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Contents

Introduction

The software needed to control the SCSI Autoloading DDS-2 (Digital Data Storage with Data Compressions) tape drive drive depends on your operating environment; ask your Apricot supplier for details.

The Autoloading DDS-2 drive uses 120-metre DDS-2 cartridges. It can also use 60-metre or 90-metre digital cartridges bearing the DDS symbol. The drive can automatically detect which cartridges are DDS-2 format, or the older DDS format. The drive uses magazines to allow multiple DDS-2 cartridges to be loaded automatically. A four cartridge magazine is supplied with the drive.

Note
Data Stored on DDS-2 cartridges will not be readable by first generation DDS drives.

Data compression A built in compression algorithm can typically double, and in some cases quadruple, tape capacity. The drive writes compressed data by default, unless it finds uncompressed data already on the cartridge, in which case it writes uncompressed data. The drive can also write uncompressed data under software control.

Note
A switch on the rear of the drive allows it to default to writing uncompressed data. Refer to Rear panel switches *later in this document for further information.*

When reading a cartridge, the drive automatically distinguishes compressed and uncompressed data and either decompresses it or passes it through unaltered as appropriate. It has the capability to read and write both DDS uncompressed and DDS-DC compressed data and data cartridges. Data compression and decompression is transparent to the host software.

Caution
Use only cartridges bearing the DDS-2 or DDS symbols, you cannot play audio DAT cartridges with these drives, even on multimedia systems.

Data capacity
The DDS-2 drive writing uncompressed data has a nominal capacity of 1.3 Gbytes on a 60-metre cartridge, 2.0 Gbytes on a 90-metre cartridge and 4.0 Gbytes on a 120-metre cartridge DDS-2 cartridge, with a sustained transfer rate of 400 Kbytes/ second. At a data compression ratio of 4:1 the DDS-2 drive has a nominal maximum capacity of 5.2Gbytes on a 60-metre cartridge, 8.0 Gbytes on a 90 metre cartridge, and 16.0 Gbytes on a 120-metre DDS-2 cartridge; the substantial transfer rate is increased by the same ratio. The compression ratio and transfer rate achievable in any particular case depend on the characteristics of the data being compressed, and may be higher or lower than these nominal figures.

Automatic drive operation
To prolong the life of the tape and drive mechanism, the drive automatically carries out the following operations after periods of inactivity.

- After 30 seconds the capstan and pinch roller are released and tape tension is removed.

- After 90 seconds the tape is pulled away from the cylinder and the cylinder stops rotating.

Front panel

The front panel of the Autoloading DDS-2 drive includes an eight character display, four LEDs and two buttons. The front panel is illustrated below.
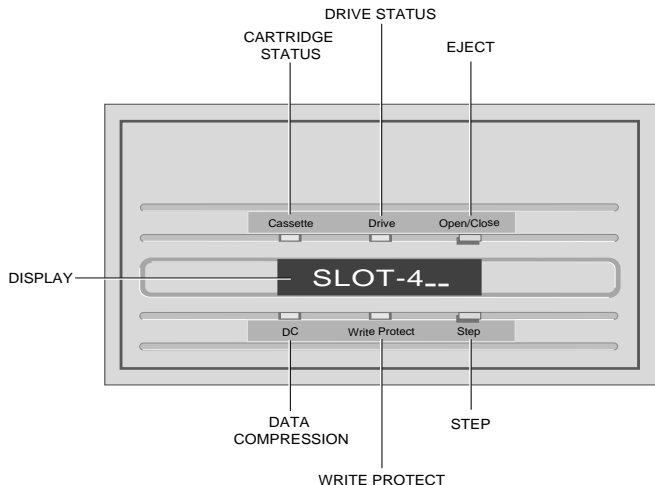
Front panel The front panel display is used to display eight alphanumeric
display characters indicating the status of the drive. If the drive is
installed with the display horizontal, text is oriented to read
from left to right. If the drive is installed with the display vertical,
text is oriented to read from top to bottom.

Warning
*It is vital that the text reads left to right when the display is horizontal,
and top to bottom when the display is vertical. The drive must not
be operated with the text incorrectly oriented.*

*If text is displayed incorrectly, open the drive drawer, eject the
magazine, power the system down and refer to* Drawer switches
for information on changing the orientation.

When the drive drawer is closed and a magazine present the
display identifies the magazine slot that is positioned for use.

