

Subchapter 4.8—Tape Drives, Libraries, and DVD-ROM

DDS DAT Tape Drives and DDS Autoloaders

Description

HP offers the latest DDS-2, DDS-3, and the latest DDS-4 tape drives. The new DDS-4 tape cassette with 150-meter tapes has a native mode capacity of 20 GB, and transfer rate of 3 MB/sec (native). With data compression, customers can typically store 40 GB on a single tape.

Table 4.8.1 lists the specifications for DDS-2, DDS-3, and DDS-4 drives.

Table 4.8.1 Data Compression DDS DAT Drive Specifications

	DDS-4	DDS-3	DDS-2
Capacity	20 GB without data compression 40 GB with data compression *	12 GB without data compression 24 GB with data compression*	4 GB without data compression 8 GB with data compression*
Transfer rate (sustained)	3.0 MB/sec (maximum) without data compression	1.0 MB/sec (maximum) without data compression	510 KB/sec (maximum) without data compression
Search speed	An average of 50 seconds file access time to any part of a 125-meter tape.	An average of 40 seconds file access time to any part of a 120-meter tape	An average of 40 seconds file access time to any part of a 120-meter tape
Reliability (MTBF)	400,000 power-on hours @ 12% duty cycle	200,000 power-on hours @ 12 % duty cycle	200,000 power-on hours @ 12 % duty cycle
Power requirements	+5V DC: 0.85A max. +12V DC: 1.2A max.	+5 Vdc: 0.95 amps max +12 Vdc: 0.06 amps typ. (0.51 amp max.)	+5 V dc: 0.75 amps typical 1.0 amps max. +12 Vdc: 0.04 amps typ. (0.1 amps max.)
Power consumption	7.3W typical	5.7 watts typical	4.5 watts typical

Features

DDS-4 (Supported on N- and A-Class running 7.0 express 1)

- Industry-standard DDS-4 recording method
- SCSI-3 LVDS (Low voltage differential SCSI) interface—Ultra2 wide compatible
- Automatic head cleaner
- Automatic capstan cleaner
- Sapphire blade tape cleaner
- Read and write compatible with previous DDS-2 and DDS-3 formats.
- Read only compatible with DDS-1 format (90-meter tapes only)
- Hardware data compression using DCLZ method.
- Fast search

DDS-2 and DDS-3

- SCSI-2, single-ended interface
- Industry-standard DDS-2 and DDS-3 recording formats
- Read and write compatible with previous DDS-1 standard
- Hardware data compression using DCLZ method
- Fastsearch

The DCLZ data compression algorithm provides a typical data compression ratio of approximately 2:1. The algorithm can achieve a compression factor of two for files such as object code, which do not have much repetition, and a compression factor of four for text or databases.

See the **Table 4.8.2** for media and compatibility among the DDS-2, DDS-3, and DDS-4 drives.

Table 4.8.2 Media Compatibility with HP DAT Products

	DDS-1 90-meter (4 GB)	DDS-2 120-meter (8 GB)	DDS-3 125-meter (24 GB)	DDS-4 150 meter (40 GB)
DDS-2 tape drives	Read/Write	Read/Write (recommended)		
DDS-3 tape drives	Read/Write	Read Write	Read/Write (recommended)	
DDS-3 Autoloaders	Read/Write	Read/Write	Read/Write (recommended)	
DDS-4 tape drives	Read Only	Read/Write	Read/Write	Read/Write (recommended)
DDS-4 Autoloaders	Read Only	Read/Write	Read/Write	Read/Write (recommended)

Note 1: The Autoloader magazine (C1571A) can be used in the DDS-3 or DDS-4 autoloader. Pre-loaded Autoloader magazines (5 data tapes+ cleaning cassette) can be purchased with either DDS-3 media (C1570A) or DDS-4 media (C7436A).

Note 2: The DDS-1 60-meter (2.4 GB) tapes are not supported in the DDS-4 drives. They can be used in the DDS-2 and DDS-3 drives for compatibility with other systems. For optimum performance use the tape shown as 'recommended' in the table 4.9.1.35. Media without the DDS logo is not supported.

Configuration

HP offers DAT/DDS drives as add-on storage for installation inside the server , as standalone or rack ready units. The DDS-4 drive and the DDS-4 Autoloader have a LVDS (low voltage differential SCSI) interface and cannot be used with the high voltage fast/wide SCSI interfaces. The new LVDS interfaces are only available on the A- and N-Class servers.

Table 4.8.3 Part Numbers, Format, and Configuration

Part Number	Format	Configuration
A3183A	DDS-2	Internal to SPU cabinet
A3324A	DDS-2	Standalone
C3556U	DDS-2	Expansion module
A3311A	DDS-3	Expansion module with DDS-3 tape drive option
A3312A	DDS-3	Field rack expansion module with DDS-3 tape drive option
A3312AZ	DDS-3	Factory rack enclosure with DDS-3 tape drive option
A3330A	DDS-2	Rackmountable
C6366A	DDS-2	Desktop Standalone autoloader DAT
A3542A	DDS-3	DDS-3 internal to SPU cabinet
C6364A	DDS-3	Desktop Standalone DAT (Rack-ready C6365A)
C6367A	DDS-3	Autoloader (Field-rack—requires C4318B)
C4318SZ	DDS-2	Autoloader (Factory-rack)
Opt 102	DDS-2	Factory-rack DAT Drive
Opt 103	DDS-3	Factory-rack DAT Drive
Opt 104	DDS-3	Factory-rack DAT Autoloader
C6368A	DDS-4	Desktop standalone DAT
C6369A	DDS-4	Rack ready single drive DAT
C6370A	DDS-4	DAT Autoloader desktop standalone
C6371A	DDS-4	DAT Autoloader rack ready
C4318SZ opt 110	DDS-4	Single drive pre-installed in rack DAT
C4318SZ opt 111	DDS-4	DAT Autoloader pre-installed in rack

DDS-3 Autoloader—C6366A

HP offers a six-cartridge DDS-3 autoloader (A3716A). This is a standalone device that has a single DDS-3 drive and can hold up to six DDS-3 cartridges. Typical capacity is 144 GB assuming a 2:1 compression ratio. The autoloader is supported only when used on a dedicated single ended SCSI bus and managed by a backup/restore software package such as HP OmniBack II. Multiple autoloaders on a single bus is supported provided only autoloaders are on the bus and all devices on the bus are managed by the same backup software application.

