS cassettes. You should give the cassettes a full pass in the drive at least once a year during storage to prevent the tape sticking.

☐ *How many tapes do I need?*

This depends on your needs. See the backup models in chapter 3.

☐ *Will I be able to use my cassettes with future Hewlett-Packard DDS-format products?*

Yes. All Hewlett-Packard DDS-format products will be backwards compatible, so they will be able to read previously recorded data.

☐ *Can I use DDS cassettes for audio?*

Yes, DDS cassettes will work with DAT players. DDS cassettes are certified to a higher specification than DAT cassettes, so while DDS cassettes can be used for DAT, do not use DAT cassettes in DDS-format drives.

☐ *What length tapes can I use?*

Tape length specifications are provided with your drive.

☐ *Can I do more than one backup to a cassette?*

Yes, if your backup utility supports the use of 2-partition tapes.