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# **DDS-Format DAT Drive User's Manual**



**HEWLETT  
PACKARD**

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March 1992

## Typographical Conventions

The following safety symbols and typographical conventions are used in this manual:

-  indicates the power button on a storage system.
- *Italic* is used for emphasis or titles of manuals.

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### Note



Notes contain important information.

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### Caution



Caution messages appear before procedures which, if not observed, could result in damage to equipment or loss of your data.

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## About This Manual

This manual provides information on operating and maintaining DDS-format DAT drives included in Hewlett-Packard storage systems.

### Note



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This manual should be used with *Success with DDS Media*, part number C1500-90911, which includes information on loading and unloading DDS cassettes, care and handling of DDS cassettes, and using cleaning cassettes.

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## How It's Organized

- Chapter 1 describes the basic tasks of operating the drive.
- Chapter 2 provides additional useful information about the drive. Once the drive is operating, read this chapter to learn more about the drive, media, troubleshooting, and service.
- Appendix A includes the technical specifications of and environmental requirements for the drive.

## How To Use It

1. Using the information in Chapter 1, begin operating the drive.
2. Once the drive is operating, read Chapter 2 to learn more about the drive.



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## Operating Your DDS-Format DAT Drive

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This chapter describes how to operate the DDS-format (digital data storage-format) DAT (digital audio tape) drive within your HP storage system. Normal operation of the DDS-format DAT drive includes the following tasks:

- Switching on drive power and ensuring the drive passes self-test.
- Loading a DDS cassette.
- Unloading a DDS cassette.

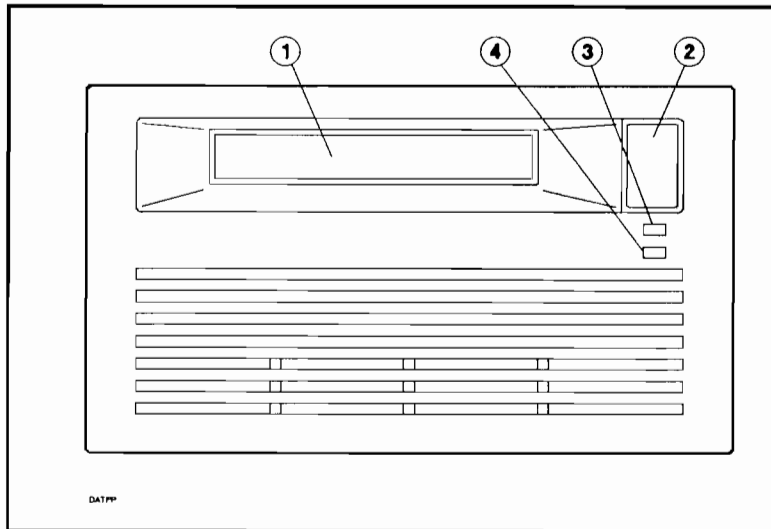
---

### Identifying Front Panel Parts

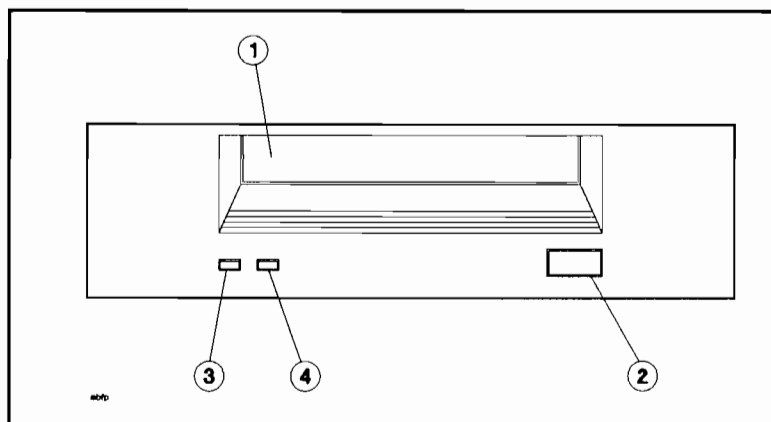
There are two DDS-format DAT drive models: the 5.25-inch model and the 3.5-inch model. Your drive front panel may look like Figure 1-1 or Figure 1-2. The front panel parts are described on page 1-3.