DDS-4 Autoloader—C6370A (desktop), C6371A (rack-ready), and C4318SZ option 111 (factory-integrated)

HP offers a six tape DDS-4 autoloader as a standalone device or rack-ready unit. The autoloader has a single DDS-4 tape drive and can hold up to 6 DDS-4 tapes. Typical capacity is 240 GB assuming a 2:1 compression ratio. The DDS-4 autoloader has an Ultra2 wide compatible SCSI interface. The HP Autoloader must be used with a suitable backup package such as HP OmniBack II. Although the unit can be used with DDS-1 (90-meter), DDS-2 and DDS-3 tapes it is recommended that only DDS-4 tapes are used for regular backups. The mixing of different types of tape is not recommended. Up to two autoloaders can be used on the same bus.

DDS Media Information

- C5709A—Cleaning Cassette for DDS Tape Drives
- C5705A—5-pack of DDS Tape, 60-meter, 1.3 GB
- C5706A—5-pack of DDS-1 Tape, 90-meter, 4 GB
- C5707A—5-pack of DDS-2 Tape, 120-meter, 8 GB
- C5708A—5-pack of DDS-3 Tape, 125-meter, 12 GB
- C5718A—5-pack of DDS-4 Tape, 150-meter, 20 GB
- C1571A—Autoloader Magazine (empty)
- C1572A—Autoloader Magazine complete with five DDS-2 tapes and one cleaning tape
- C1570A—Autoloader Magazine complete with five DDS-3 tapes and one cleaning tape
- C7436A—Autoloader Magazine complete with five DDS-4 tapes and one cleaning tape

DLT Tape Autoloaders and Libraries

General

HP references these products from StorageTek and HP Greeley. All StorageTek hardware and library specific software support would be obtained through qualified StorageTek engineers.

Restrictions

These tape drives cannot be used as boot devices, and no HP application software is available on this media.

Description

With MPE/iX 5.5 PowerPatch 7, the HP e3000 provides connectivity to StorageTek's 9710, 9714, and 9730 devices. MPE/iX support of StorageTek's DLT tape drives requires patches MPEKXA7 and MPEKX37 (?) or MPE/iX 5.5 PowerPatch 7. MPE/iX 5.5 PowerPatch 7 contains MPEKXA7 and MPEKX37. MPEKX37 is the new FW SCSI tape drive, which is needed for support of the FW DLT-7000.

StorageTek's 9710/9714/9730 drives are supported on all HP e3000 Series 9x8s (E-Class), 9x9 (K-Class), and 99x (T500 through T600) using NIO buses. StorageTek's 9710/9714/9730 drives should be configured to use only one tape drive per fast/wide SCSI channel.

Software Support

Hewlett-Packard will also support the FW SCSI connection to StorageTek DLT-7000 and DLT-8000 Library systems. StorageTek will provide support for the StorageTek libraries and related components, including firmware software.

Supported Servers

- 9x8, E-Class (NIO)
- 9x9, K-Class (NIO)
- 99x, T-Class (NIO)
- A-/N-Class (PCI-SCSI)

Requirements

Hardware Configuration Requirements

Supported Servers and Bus Architectures for StorageTek's 9710, 9714, and 9730 Tape Drives:

- Supported on all 9x8 (E-Class), 9x9KS (K-Class), and 99x (T500/600) servers
- Supported on NIO (HP-PB) bus architecture
- Drives must be on a dedicated fast wide SCSI bus (28696A)
- Maximum of two tapes drives per SCSI channel is supported. HP recommends single drive per SCSI bus for performance.
- For A-/N-Class servers, a dedicated SCSI bus is required (A4800A, A5149A, A5150A, A5159A, A6828A, A6829A).

Connections

For the StorageTek 9710, 9714 and 9730—A dedicated 28696A Fast/Wide SCSI card is required. Although these devices have a theoretical maximum speed of over 7 MB/s, actual performance can/will vary greatly so care must be taken to promise only connectivity. For best results, one StorageTek 9710, 9714 or 9730 should have not only a dedicated SCSI bus, but also a dedicated HP-PB backplane. For the control path—The HP e3000 Enterprise Server communicates through the fast wide SCSI pass-thru driver.

Digital Linear Tape (DLT-8000)

Description

HP offers a rich spectrum of DLT tape libraries to provide storage solutions for up to 20 TB. Every library offers full automation benefits including tape handling, bar code reading of tape cartridges (not on A5501A), high performance data transfer, and high capacity data storage in each cartridge. DLT is a robust tape technology specifically developed for large computer data storage.

HP e3000 supports the software driver for DLT-8000 standalone tape drive, as well as the HP Tape Libraries. The DLT-8000 is offered in all our current library offerings. DLT-8000 offers 40-GB native capacity per cartridge and native throughput of 6.0 MB/sec. Both throughput and capacity can be doubled with a 2:1 compression ratio. Actual achievable compression ratio (and throughput) are dependent on the files being stored and will vary between applications.

Answers to some frequently asked questions about DLT:

- DLT-7000 drive can read a DLT tape media written by DLT-4000.
- DLT-8000 drive can read and write to both DLT-4000 and DLT-7000 formats.
- The DLT tape media does NOT need to be formatted before use. The drive will label what device was used to write to it.
- The DLT-7000 drive can overwrite a tape written on by a DLT-4000 drive by using an overwrite command or by using a bulk eraser before writing to it.
- The DLT-8000 drive can overwrite a tape written on by a DLT-4000 and a DLT-7000 drive by using an overwrite command or by using a bulk eraser before writing to it.
- The DLT-7000 and DLT-8000 drives cannot append write to a tape written on by a DLT-4000 drive.
- The DLT-7000 drive can write in DLT-4000 format.
- The DLT-8000 drive can write in DLT-4000 and DLT-7000 format.
- The DLT-7000 and DLT-8000 drives cannot be mixed within the 1- to 10-drive, 252- to 588-slot library (A4845A) or the 1- to 20-drive, 228- to 690-slot library (A5597A).