When the drive drawer is closed without a magazine present
no message is displayed.

When the drawer is open and a magazine other than a four
cartridge magazine is present, the drive identifies the magazine
and locks it and the drawer in place. The display indicates which
slot is positioned for use.

If the slot positioned for use does not contain a cartridge the
display flashes rapidly. If the slot contains a correctly inserted
cartridge the display flashes slowly identifying the slot.

The slow flash continues for five seconds after the magazine is
stepped using the STEP button. Once the cartridge is loaded the
slot number is displayed continuously.

If a cartridge is not correctly inserted in the magazine the
display shows the CHECK MAGAZINE message.

Whenever the drive needs operator intervention the display
flashes OPERATOR.

Note

Recommended solutions for cleaning the display are given later. Check this information before cleaning the display.

The messages that the drive can display are listed in the following table.

Message	Meaning
MAG ERR	Magazine is jammed
ILLEGAL	Button has no function
NO CASS	A cartridgeis not present
CASS IN	A cartridge is in the drive
CLEANING	Cleaning cycle is occurring
OPERATOR	Operator action is required
EJECTING	Cartridge is being ejected
INSERT	Cartridge is being inserted
SCAN MAG	Magazine is being initialized
DISMOUNT	Magazine is being dismounted
SLOT—nn	Slot number nn is in position
OPENING	Drawer is opening
CLOSING	Drawer is closing
CHK MAG	The cartridge is not correctly inserted in the magazine

Front panel buttons

EJECT **button**

The EJECT button ejects the currently loaded cartridge and, if a magazine is being used, dismounts the magazine, opening the drawer if necessary.

STEP **button**

This button allows you to step through the cartridge in the magazine in turn, until you reach the one you require.

Pressing the STEP button returns the current cartridge to the magazine and moves the magazine to the next cartridge. If a cartridge is present in that slot it is loaded into the drive after a five second delay.

The delay allows you to step the magazine to the next cartridge if the current one is not the one you require.

When the magazine is stepped beyond the last slot it moves back to the first slot.

Front panel ***LEDs***   The following table summarizes the operation of the front panel LEDs. Further information on each LED is given after the table.

LED	Action	Meaning
Drive status	ON	The drive is reading or writing the cartridge.
	Flashing rapidly	A hardware fault has occurred, or dew has been detected.
Cartridge status	ON	A cartridge is in the drive and is not generating excess errors.
	Flashing slowly	A cartridge is in the drive and is generating excess errors (Warning). Use a cleaning cartridge to clean the heads.
	Flashing slowly (with drive status LED flashing)	A prerecorded audio cartridge is in the drive
	Flashing rapidly	The drive cannot write to the tape (Error). Use a cleaning cartridge to clean the heads.
Data compression	ON	A data compression or decompression operation is in progress.
Write protect	ON	The cartridge in the drive is write protected.

Drive status

The drive status LED indicates the following conditions:

1. When the LED is lit the drive is reading or writing the tape.

    Note

    Do not press the EJECT button while this LED is lit. If you do so the operation in progress is aborted and the cartridge ejected. This may cause loss of data.

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2. When the LED is flashing rapidly a hardware fault has occurred, or dew has been detected.

    If this happens soon after powering-up the computer, the drive's diagnostic test may have failed, in which case the drive will not operate. Request help from your Apricot supplier or an authorized Apricot maintainer.

    If the drive detects high humidity, the tape is automatically ejected. As soon as the drive detects that humidity is at an acceptable level it will return to normal operation.

Cartridge status

The cartridge status LED indicates the following conditions:

1. When the LED is lit a cartridge is in the drive and is not generating excess errors.

2. When the LED is flashing slowly a cartridge is in the drive and is generating excess errors. This is a warning, drive operation is proceeding normally.

    Use an approved DDC cleaning cartridge to clean the heads. If the LED continues to flash after the heads have been cleaned, or flashes when ejecting the cartridge use a new cartridge for future write operations.

3. If the LED is flashing slowly and the drive status LED flashing is flashing a prerecorded audio cartridge is in the drive.

4. When the LED is flashing rapidly the drive cannot write to the tape, the write operation has failed.

    Use an approved DDC cleaning cartridge to clean the heads. If the LED continues to flash after the heads have been cleaned, use a new cartridge for future write operations.