The letters “DCLZ” beneath the cassette slot on a 3.5-inch drive indicate that the drive uses data compression recording technology.

## DDS-Format DAT Drive



**Figure 1-1.**  
**DDS-Format DAT Drive Front Panel (5.25-inch Model)**



**Figure 1-2. DDS-Format DAT Drive Front Panel (3.5-inch Model)**

## DDS-Format DAT Drive

- |                          |   |
|--------------------------|---|
| 1—Cassette Slot          | Insert the DDS cassette into the drive through this slot.   |
| 2—Cassette Unload Button | Press this button to start the cassette unload sequence and to eject a DDS cassette. The cassette is ejected within 10 seconds. This button does not function if there is no power present or if a software application has disabled its operation.                             |
| 3—Cassette Status Light  | During normal operation, this light indicates whether a cassette is installed, and if the cassette is write-protected or write-enabled (see Table 1-1). During a fault condition, this light is used with the drive status light to indicate the type of fault (see Table 1-2). |
| 4—Drive Status Light     | During normal operation, this light indicates host activity, or that a cassette is loaded and the drive is ready for host activity (see Table 1-1). During a fault condition, this light is used with the cassette status light to indicate the type of fault (see Table 1-2).  |

## DDS-Format DAT Drive

**Table 1-1. Status Light Normal Indications**

<b>Cassette Status Light</b>	<b>Drive Status Light</b>	<b>Explanation</b>
OFF	OFF	Drive power is off, self-test passed with no cassette loaded, or no cassette loaded and no activity with host.
GREEN (FLASHING)	GREEN (FLASHING)	Loading or unloading a write-enabled cassette.
YELLOW (FLASHING)	GREEN (FLASHING)	Loading or unloading a write-protected cassette.
GREEN	GREEN	Write-enabled cassette loaded and drive on-line.
YELLOW	GREEN	Write-protected cassette loaded and drive on-line.
GREEN	GREEN (FLASHING)	Write-enabled cassette loaded and activity with host.
YELLOW	GREEN (FLASHING)	Write-protected cassette loaded and activity with host.
OFF	GREEN (FLASHING)	No cassette loaded and activity with host.

**Table 1-2. Status Light Fault Indications**

Cassette Status Light	Drive Status Light	Explanation
GREEN or YELLOW	GREEN/YELLOW (FLASHING)	MEDIA WARNING on 3.5-inch Model. (See Table 2-3.)
GREEN (FLASHING)	GREEN or YELLOW	MEDIA WARNING on 5.25-inch Model. (See Table 2-3.)
YELLOW	YELLOW	High humidity. (See Table 2-3.)
YELLOW (FLASHING)	YELLOW	Drive failed self-test. (See Table 2-3.)

---

## Switching On Power

### Caution




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If the drive has been exposed to temperature extremes, allow two hours for it to stabilize at room temperature and humidity before operating it. Operating a drive that is very cold or very hot may damage it (refer to “Environmental Requirements” in Appendix A).

---

1. Switch on drive power by setting the **LINE** switch on the storage system cabinet to the 1 (ON) position.
2. Wait 30 seconds for the drive to complete the self-test. During the self-test, the drive makes clicking sounds and the status lights perform one of the following sequences (time in seconds for each step is shown):

## DDS-Format DAT Drive

If no cassette is in the drive:

<b>Cassette Light</b>	<b>Drive Light</b>
1. GREEN (flash 1 s)	GREEN (flash 1 s)
2. YELLOW (flash 1 s)	YELLOW (flash 1 s)
3. OFF	YELLOW (flash 20 s)
4. OFF	OFF

If a write-enabled cassette is in the drive:

<b>Cassette Light</b>	<b>Drive Light</b>
1. GREEN (flash 25 s)	GREEN (flash 25 s)
2. GREEN	OFF

If a write-protected cassette is in the drive:

<b>Cassette Light</b>	<b>Drive Light</b>
1. YELLOW (flash 25 s)	GREEN (flash 25 s)
2. YELLOW	OFF

3. Check the cassette status light and the drive status light to ensure the self-test passed. The drive status light should be off, and the cassette status light should be off (no cassette loaded), green (write-enabled cassette loaded), or yellow (write-protected cassette loaded).