Table 4.8.4 Comparison of Backup Technologies Supported on the HP e3000 Enterprise Servers

	Native Capacity	Transfer Rate (MB/sec)	Average Access Time (sec)	GB/hour Backup	GB/hour with 2:1 Data Compression	Cost per MB	Data Bit Error Rate
DLT-4000 (no longer available)	20 GB	1.5 MB/s	68	5.4	10.8	\$.006	10 ⁻¹⁷
DLT-7000 (no longer available)	35 GB	5.0 MB/s	68	18	36	\$.0035	10 ⁻¹⁷
DLT-8000	40 GB	6.0 MB/s	68	21.6	43.2	\$.0025	10 ⁻¹⁷
DDS 2: 4 mm	4 GB	0.51 Mb/s	40*/20	1.32	2.64	\$.014	10 ⁻¹⁴
DDS 3: 4 mm	12 GB	1.0 Mb/S	40*/20	3.60	7.2	\$.014	10 ⁻¹⁴

Note: Unless otherwise stated, all numbers are without data compression.

HP Surestore Tape Autoloaders

- C7145RA/C7745RA (HVDS)—One-drive, nine-cartridge autoloader (1/9)

HP Surestore Mid-Range Tape Libraries

- A5583A/A5583AZ/A5584A (HVDS)—One or two-drive, 20-cartridge library (2/20)
- A5585A/A5585AZ/A5586A (HVDS)—Two or four-drive, 40-cartridge library (4/40)
- A5587A/A5587AZ/A5588A (HVDS) —Two, four, or six drives, 60 cartridge library (6/60)
- A4669A (HVDS)—Four- or six-drive, 100-cartridge library (4/100 or 6/140)
- Six-drive, 120- or 140-cartridge library available with capacity upgrade kits (6/140)

HP Surestore High-End Libraries

- A5617A—One to ten-drive, 84*, 140* or 174* cartridge library ** (10/180)
- A5597A—One to twenty drive, 228*, 396* or 690* cartridge library (20/700)

* Depending on number of tape drives and options.

Boot from DLT Tape Drive

Only the SE DLT-4000 tape drive can be used as a boot device on the HP e3000. A bootable DLT recovery tape can be created using the same process required to create DDS system recovery tapes.

Server class	Bus type in server	Supported configuration	Operating System	DLT Boot support
9x9	NIO	Single-ended SCSI	MPE/iX 5.5 PowerPatch 7 or later	Yes for DLT-4000 (SE only)
9x8	NIO	Single-ended SCSI	MPE/iX 5.5 PowerPatch 7 or later	Yes for DLT-4000 (SE only)
99x	NIO	Single-ended SCSI	MPE/iX 5.5 PowerPatch 7 or later	Yes for DLT-4000 (SE only)

Due to system firmware limitations boot from FWD, HVD, or LVD, DLT devices are not supported with the above servers. A-/N-Class servers do support usage of HVD and LVD DLT as a boot device.

DLT Tape Autoloader

Description

The Tape Autoloader 1/9 has one DLT-8000 drive and nine cartridge slots. The autoloader is available either rack-ready or standalone, with or without remote management, LVD or HVD SCSI. When the product is purchased rack-ready, the customer must order a rack kit (C7740R) and can fit two side-by-side in a standard 19-inch rack. A non-remote management version can be upgraded at any time by ordering a RMC upgrade kit (C7749A). Product can also be upgraded to Super Drives (LTO and S-DLT) when drives become available. All versions come standard with barcode reader. The 1/9 Autoloader (C71xxRA/NB, C77xxRA/NB) will be shipped with:

- One DLT tape IV cartridge
- One DLT cleaning cartridge
- Bar code labels
- User/Service Manual
- Power cord
- Install poster
- SCSI terminator
- SCSI jumper cable

- 2-meter SCSI cable
- Infotab Kit
- Media Mouse Mat

Note: DLT cleaning cartridge provides head-cleaning capability of up to 20 times per cartridge.

A single data SCSI cable should be used for both the data channel and the robotics picker mechanism in standard configurations. Advanced configurations may require a separate SCSI bus for data and robotics.

Product Structure

The following tables show the product numbers for the different configurations for the Autoloader.

Table 4.8.5 DLT Autoloader Structure for 9-Slot Autoloader

Product Number	Description
C7145RA	HP DLT-8000 Autoloader 1/9, HVDS, deskside, no remote mgmt card
C7745RA	HP DLT-8000 Autoloader 1/9, HVDS, rackmount, no remote mgmt card
Kits	
C7148A	Skins kit which includes all cosmetic parts (front bezel, chin, enclosure and feet)
C7738RA	HVDS connectivity kit which includes HVD HBA, 5 pieces of media, cleaning cartridge, ESD Wrist Strap
C7740R	Rackmount kit*
DLT Media and Cleaning Cartridges	
C5141F	DLT Tape IV cartridge (40-GB cartridge)
C5141A	DLT Tape III XT Cartridge (15-GB cartridge)
C5142A	DLT Cleaning Cartridge
C7741R	9-slot empty DLT magazine
C7742R	9-slot DLT magazine with six pieces of media

* Racking configurations: Two 1/9 Autoloaders per rack; the autoloaders can be mounted side-by-side.

Features

Refer to product brief.

Capacity

The following table reviews the maximum capacities for the Autoloader.

Table 4.8.6 DLT Capacity for the 1/9 Autoloader

Product Number	Description	Native Capacity	Compressed Capacity
C7145RA and C7745RA	HP DLT-8000 Autoloader	360 GB	720 GB

SCSI Interface

The DLT Tape Autoloaders come with a 68-pin SCSI interface cable and jumper cable, as well as a 68-pin HVD SCSI terminator.

Cables and Terminators

The following SCSI cables for data channel are available for a customer to choose from:

Table 4.8.7 SCSI Cables for Data Channel

Product Number	Description
A4852A #BZ6	0.5 meter 68-pin cable
A4852A #BZ7	2.5-meter 68-pin cable
A4852A #BZ8	5.0-meter 68-pin cable
A4852A #BZ9	10.0-meter 68-pin cable
A4852A #BZA	20.0-meter 68-pin cable

The following SCSI cables for robotic picker mechanism are available for a customer to choose from:

Table 4.8.8 SCSI Cables for Robotic Picker Mechanism

A4854A #BZ7	2.5-meter 68-pin cable
A4854A #BZ8	5.0-meter 68-pin cable
A4854A #BZ9	10.0-meter 68-pin cable
A4854A #BZA	20.0-meter 68-pin cable
A4854A #BZE	1.0-meter, 50-pin to 68-pin conversion (for single-ended SCSI only)
A4854A #BZF	1.5-meter, 50-pin to 68-pin conversion (for single-ended SCSI only)
A4854A #BZG	2.0-meter, 50-pin to 68-pin conversion (for single-ended SCSI only)
A4854A #BZH	5.0-meter, 50-pin to 68-pin conversion (for single-ended SCSI only)

If a replacement SCSI terminator is needed, it must be ordered separately, product number C2905A.