Data compression

Whenever a compression or decompression operation occurs for a loaded cartridge this LED is illuminated.

Write protect

Whenever a write protected cartridge is loaded this LED is illuminated.

Write-protecting a cartridge

A cartridge can be write-protected by sliding the white tab on the cartridge so that the recess is revealed. In this position, data can be read from the tape but not written to it.
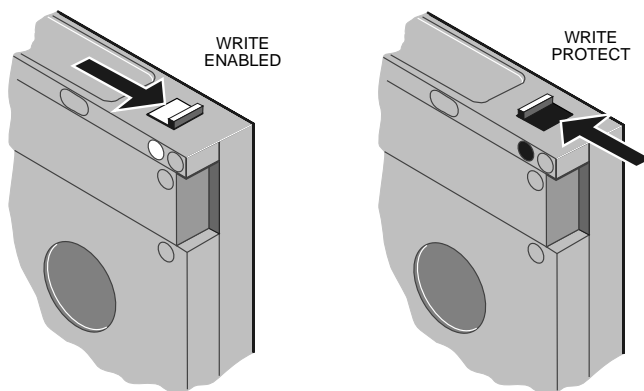
The tape log, which includes a record of data integrity failures, cannot be updated while the cartridge is write-protected. It follows that the tape log becomes inaccurate if a cartridge is used while write-protected. As a result the media warning LED

status cannot be relied upon to determine if the cartridge needs to be copied and replaced.

Keep your cartridges well away from magnetic objects, and equipment that generates magnetic fields. Avoid extremes of temperature and exposure to direct sunlight; otherwise the data recorded on the tape may become corrupted.

Magazine operation

When you load cartridges into the magazine and insert the magazine the drive can be left to complete its operation unattended. Once cartridges are loaded in the magazine they are secure in the cartridge, and the proximity of the magazine to the front of the computer prevents removal of the cartridges.

The four cartridge magazine can only be used in closed drawer operation. Five, eight and twelve cartridge magazines can only be used in open drawer operation.

Loading cartridges
To load cartridges hold the magazine with the flat side towards you, so that the cartridge slots face away from you. Then insert a cartridge with the write protect tab facing you at the right end of the cartridge.


WRITE
PROTECT
TAB
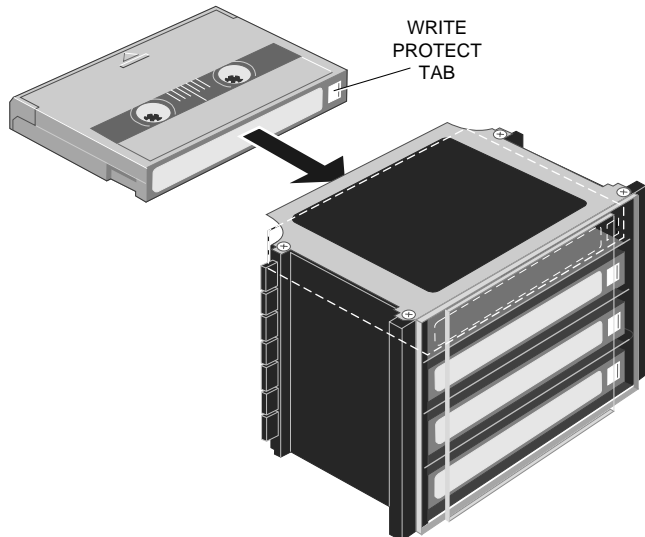
The cartridge should seat firmly in the slot. Repeat the process for the remaining cartridges.

Inserting a magazine The drive senses when a four cartridge magazine is used, and automatically closes the drawer and loads the first (top) cartridge. To load a four cartridge magazine:

1. Press the EJECT button to open the drawer. The drawer will open and the display will indicate that operator action is required.