### Note



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If the self-test failed, see Table 1-2 for information about the failure.

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## Loading a DDS Cassette

Refer to Chapter 2 in *Success with DDS Media*, part number C1500-90911, for specific information about loading a DDS cassette.

### Caution



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Use only DDS cassettes in your DDS-format DAT drive. If you use audio DAT cassettes, you may damage the drive or lose data stored on the cassette. DDS cassettes are *not* the same as audio DAT cassettes. Audio DAT cassettes have a different mechanical specification, which can cause them to jam in the tape mechanism of a DDS-format DAT drive. Also, DDS cassettes are certified to store digital data.

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### Note



- 
- You cannot load a cassette when drive power is off.
  - When a cassette is loaded, the drive threads the tape, winds the tape to the Beginning of Tape (BOT) mark, then performs read/write tests to ensure the drive is operating properly. This process takes about 25 seconds. The cassette is then ready to be accessed by the host computer.
-

## DDS-Format DAT Drive

### Unloading a DDS Cassette

Refer to Chapter 2 in *Success with DDS Media*, part number C1500-90911, for specific information about unloading a DDS cassette.

#### Note



- 
- You cannot unload a cassette when drive power is off.
  - If power to the drive is interrupted after a cassette is loaded, the cassette cannot be removed. After power is restored, the host computer cannot access the cassette until it is unloaded, then loaded again.
  - Some software applications disable the unload button to prevent removal of the cassette while the application is running.
-



## **Using Your Drive**

Your DDS-format DAT drive performs such operations as file backup and recovery. How you initiate these operations is determined by the application or operating system you are using. For details on initiating these operations, refer to the appropriate system documentation or application note for your operating system.

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## **Learning More About Your Drive**

Now that you have learned how to operate your drive, read Chapter 2 for additional information about your drive.



## More About Your DDS-Format DAT Drive

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This chapter includes the following information about your DDS-format DAT drive:

- A description of the drive.
- Where to find information about the use, care, and handling of DDS cassettes.
- Ordering DDS cassettes.
- Troubleshooting.
- Service.



---

### Drive Description

The DDS-format (digital data storage-format) DAT (digital audio tape) drive is a sequential-access, streaming tape device that stores data on DDS cassettes. The DDS-format DAT drive employs helical-scan recording technology, which uses a rotating head assembly to read and write information. Data is recorded using the digital data storage (DDS) format.

The drive includes an embedded Small Computer System Interface (SCSI) controller with built-in self-test diagnostic routines. Each time the drive is switched on, the self-test diagnostics ensure the drive is working properly.

## DDS-Format DAT Drive

### Data Compression

The 3.5-inch drive is available in a model that uses data compression technology. The data compression model is identified by the letters "DCLZ" on the front panel beneath the cassette slot.

Data compression allows you to store up to four times as much data on each DDS cassette. This reduces both your media costs and the amount of operator involvement required when doing a system backup.

With both standard (uncompressed) and data compression DDS DAT drives available, you should be aware of the following restrictions on data interchangeability between drive types:

- Both compressed and uncompressed tapes can be read by the data compression model drive.
- Data compressed tapes *cannot* be read in a drive that uses standard (uncompressed) recording.

---

## DDS Cassettes

The drive uses cassettes that are formatted using the digital data storage (DDS) format. (Refer to Appendix A for information about the formatted capacity of DDS cassettes.) Like audio and video cassettes, a DDS cassette contains a spool of magnetic tape enclosed in a plastic housing.

### Caution



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Use only DDS cassettes in your DDS-format DAT drive. If you use standard audio DAT cassettes, you may damage the drive or lose data stored on the cassette.

---

Refer to *Success with DDS Media*, part number C1500-90911, for the following information about DDS cassettes:

- Environmental requirements for DDS cassettes
- Loading and unloading DDS cassettes
- Care and handling of DDS cassettes
- Backing up data with DDS cassettes
- Write-protecting DDS cassettes
- Using cleaning cassettes
- Storing DDS cassettes

## DDS-Format DAT Drive

### Cassette Capacity

The amount of data that can be recorded on a DDS cassette is a function of both its length and the type of recording used (standard or data compression). Table 2-1 lists the DDS cassette capacities for each model DAT drive.