Autoloader Specifications

The following table reviews the specifications for the HP DLT Autoloader. .

Table 4.8.9 DLT Autoloader Specification

Product Number	Description	Dimensions	Current Consumption		Number of AC Plugs
			100-127 VAC	200-240 VAC	
C7145RA	HP SureStore DLT-8000 Autoloader 1/9 Deskside	H 9 in. (177 mm) W 9.5 in. (221 mm) D 27 in. (559 mm)	2.2 A	1.5 A	1
C7745RA	HP SureStore DLT-8000 Autoloader 1/9 Rackmount	H 8.5 in. (177 mm) W 8.7 in. (221 mm) D 27 in. (559 mm)	2.2 A	1.5 A	1

Supported Servers

The DLT Libraries will be supported on all the currently shipping HP e3000 Commercial Servers:

- 9x8, E-Class
- 9x9, K-Class
- 99x, T-Class
- A-Class
- N-Class
- Supported Operating System

These Surestore Autoloaders are supported on 6.0 Express 1+ patches and future release.

Note: The 1/8 and 1/9 Autoloaders support stacker mode without any additional software

Surestore Mid-range Libraries and Accessories

Products

The DLT-8000 version of these libraries have a 68-pin fast/wide/HVDS differential SCSI interface and are supported on all current HP e3000 Enterprise Servers. These libraries are available in either 20-slot (two-drive, 20-cartridge), 40-slot (four-drive, 40 -cartridge), or 60-slot (six-drive, 60-cartridge) configurations. All configurations can be either standalone or rackmounted. A minimum required number of drives must be ordered with the library. Only even numbers of drives can be ordered (2, 4, 6) up to the maximum number of drives supported on a specific library—with one exception (The 20-slot library [A5583A/A5584A] can be configured and shipped with either one or two drives). Odd numbers of drives, (1, 3, 5) are supported configurations, but cannot be shipped from the factory with odd numbers of drives installed (except for the 20-slot version).

All libraries will be shipped with the following:

- One DLT tape IV cartridge
- One DLT cleaning cartridge
- 80 bar code labels
- User's Guide
- Power cord (For connection to facility power for both standalone and racked versions. Cable to PDU within a rack is NOT included in rackmount versions of these tape libraries)
- Install poster
- SCSI terminator (one per each DLT drive)
- SCSI jumper cable (between drive and library controller)

A dedicated HVDS SCSI F/W host bus adapter installed in the server is required for this product for each DLT-8000 drive. Users may find that other SCSI devices connected to the dedicated SCSI bus actually work, but such configurations are NOT supported by HP. A single data SCSI cable can be used for both the data channel and the library controller in standard configurations. Advanced configurations may require a separate SCSI bus for data and library controller.

Note: DLT cleaning cartridge provides head-cleaning capability of up to 20 times per cartridge.

The following tables show the product numbers for the different configurations of the Mid-Range libraries.

Table 4.8.10 HP Surestore Tape Library Product Structure for 20-, 40-, and 60-Slot Libraries

Product Number	Description
A5583A	HP Surestore Tape Library 2/20 (Rack Mount Version)
A5584A	HP Surestore Tape Library 2/20 (Standalone Version)
A5585A	HP Surestore Tape Library 4/40 (Rack Mount Version)
A5586A	HP Surestore Tape Library 4/40 (Standalone Version)
A5587A	HP Surestore Tape Library 6/60 (Rack Mount Version)
A5588A	HP Surestore Tape Library 6/60 (Standalone Version)
Drives and Upgrade Kits	
A5589A	DLT-8000 Drive
A5590A	Surestore Fiber Channel Interface
C7204J	Standalone Enclosure Kit for 20 Slot Library
C7216J	Standalone Enclosure Kit for 40 Slot Library
C7232J	Standalone Enclosure Kit for 60 Slot Library
DLT Media, Cleaning Cartridges, and Magazines	
C5141F	DLT Tape IV cartridge
C5142A	DLT Cleaning Cartridge
C7235J	Removable Magazine, 5 slots, No media
C7236J	Removable Magazine, 5 slots, With 5 DLT Tape IV cartridges
Enclosures, Rack Mount Kits, and Shipping Package	
C7205J	Rack Mount Kit for 2/20
C7204J	Desktop Enclosure Kit for 2/20
C7206J	Return Shipping Package Kit for 2/20
C7217J	Rack Mount Kit for 4/40
C7216J	Deskside Enclosure Kit for 4/40
C7218J	Return Shipping Package Kit for 4/40
C7233J	Rack Mount Kit for 6/60
C7232J	Mini Rack Standalone Enclosure for 6/60
C7234J	Return Shipping Package Kit for 6/60

The following table reviews the maximum capacities for the Mid-range libraries.