2. Align the loaded magazine over the open drawer with the flat side of the magazine towards you, and the protrusions on the sides of the magazine matching the cut-outs in the drawer.
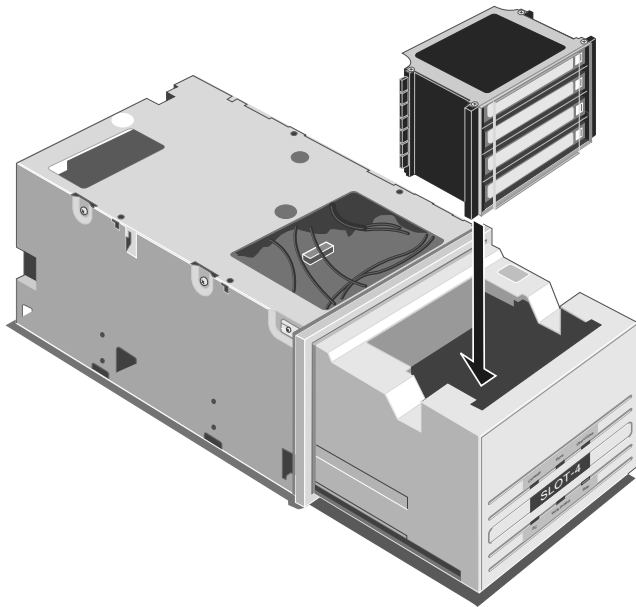

3. Place the magazine gently in the drawer. Do not force it. The drive senses its presence, positions it and closes the drawer automatically.

Using a single cartridge

The drive can be operated with a single cartridge. To load a single cartridge:

1.   Press the EJECT button to open the drawer. The drawer will open and the display will indicate that operator action is required.

2.   Insert the cartridge into the slot as shown in the following illustration, with the write protect tab facing you at the right end of the cartridge.
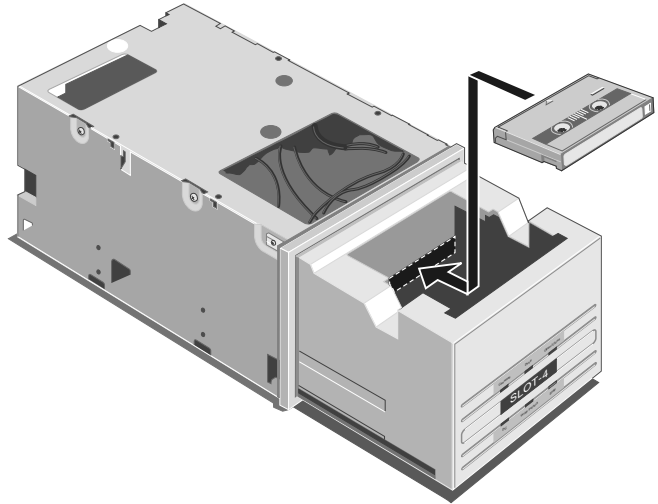
3.   Gently push the cartridge into the drive until the drive pulls the cartridge into the opening.

      Once the cartridge is in the drive you may close the drawer if you wish.

Cleaning the drive

Head cleaning   There are two points at which the drive heads should be cleaned.

1.   As routine maintenance after every 25 hours of read/ write activity.

2.   Whenever the cartridge status LED flashes.

Note

The flashing of the cartridge status LED could refer to a damaged tape, or a tape nearing the end of its life. If cleaning the heads does not correct the flashing LED condition, replace the tape.

To clean the heads insert a cleaning cartridge. These are available from Apricot.

Note

Do not use an audio DAT cleaning cartridge, the drive will not recognize it as a cleaning cartridge.

The drive automatically recognises the cleaning cartridge, loads it and runs it for approximately 10 seconds, before it is ejected. Each time the cleaning cartridge is used a clean unused portion of the tape is advanced. After approximately 30 uses the entire tape is used and a new cartridge is required.
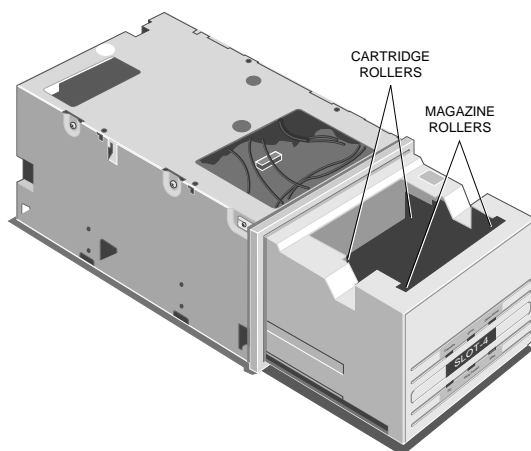
Cleaning the cartridge rollers

To clean the cartridge rollers:

1. Press the EJECT button and, once the drawer is open, remove the magazine or cartridge.

2. Dip one end of a cotton swab in ethyl alcohol.

3. Press the STEP button three times within three seconds. CLEAN 1 will appear on the display, and the cartridge rollers will rotate for 10 seconds.