The capacity achieved using data compression varies depending on the nature of data being recorded. The nature of the data is related to the type of system you are using.

On technical systems, typical capacity is approximately twice that achieved using normal (noncompressed) recording. However, on commercial or business systems, typical capacity is four times standard recording.

Note that you should not use 90-meter cassettes in the 5.25-inch drive.

**Table 2-1. DDS Cassette Capacities**

Cassette	Capacity With		
	5.25-inch Drive	3.5-inch Drive (Standard)	3.5-inch Drive (Data Compression) <sup>1</sup>
60-meter	1.3 gigabytes	1.3 gigabytes	up to 5.2 gigabytes
90-meter	Do Not Use	2 gigabytes	up to 8 gigabytes

<sup>1</sup> Maximum capacity. The exact capacity is a function of the type of data being recorded. Typical capacity ranges from 2 to 4 times that achieved with standard (noncompressed) recording.

**Ordering Cassettes**

To ensure the safety and reliability of your data, we recommend you use only Hewlett-Packard DDS cassettes. Only cassettes with the DDS label meet the quality standards required for reliable digital data storage in your DDS-format DAT drive (see Table 2-2).

**Caution**




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Use *only* 60-meter cassettes in the 5.25-inch model drive. If a 90-meter cassette is used in the 5.25-inch model drive, you may lose data. Both 60-meter and 90-meter cassettes can be used in the 3.5-inch model drive.

---

The following cassettes should be available from your dealer, or they can be ordered directly from Hewlett-Packard by calling toll free: 1-800-227-8164.

**Table 2-2. Ordering Cassettes**

Part Number	Description
92283A	Box of five 60-meter DDS cassettes.
92283B	Box of five 90-meter DDS cassettes.
92283K	One cleaning cassette.

The cleaning cassette is used to clean the tape head in your drive (refer to "Maintenance" in this chapter).

### Maintenance

The only maintenance your drive requires is cleaning the tape head. A clean tape head will maximize data integrity and prolong tape head life. Also, ensure your drive operates within the environmental limits in Appendix A.

### Cleaning the Tape Head

As with any tape device, the tape head picks up residue from the DDS cassette, and must be cleaned periodically. Clean the tape head with the cleaning cassette included with your drive.

The tape head should be cleaned at the following times:

- After every 25 hours of use
- If a media warning fault is displayed by the status lights (see Table 2-3).

Refer to *Success with DDS Media*, part number C1500-90911, for more information about using the cleaning cassette.

### Operation In Low-Humidity Environments

DDS cassettes are designed to provide optimum performance at humidity levels of about 50%. The 25-hour cleaning interval for the tape heads reflects operation in this environment.

If your operating environment is very dry (20% to 35% humidity) you may find it necessary to clean the tape heads more often. Media warning faults are an indication that you may need to shorten the tape head cleaning interval.

Operating at low humidity levels may also reduce the life expectancy of DDS cassettes.



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## Troubleshooting

Problems with the drive can be caused by a dirty tape head or an internal hardware failure. If a problem occurs, check the status lights (see Table 2-3).

### Note



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If either status light begins flashing slowly when it should not be, a media warning condition may exist. See Table 1-2. A media warning condition should be corrected immediately. See Table 2-3 for information to correct this problem.

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Your operating system may include an on-line troubleshooting utility to aid in the diagnosis and repair of the drive. There may also be an off-line utility available for troubleshooting the drive. Refer to the documentation included with your storage system for more information about troubleshooting utilities.

If the drive has a problem you cannot solve, contact your service center. Refer to the following section to prepare for a service call.