Table 4.8.11 DLT Capacity for 20-, 40-, and 60-Slot Libraries

Product Number	Description	Native Capacity	Compressed Capacity*
A5583A/A5584A	Surestore Tape Library 20	800 GB	1.6TB
A5585A/A5586A	Surestore Tape Library 40	1.6 TB	3.2 TB
A5587A/A5588A	Surestore Tape Library 60	2.4 TB	4.8 TB

* Assumes 2:1 data compression

Cables and Terminators

The following SCSI cables for data channel are available for a customer to choose from:

Table 4.8.12 SCSI Cables for Data Channel

Product Number	Description
A4852A #BZ6	0.5 meter 68-pin cable
A4852A #BZ7	2.5-meter 68-pin cable
A4852A #BZ8	5.0-meter 68-pin cable
A4852A #BZ9	10.0-meter 68-pin cable
A4852A #BZA	20.0-meter 68-pin cable

Table 4.8.13 SCSI Cables for Data Channel (N-Class Only)

Product Number	Description
A4852A #806	CA-1-meter 68-pin HD LP to 68-pin HD LP
A4852A #807	CA-2.5-meter 68-pin HD LP to 68-pin HD LP
A4852A #808	CA-5-meter 68-pin HD LP to 68-pin HD LP
A4852A #809	CA-10-meter 68-pin HD LP to 68-pin HD LP
A4852A #811	1.0-meter VHDCI to 68-pin HD Cable
A4852A #812	2.5-meter VHDCI to 68-pin HD Cable
A4852A #813	5.0-meter VHDCI to 68-pin HD Cable
A4852A #814	10.0-meter VHDCI to 68-pin HD Cable

The following SCSI cables for robotic picker mechanism (library controller) are available for a customer to choose from:

Table 4.8.14 SCSI Cables for Robotic Picker Mechanism (Library Controller)

A4854A #BZ7	2.5-meter 68-pin cable
A4854A #BZ8	5.0-meter 68-pin cable
A4854A #BZ9	10.0-meter 68-pin cable
A4854A #BZA	20.0-meter 68-pin cable
A4854A #BZE	1.0-meter, 50-pin to 68-pin conversion (for single-ended SCSI only)
A4854A #BZF	1.5-meter, 50-pin to 68-pin conversion (for single-ended SCSI only)
A4854A #BZG	2.0-meter, 50-pin to 68-pin conversion (for single-ended SCSI only)
A4854A #BZH	5.0-meter, 50-pin to 68-pin conversion (for single-ended SCSI only)

Library Specifications

The following table reviews the specifications for the HP Surestore Mid-Range Tape Libraries. All HP Surestore Libraries come with one HP DLTtape IV data cartridge, one HP DLT cleaning cartridge, and up to 75 bar code labels (depending on library capacity), and an English user manual.

Table 4.8.15 HP SureStore Mid-range Libraries Specifications

Product Number (Rackmount)	A5583A	A5585A	A5587A
Product Number (Standalone)	A5584A	A5586A	A5588A
Product Name	HP Surestore Tape Library 2/20	HP Surestore Tape Library 4/40	HP Surestore Tape Library 6/60
Drive Type	DLT-8000	DLT-8000	DLT-8000
Number of Drives	1 or 2	2 or 4	2, 4, or 6
Number of Slots	20	40	60
Maximum Storage Capacity (Native)	800 GB	1.6 TB	2.4 TB
Maximum Data Transfer Rate (Native)	6 or 12 MB/s	12 or 24 MB/s	12, 24, or 36 MB/s
Average Tape Access Time	15s	15s	15s
Average Tape Exchange Time	46s	46s	46s
Reliability	1 million MSBF	1 million MSBF	1 million MSBF
Standard Warranty	2-year next-day on-site	2-year next-day on-site	2-year next-day on-site
Drive Characteristics			
Maximum Sustained Transfer Rate	6 MB/s native, 10MB/s compressed		
Burst Transfer Rate	20 MB/s	20 MB/s	20 MB/s
Average Access Time	60s	60s	60s
Tape Load Time	37s	37s	37s
Tape Unload Time	17s	17s	17s
Repositioning Time	1.3s	1.3s	1.3s
Hard Error Rate	1 × 10 ¹⁷ bytes read	1 × 10 ¹⁷ bytes read	1 × 10 ¹⁷ bytes read
Undetected Error Rate	1 × 10 ²⁷ bytes read	1 × 10 ²⁷ bytes read	1 × 10 ²⁷ bytes read
Reliability	200,000 hours MTBF	200,000 hours MTBF	200,000 hours MTBF
Supported Media	HP DLTtape IV, DLTtape IIIXT	HP DLTtape IV, DLTtape IIIXT	HP DLTtape IV, DLTtape IIIXT
Physical Characteristics			
Height	216 mm (8.5 in) 5U	489 mm (19.25 in) 11U	711 mm (28 in) 16U
Width	442 mm (17.4 in)	442 mm (17.4 in)	442 mm (17.4 in)
Depth	696 mm (27.4 in)	696 mm (27.4 in)	696 mm (27.4 in)
Net Weight	30.4 kg (67 lbs)	72.6 kg (160 lbs)	101.6 kg (224 lbs)
Shipping Weight	39.5 kg (87 lbs)	81.7 kg (180 lbs)	110.7 kg (244 lbs)
Interface	Fibre Channel, HVDS	Fibre Channel, HVDS	Fibre Channel, HVDS

Table 4.8.15 HP Surestore Mid-range Tape Libraries Specifications (continued)

Product Number (Rackmount)	A5583A	A5585A	A5587A
Product Number (Standalone)	A5584A	A5586A	A5588A
Product Name	HP Surestore Tape Library 2/20	HP Surestore Tape Library 4/40	HP Surestore Tape Library 6/60
Environmental Characteristics			
Media	<ul style="list-style-type: none"> • 25°C max • -30 to 60°C (< 14 consecutive days) • 10°C per hour 	<ul style="list-style-type: none"> • Operating 10 to 25°C max; non-operating 40°C max • -30 to 60°C (< 14 consecutive days) • 10°C per hour 	
Temperature	<ul style="list-style-type: none"> • 10 to 40°C • -40 to 66°C 	<ul style="list-style-type: none"> • 10 to 35°C • -40 to 60°C 	
Humidity	Operating: 20% to 80% relative humidity Non-operating: 10% to 95% relative humidity		
Shock	Non-operating: 30 g/206 in/s	Non-operating: 30 g/206 in/s	Non-operating: 30 g/206 in/s
Vibration	Operating: 0.21 g rms (random) Non-operating: 2.1 g rms (random) Non-operating: 0.5 g (0 to peak, swept-sine wave)		
Power Requirements	Line voltage: 100-127 VAC, 200-240 VAC Line frequency: 50-60 Hz		
Power Consumption	Typical: 175W; Maximum: 200W	Typical: 340W; Maximum: 375W	Typical: 500W; Maximum: 560W
Family Certification Numbers	N2724N1Z	N2724N2Z	N2724N3Z
Product Certification	FCC Class A; CISPR 22, A: UL 1950; cUL; CSA 950; TÜV IEC 60 950/IEC 60 825-1 (laser Class 1); C-Tick, VCCI		
Drive and Interface Information			
Drive Upgrade	A5589A (1 min, 2 max)	A5589A (2 min, 4 max)	A5589A (2 min, 6 max)
Fibre Channel Upgrade	A5590A (1 max)	A5590A (2 max)	A5590A (3 max)

Supported Servers

The Surestore Mid-range Tape Libraries are supported on all currently shipping HP e3000 Commercial Servers:

- 9x8, E-Class (NIO)
- 9x9, K-Class (NIO)
- 99x, T-Class (NIO)
- A-Class (PCI)
- N-Class (PCI)

Supported Operating System

These Surestore Autoloaders are supported on 6.0 Express 1(+ patches) and beyond.