4. As the cartridge rollers begin to rotate extend the swab into the drawer and wipe the rollers with the wet end of the swab.

5. While the rollers are still rotating wipe them with the dry end of a cotton swab.

Cleaning the left magazine rollers

To clean the left magazine rollers:

1. Press the EJECT button and, once the drawer is open, remove the magazine or cartridge.

2. Dip one end of a cotton swab in ethyl alcohol.

3. Press the STEP button three times within three seconds. CLEAN 2 will appear on the display, and the left magazine rollers will rotate for 10 seconds.

4. As the left magazine rollers begin to rotate extend the swab into the drawer and wipe the rollers with the wet end of the swab.

5. While the rollers are still rotating wipe them with the dry end of a cotton swab.

Cleaning the right magazine rollers

To clean the right magazine rollers:

1. Press the eject button and, once the drawer is open, remove the magazine or cartridge.

2. Dip one end of a cotton swab in ethyl alcohol.

3. Press the STEP button three times within three seconds. CLEAN 3 will appear on the display, and the right magazine rollers will rotate for 10 seconds.

4. As the right magazine rollers begin to rotate extend the swab into the drawer and wipe the rollers with the wet end of the swab.

5. While the rollers are still rotating wipe them with the dry end of a cotton swab.

Display cleaning

If necessary the front panel display can be cleaned with a damp cloth and soapy water.

Warning

Do not use detergents or any proprietary cleaning solutions. These may damage the display.

Drive configuration

Three sets of switches are used to configure the drive. Once the drive has been installed and correctly configured there should be no need to change the switch settings.

The descriptions that follow assume that the drive is viewed with the display horizontal.

Drawer switches
When the drawer is open a bank of four switches are available in the right rear corner of the top surface. The switches are beneath a small rectangular plastic cover.
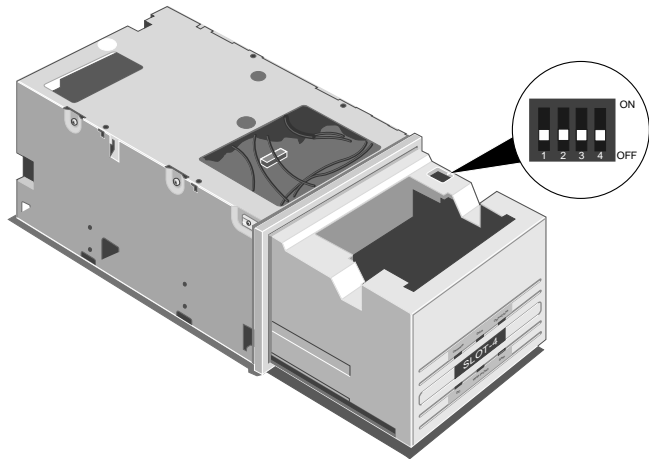
Only two of the four switches are used, switches 1 and 2.

Switch 1

Switch 1 determines the orientation of the characters on the display. When switch 1 is off the display reads from left to right, when switch 1 is on the display reads from top to bottom.

It is vital that switch 1 is set in the correct position, in addition to the display orientation the position of this switch also changes the operation of the drive mechanism.

Switch 2

Switch 2 determines whether the first cartridge in the magazine is automatically loaded into the drive. When switch 2 is off the cartridge is not loaded, when switch 2 is on the cartridge is loaded.
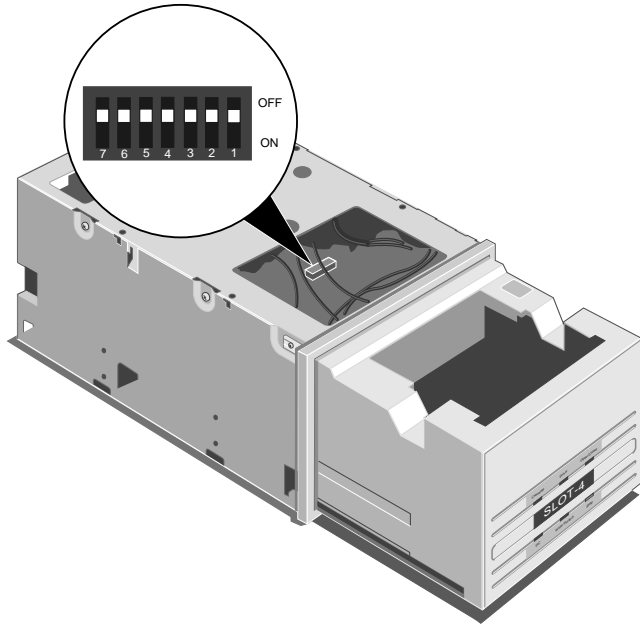
Switch 3

Switch 3 is reserved. Its default position is off.