## DDS-Format DAT Drive

**Table 2-3. Troubleshooting the DDS-Format DAT Drive**

<b>Problem</b>	<b>Cause/Action</b>
Media Warning	<p><b>CAUSE</b> - The tape head is dirty, or this cassette has reached the end of its useful life.</p> <p><b>ACTION</b> - Clean the tape head and see if the problem is solved. If not, the cassette may be defective. To save the data on the cassette:</p> <ol style="list-style-type: none"><li>1. Back up data on the defective cassette to your hard disk.</li><li>2. Remove the defective cassette and insert a new cassette.</li><li>3. Copy the data from your hard disk to the new cassette.</li></ol> <p>If the problem persists, call your service center.</p>
High Humidity	<p><b>CAUSE</b> - The drive detected humidity above a safe operating level. To protect the tape and head from damage, the drive will not operate until the humidity is lowered to an acceptable level.</p> <p><b>ACTION</b> - Lower the humidity at the operating site, or move your storage system to a more stable environment. Once the humidity reaches the proper level, the drive will begin operating again.</p>
Cassette Jammed	<p><b>CAUSE</b> - The cassette has become jammed in the tape mechanism. This can be a result of applying multiple stick-on labels to a cassette.</p> <p><b>ACTION</b> - Cycle power on and off. If the cassette does not release, call your service center.</p>
Hardware Fault	<p><b>CAUSE</b> - The internal diagnostics detected a hardware failure.</p> <p><b>ACTION</b> - Note the pattern on the status lights and call your service center.</p>

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## Service

**Caution**

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There are no user-serviceable parts inside the drive. Service should only be performed by someone with the proper training. If you attempt to fix the problem, you may void the warranty and damage the drive.

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If the drive requires service, there are a few things you can do to help your service center identify the problem and solve it quickly:

1. Record any information about the problem. This includes any error messages displayed by your computer, information accessed using troubleshooting utilities, details about the operation that was being performed, and the software application being used when the problem occurred.
2. Locate the serial number of the drive on either the storage system cabinet pull-out configuration card, or on the rear of the drive.
3. Contact your service center for assistance in solving the problem.

**Warranty**

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

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**Repacking the Drive**

Before the drive is moved to a new site or sent to a repair facility, it must be repacked in the original type of shipping container and packing material. If the original container and packing material are not available, order a replacement container and packing material from your service center.

**Note**



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

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## DDS-Format DAT Drive Technical Information

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This appendix contains the technical specifications of and environmental requirements for DDS-format DAT drives. The model (5.25-inch or 3.5-inch) of your drive is listed with each specification to help you find information for your drive.

### Note



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The environmental requirements for your storage system are a composite of the environmental requirements for the mass storage devices within your storage system. The environmental requirements for this drive may be more stringent than those for your storage system. Consequently, the environmental requirements for this drive may determine the environmental requirements for your storage system. Refer to your storage system user's manual for the environmental requirements for your storage system.

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## Technical Specifications

### WEIGHT

Net:

5.25-inch: 2.7 kg (6.0 lbs)

3.5-inch: 1.5 kg (3.4 lbs)

Shipping:

5.25-inch: 5.1 kg (11.2 lbs)

3.5-inch: 2.6 kg (5.8 lbs)

### FUNCTIONAL

Load Time: 25 seconds

Unload Time: 10 seconds

### MEDIA

Format: 4 mm Digital Data Storage (DDS)

Record Size: 512 bytes

Cassette Capacity:

5.25-inch: 1.3 gigabytes (60 meter)

3.5-inch (standard): 1.3 gigabytes (60 meter) *or* 2 gigabytes (90 meter)

3.5-inch (data compression): up to 5.2 gigabytes (60 meter) *or* up to 8 gigabytes (90 meter)<sup>1</sup>

<sup>1</sup> The exact capacity is a function of the type of data being recorded. Typical capacity ranges from 2 to 4 times that achieved with standard (noncompressed) recording.

## Environmental Requirements



### TEMPERATURE

Operating:	5°C to 40°C (41°F to 104°F)
Nonoperating <sup>1</sup> :	-40°C to 70°C (-40°F to 158°F)
Maximum Rate of Change:	10°C/hr (50°F/hr)

<sup>1</sup>*Excluding media; cassettes can be stored at temperatures down to -40°C (-40°F).*

### HUMIDITY

Operating:	20% to 80% RH (noncondensing)
Nonoperating <sup>1</sup> :	5% to 95% RH (noncondensing)
Maximum Wetbulb Temperature:	26°C (79°F)

<sup>1</sup>*Excluding media.*

### ALTITUDE

Operating:	0 m to 4,600 m (-0 ft to 15,000 ft)
Nonoperating:	0 m to 15,240 m (0 ft to 50,000 ft)





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