Supported Host Bus Adapters

SCSI:

- Wide-Differential SCSI cards (A28696A) for 9x8, 9x9, and 99x servers
- Wide-Differential SCSI cards (A5159A and A4800A) for the A- and N- Class servers

If a replacement SCSI terminator is needed, it must be ordered separately, product number C2905A.

Surestore High-end Tape Libraries and Accessories

Description

The A5617A and A5597A library has a 68-pin FW Differential SCSI interface (20 MB/sec burst) and supports DLT drive technology.

The High-end Libraries will be shipped with:

- one DLT diagnostic tape IV cartridge (it can be used for data storage)
- one DLT cleaning cartridge
- bar code labels
- User's Guide
- SCSI terminator(s)
- power cord

DLT cleaning cartridge provides head-cleaning capability of up to 20 times per cartridge.

Product Structure

Table 4.8.16 Product Structure for 10/180 Library—84-, 140-, and 174-Slot (A5617A)

Product Number	Description
A5617A	Library Chassis for 1-10 drive 84 slots (1 power supply)
A5599A	1-DLT-8000 Drive
A6327A	Secondary power supply
Upgrade Kits	
A1376A	Upgrade Kit - Expansion from 84 slots to 140 slots
A1377A	Upgrade Kit - Expansion from 140 slots to 174 slots (A1376A required to use this upgrade kit)
DLT Media and Cleaning Cartridges	
C5141F	DLT Tape IV Cartridge (20 GB for DLT-4000; 35 GB for DLT-7000; 40 GB for DLT-8000 per cartridge)
C5141A	DLT Tape III XT Cartridge (15 GB per cartridge for DLT-4000, DLT-7000, and DLT-8000)
C5142A	DLT Cleaning Cartridge

Table 4.8.17 Product Structure for 20/700 Library—228-, 396-, and 690-Slot (A5597A)

Product Number	Description
A5597A	Library Chassis for 1-20 drive 216 slots (plus 12 user-reserved slots for cleaning and diagnostics)
A5599A	1-DLT-8000 Drive
Upgrade Kits	
A5604A	Expansion from 216-slot to 384-slot Upgrade Kit
A5605A	Expansion from 384-slot to 678-slot Upgrade Kit
A5600A	Second Drive Tower to convert from 10 drive capacity to 20 drive capacity
A5601A	Second Cartridge Access Port to convert 20 cartridge import / export to 40 import / export
DLT Media and Cleaning Cartridges	
C5141F	DLT Tape IV Cartridge (40 GB for DLT-8000)
C5141A	DLT Tape III XT Cartridge (15 GB per cartridge for both DLT-4000 and DLT-7000)
C5142A	DLT Cleaning Cartridge

Note: The cartridge capacity of the tape library 20/700 (A5597A) is reduced by 60 cartridges when a second drive tower (A5600A) is added to the configuration.

Capacity

Table 4.8.18 Storage Capacity for the A5617A and A5597A High end Libraries

Product Number	Description	Native Capacity with DLT-4000	Native Capacity with DLT-7000	Native Capacity with DLT-8000	Native Capacity with 9840 Drive
A5597A	228-slot library with maximum cartridge configurations	4,560 GB	7,980 GB	9,120 GB	4,560 GB
A5597A + A5604A	396-slot library with maximum cartridge configurations	7,920 GB	13,860 GB	15,840 GB	7,920 GB
A5597A + A5605A	690-slot library with maximum cartridge configurations	13,800 GB	24,150 GB	27,600 GB	13,800 GB
A5617A	84-slot library	1,680 GB	N/A	3,360 GB	1,680 GB
A5617A + A1376A	140-slot library	2,800 GB	N/A	5,600 GB	2,800 GB
A5617A + A1377A	174-slot library	3,480 GB	N/A	6,960 GB	3,480 GB

Specifications

Table 4.8.19 Library Specifications for the A5617A and A5597A High end Libraries

Product Number	Description	Dimensions	Current Consumption		Number of AC Plugs
			100-120V AC	200-240V AC	
A5597A	228-/396-/690-cartridge library	H - 72 in. W - 61 in D - 30 in.*	Main- 1.75 A	0.88 A	2

* D - 39.6 inches with expansion to 690 cartridges.

Supported Servers

The Surestore Mid-range Tape Libraries are supported on all currently shipping HP e3000 Commercial Servers:

- 9x8, E-Class (NIO)
- 9x9, K-Class (NIO)
- 99x, T-Class (NIO)
- A-Class (PCI)
- N-Class (PCI)

Supported Operating System

These Surestore Autoloaders are supported on 6.0 Express 1(+ patches) and beyond.

Supported Host Bus Adapters

SCSI:

- Wide-Differential SCSI cards (A28696A) for 9x8, 9x9, and 99x servers
- Wide-Differential SCSI cards (A5159A and A4800A) for the A- and N- Class servers

If a replacement SCSI terminator is needed, it must be ordered separately, product number C2905A.

HP Surestore Tape Array 5300

The HP Surestore Tape Array 5300 provides a high availability rack mount solution for HP Surestore DLT80, DAT24 (DDS-3), DAT40 (DDS-4) and DVD-ROM modules. Dual redundant power supplies, which can be hot-swapped, are available. (These are standard on the factory-integrated version.) The HP Surestore Tape Array 5300 occupies three EIA units of rack space. Individual SCSI connections are provided for each of the four half-height bays. DLT80 module occupies two bays. SCSI terminators are not provided and must be ordered separately.