Switch 4

Switch 4 is a dummy switch. Its default position is off.

Top panel switches With the drive out of the system a bank of seven switches is available on the circuit board at the top of the drive. The location of the switches is indicated in the following illustration.

The functions of these switches are given in the following table.

Switch	Function
1	Display language
2	Display language
3	Continuous cycle
4	Display intensity
5	Power on self test
6	Reserved
7	Reserved

Switches 1 and 2

These two switches determine the language used by the display as follows.

Switch 2	1	Language
OFF	OFF	English
OFF	ON	French
ON	OFF	German
ON	ON	Spanish

Switch 3

Switch 3 determines the action of the drive after it accesses the last cartridge in the magazine. When switch 3 is off the drive stops. When switch 3 is on the drive returns to the first cartridge.
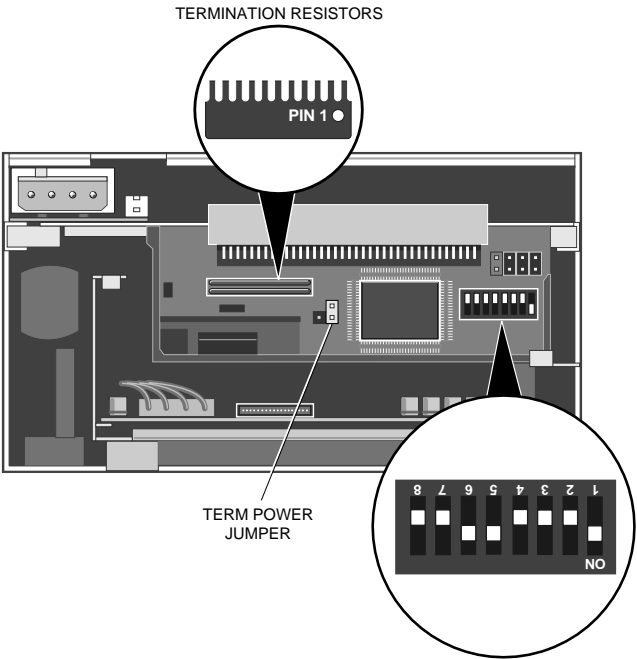
Switch 4

Switch 4 controls the intensity of the display. When switch 4 is off display intensity is normal. When switch 4 is on display intensity is high.

Switch 5

Switch 5 controls whether the drive runs its self test sequence on power up. When switch 5 is off the drive does not run the self test sequence. When switch 5 is on the drive does run the self test sequence.

Rear panel switches With the drive out of the system a bank of eight switches is available on the circuit board at the rear of the drive. The location of the switches is indicated in the following illustration.

The functions of these switches are given in the following table.

Switch	Function
1	SCSI ID bit 0
2	SCSI ID bit 1
3	SCSI ID bit 2
4	SCSI mode
5	Parity
6	Data Compression (DC) pass through
7	Reserved
8	Power on self test

Switches 1, 2 and 3

These three switches determine the identity of the drive on the SCSI bus.

Switch			Identity
3	**2**	**1**	
OFF	OFF	OFF	0
OFF	OFF	ON	1
OFF	ON	OFF	2
OFF	ON	ON	3
ON	OFF	OFF	4
ON	OFF	ON	5
ON	ON	OFF	6
ON	ON	ON	7

In Apricot systems it is recommended that tape drives use SCSI identity 2.

Switch 4

This switch is used to select whether the drive uses a SCSI-1 or SCSI-2 interface. When the switch is off SCSI-1 is selected, when the switch is on SCSI-2 is selected.

Switch 5

This switch is used to select whether the drive enables parity and parity checking on the SCSI bus. When the switch is off parity is disabled. When the switch is on (default) parity is enabled.