A maximum of four half-height modules (DAT24, DAT40 and DVD-ROM) may be ordered with an HP SureStore Tape Array 5300. A maximum of two DLT80 modules can be ordered. A combination of one DLT80 module and two half-height modules may be ordered.

This unit replaces the Smart Storage range of rack mount tape drives.

- Supported on HP e3000 A-Class and N-Class servers with MPE/iX 7.0 Express 1 or greater. HP recommends a maximum of two drive modules per SCSI host bus adapter.
- Uses standard SCSI-2 68-pin high density SCSI connections
- DDS-3 drive is a SCSI single-ended device and cannot be mixed with LVD devices
- DVD-ROM module is available for software load
- All modules except the DAT24 are Ultra-2 SCSI and can have a maximum cable length of 10m.

Product Number	Option	Description
C7508A		HP Surestore Tape Array 5300 3U enclosure for field integration
C7508AZ		HP Surestore Tape Array 5300 3U enclosure with dual redundant power supply – factory integrate
C7496A		HP Surestore Tape Array 5300 redundancy kit. Not required for factory integrated module
C7498A		HP Surestore DAT24 DDS-3 tape drive module
C7498A	OD1	Factory integration
C7497A		HP Surestore DAT40 DDS-4 tape drive module
C7497A	OD1	Factory integration
C7499A		HP Surestore DVD-ROM module
C7499A	OD1	Factory integration
C7456A		HP Surestore DLT80 tape module
C7456A	OD1	Factory integration
C2364A		68-pin multi-mode SCSI terminator – order 1 per SCSI bus
C2978A		0.5m 68-pin HDTS-68-pin HDTS SCSI cable for interconnecting two drive modules.
SCSI Cable for A/N-Class Systems		
C2361B		1.0-meter 68-pin HDTS – 68-pin VHDCI multi-mode cable
C2362B		2.5-meter 68-pin HDTS - 68-pin VHDCI multi-mode cable
C2363B		10.0-meter, 68-pin HDTS – 68-pin VHDCI cable
C2365B		5.0-meter 68-pin HDTS – 68-pin VHDCI cable

For more information on standalone DDS drives see:

http://www.hp.com/products1/storage/products/tapebackup/dds_dat_drives/index.html

DVD-ROM

HP offers a high capacity, high-performance DVD-ROM that is backward compatible with CD-ROM that HP has been using for software distribution. The new DVD-ROM will become the HP standard media for software distribution. MPE/iX and associated software products that are available on CD-ROM for software installation/Update can be read by DVD-ROM, thus, offering backward compatibility. Initially, the DVD-ROM will be read using CD-ROM device drivers. Using an HP provided codeword, the software ordered is “unlocked” from the CD-ROM and loaded onto the system. At a future date, HP plans to deliver a native DVD-ROM device driver to utilize DVD-ROM’s higher capacity/performance.

MPE/iX updates and associated software products are available on DVD-ROM for software installation. Using an HP provided codeword, the software ordered is “unlocked” from the DVD-ROM and loaded onto the system. The DVD-ROM drive can read CD- disks that HP has used (i.e., backward compatible).

The following DVD-ROM drive is available as a standalone desktop unit:

Product Number	Capacity	Speed
C4314A	4.7 GB *	6X DVD-ROM mode, 32X CD-ROM mode

* Using DVD-ROM device drivers.

The following DVD-ROM drive is available as a field-rackable product.

Product Number	Capacity	Speed
C4315A	4.7 GB *	6X DVD-ROM, 32X CD-ROM

* Using DVD-ROM device drivers.

The following DVD-ROM drive is available as a factory racked product.

Product Number	Capacity	Speed
C4318SZ Option 108	4.7 GB *	6X DVD-ROM, 32X-CD-ROM

* Using DVD-ROM device drivers.

Hardware Configuration

Requirements

- Dedicated HVD SCSI channel for DLT-7000 and DLT-8000 drives.
- Differential SCSI (NIO bus) channel for robotic control

Configuring Tape and Autochanger Devices on MPE/iX

An example of how to configure a DLT Library on a HP e3000 is used to illustrate how to configure tape and autochanger devices on MPE/iX. Note that the following example for configuring a DLT Library on a HP e3000 works for connectivity and illustrates the driver binding, but is not optimized for performance. The example has the entire library on a single differential bus, but for performance no more than two drives should be on the same bus for concurrent operations.

Configuring Standalone DLTs on MPE/iX

At the ISL prompt: Run the stand-alone utility ODE.

```
ISL> ODE
ODE> Run Mapped
```

This will generate physical configuration information, among which, will be the following entry for the Rialto unit located at 32.6.0.

```
I/O Configuration:
Path      Component Name                                Type   HW   SW   Revisions
ID        Mod      Mod      Hdwr   Firm
32.6.0    Quantum DLT-7000 Tape Drive                    ID     Mod  Mod   Hdwr   Firm
                                                1E48
```

- Exit from Mapped and ODE and boot the system. Once the system is up, run SYSGEN
:SYSGEN
*** First Level Command ***
- Next enter the IO configuration section
sysgen>IO
*** IO Configurator Commands ***
- First add the Device Adapter Card:
Io>ap path=36 id=HP28696A
This will add the FWSCSI_DAM to the configuration.
- Next add the Transparent Device Manager:
Io> ap path=36.6 id=pseudo
- Now add the actual device:
Io> ad path=36.6.0 id=DLT7000 ldev=30
Io>hold (Retain the configuration change)
Sysgen>keep (Save changes to the configuration file)
- When the machine is rebooted the device (Ldev 30) will be available for use.

Firmware Downloading using SCSIDLTL

- From a running system, run SYSDIAG.
:SYSDIAG
- Run the SCSIDLTL diagnostic in interactive mode.
DUI>scsidlt sc 4 ldev 36
- After scsidlt has initialized, type download at the prompt.
<SCSIDLT->download
Note: Before download, the door must be closed and no tape is allowed in the device.
- Download will ask for a fully qualified path name for the FW file; i.e., DLTFW.PUB.SYS.

Configuring Libraries on MPE/iX

To configure the DLT Library on an HP e3000 perform the following steps:

1. After booting, run ODE at the ISL prompt:
ISL> ODE
Note that the MPE ISL ODE "RUN MAPPER" utility does not recognize and list fast-wide robotics devices.
2. Run mapper to get device paths:
ODE> RUN MAPPER
STARTING EXECUTION OF MAPPER
Processor Identification:
...
I/O Configuration:
Type HW SW Revisions
Path Component Name ID Mod Mod Hdwr Firm
...
/4/4 HP-PB Fast Wide SCSI . . .
/4/4.0.0 C1194F . . .
/4/4.1.0 DLT7000 . . .
/4/4.2.0 DLT7000 . . .
/4/4.3.0 DLT7000 . . .
/4/4.4.0 DLT7000 . . .
3. Boot the system.
At the MPE prompt, run sysgen and start the io section:
: sysgen
SYSGEN version E . . .
sysgen> io
** IO configurator commands **
4. If not already configured, configure the differential card and the pseudo/target level of the SCSI path:
io> apath 10/4/4 id=HP28696A
io> apath 10/4/4.0 id=pseudo
io> apath 10/4/4.1 id=pseudo
io> apath 10/4/4.2 id=pseudo
io> apath 10/4/4.3 id=pseudo
io> apath 10/4/4.4 id=pseudo
5. Configure the robotic transport/"picker" and DLT tape drives:
io> adev 30 id=HPC1194F path=10/4/4.0.0
io> adev 31 id=DLT7000 path=10/4/4.1.0 mode=autoreply
io> adev 32 id=DLT7000 path=10/4/4.2.0 mode=autoreply
io> adev 33 id=DLT7000 path=10/4/4.3.0 mode=autoreply
io> adev 34 id=DLT7000 path=10/4/4.4.0 mode=autoreply

6. Verify the bindings between the PATH, LDEV number, ID, PMGR (device drivers), and LMGR attributes for each device configured.

- a. Verify the binding for the device adapter (the fw/differential dam):

```
io> lpath 10/4/4.0.0
PATH: 10/4/4 LDEV:
ID: HP28696A TYPE: DA
PMGR: FWSCSI_DAM PMGRPRI: 6
LMGR: MAXIOS: 0
```

Repeat this verification step for lpath 10/4/4.1, 4.2, 4.3, and 4.4.

- b. Verify the binding for the targets (the transparent dm):

```
io> lpath 10/4/4.0
PATH: 10/4/4.0 LDEV:
ID: PSEUDO TYPE: DA
PMGR: TRANSPARENT_MGR PMGRPRI: 6
LMGR: MAXIOS: 0
```

Repeat this verification step for lpath 10/4/4.1, 4.2, 4.3, and 4.4.

- c. Verify the binding for the picker (the pass-through driver):

```
io> lpath 10/4/4.0.0
PATH: 10/4/4.0.0 LDEV: 30
ID: HPC1194F TYPE: MOSAR_AC
PMGR: MO_SCSI_PTHRU_DM PMGRPRI: 10
LMGR: LOGICAL_DEVICE_MANAGER MAXIOS: 0
```

Repeat this verification step for lpath 10/4/4.1, 4.2, 4.3, and 4.4.

- d. Verify the binding for the tape drives (the differential tape dm):

```
io> lpath 10/4/4.1.0
PATH: 10/4/4.1.0 LDEV: 31
ID: DLT7000 TYPE: TAPE
PMGR: SCSI_TAPE2_DM PMGRPRI: 10
LMGR: LOGICAL_DEVICE_MANAGER MAXIOS:
```

Repeat this verification step for lpath 10/4/4.2.0, 4.3.0, and 4.4.0.

Configuring the Storage Node on the NetWorker Server

- e. Verify the ldev specifications:

```
io> ldev 30/34
LDEV: 30 DEVNAME: OUTDEV: 0 MODE:
ID: HPC1194F RSIZE: 128 DEVTYPE: MOSAR_AC
PATH: 10/4/4.0.0 MPETYPE: 24 MPESUBTYPE: 4
CLASS:
LDEV: 31 DEVNAME: OUTDEV: 0 MODE:
ID: DLT7000 RSIZE: 128 DEVTYPE: TAPE
PATH: 10/4/4.1.0 MPETYPE: 24 MPESUBTYPE: 8
CLASS: TAPE
...
LDEV: 34 DEVNAME: OUTDEV: 0 MODE:
ID: DLT7000 RSIZE: 128 DEVTYPE: TAPE
PATH: 10/4/4.4.0 MPETYPE: 24 MPESUBTYPE: 8
CLASS: TAPE
```

7. Save the configuration changes as follows:

a. Hold the configuration changes:

```
io> hold
```

b. Exit the io section:

```
io> exit
```

c. If you have followed the local convention for backing up the configuration file, keep the changes:

```
sysgen> keep  
keeping to group CONFIG.SYS
```

Important: Check with system management to make sure you can keep the changes to the configuration file.

```
Purge old configuration (yes/no)?y
```

d. Exit sysgen and reboot according to local convention:

```
sysgen> exit
```

Configuring and Operating NetWorker Autochanger Support

This media device has not been configured yet. Please select a media device type for /dev/tape31.

```
a) himt  
b) qic  
c) 4mm  
d) 8mm  
e) 8mm 5GB  
f) 3480  
g) dlt 7000  
h) vhs  
i) optical  
Choice? c g
```

Jukebox has been added successfully.

Repeat this step for the remaining devices, for example /dev/tape 32, 33, and 34.

When you use the JBCONFIG program to configure an autochanger, NetWorker creates a new resource with the name you specified. You can view the new resource in the Jukeboxes resource in the NetWorker Administrator program. Refer to the online help or the nsr_jukebox(5) man page for details on the attributes of the Jukeboxes resource.

Testing the Autochanger Connection

To test the autochanger connection, follow these steps:

1. Become MANAGER.SYS on the NetWorker storage node.
2. Insert two volumes, one each into the first and last slots of the autochanger. Make sure that the drives are empty and that any drive doors are open.
3. Enter the JBEXER command at the prompt; specify the control port and the device type. The control port for SCSI autochanger models is typically expressed in the format /dev/sjid1u1 as in the above example. You can obtain the exact control port pathname from the response displayed by the JBCONFIG command script. For example, the following command runs the JBEXER program on the Quantum DLT/Digital DLT autochanger detected by the JBCONFIG script:

```
: JBEXER;INFO="-c /dev/sjid1u1 -m " Quantum DLT/Digital DLT"
```