Switch 6

This switch is used to enable DC pass-through mode. When the switch is off DC pass-through mode is disabled. When the switch is on (default) it is enabled.

When DC pass-through mode is disabled data written to cartridges is compressed, unless the drive finds uncompressed

data already present on the cartridge.

When DC pass-through mode is enabled data written to the cartridges is uncompressed.

Note
The function of this switch can be overridden by SCSI command.

Switch 8

Switch 8 controls whether the drive runs its self test sequence on power up. When switch 8 is off the drive does not run the self test sequence. When switch 8 is on the drive does run the self test sequence.

SCSI termination

Termination resistors

The rear of the drive provides two sockets for SIP termination assemblies. The location of the sockets is indicated on the illustration of the rear panel of the drive in *Rear panel switches*.

If you are installing termination assemblies make sure that you align pin 1 of the assemblies with pin 1 of the sockets.

Termination power jumper

A two pin jumper on the rear of the drive determines whether the drive supplies termination power to the SCSI bus. The location of the jumper is indicated on the illustration of the rear panel of the drive in *Rear panel switches*.

When a jumper is positioned across both jumper pins termination power is enabled.

Specifications

Performance specifications apply when using data compression. Power specifications are measured at the tape drive power connector and are nominal values. The compression ratio and transfer rate achievable in any particular case depends on the characteristics of the data being compressed.

Nominal capacities	60-metre cartridge (DDS)	1.3 Gbyte (1:1 base) 2.6 Gbyte (2:1 typical) 5.2 Gbyte (4:1 max[1])
	90-metre cartridge (DDS)	2.0 Gbyte (1:1 base) 4.0 Gbyte (2:1 typical) 8.0 Gbyte (4:1 max[1])
	120-metre cartridge (DDS-2)	4.0 Gbyte (1:1 base) 8.0 Gbyte (2:1 typical) 16.0 Gbyte (4:1 max[1])
Transfer rate	DDS	366 Kbyte/s (1:1 base) 732 Kbyte/s (2:1 typical) 1464 Kbyte/s (4:1 max[1])
	DDS-2	400 Kbyte/s (1:1 base) 800 Kbyte/s (2:1 typical) 1608 Kbyte/s (4:1 max[1])

[1] Nominal capacity only; can be exceeded for highly-compressible data.

Unrecoverable errors	Less than 1 in 10^{15} data bits
Recording format	ANSI/ECMA (DDS-DC, DDS-2)
Power specification	Voltage +12Vdc ±10% +5Vdc ±7%
	Ripple +12Vdc: <= 100 mVp-p +5Vdc: <= 50 mVp-p
	Current (operational) 0.4A @ +12 Vdc, 0.8A @ +5 Vdc
	Current (peak) 0.9A @ +12 Vdc, 1A @ +5 Vdc

		Operational	Non-operational
Environmental specification	Temperature	+41 to 113°F[1] (+5 to +45°C)	-40 to +148°F[1] (40 to 65°C)
	Thermal gradient	2°C/minute (no condensation)	Below ondensation
	Relative Humidity	20 to 80% noncondensing[1]	0 to 90% noncondensing[2]
	Max Wet Bulb Temperature	78.8°F (26°C)	No condensation
	Altitude (metres)	-100 to +4,575	-300 to +15,200
	Shock (1/2 sine wave)	8 g's peak 11msec	50 g's peak 11msec

[1]Mechanism and media   [2]Mechanism

Vibration

Sweep Test	120mm peak-to-peak (5-17 Hz) 0.73 g peak (17 to 150 Hz) 0.50 g peak (150-500 Hz)
Sweep Rate	8 decades per hour
Dwell Test (15 min)	0.90 mm peak-to-peak (5-17 Hz) 0.55 g peak (17-150 Hz) 0.25 g peak (150-500 Hz)
Acoustic level idling (A-wt sum)	45 dBA maximum
Acoustic level operational (A-wt sum)	50 dBA maximum (measured in suitable enclosure at 3-ft distance and operator height)

Regulatory Compliance   The Autoloading DDS-2 drive complies with the following regulations:

Agency	Regulation
CSA	C22.2, No. 950-M89
TUV-RHEINLAND	EN 60 950
UL	1950
FCC	Class A and Class B[1]
VDE	0871, Class B

[1]Required compilance for external model; verification on file for internal models

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