COMPAQ

Software Product Description

PRODUCT NAME: **HSD50 StorageWorks™ Solutions Software   SPD: 60.69.04**
HSOF Version 5.7

Description

The HSD50 Array Controller Operating Software (HSOF) is the software component of the HSD50-Bx/Cx Array Controller. This array controller is an intelligent mass storage controller that interfaces among host computer systems and attached mass storage SCSI devices using Compaq™ Computer Corporation's DSSI bus. HSOF software executes in the HSD50-Ax Array Controller; it processes Mass Storage Control Protocol (MSCP) I/O requests from hosts, performing the lower-level operations required to execute storage requests.

HSOF Software Functions

HSOF software performs the following functions:

- Testing and diagnosis of the HSD50 Array Controller
- Host interconnect and protocol services
- SCSI device control
- Subsystem management services
- Local program support
- Write-back cache functions
- Parity RAID (RAID 3/5) functions
- Disk mirroring functions
- Disk partitioning functions

The following sections describe these functions.

Testing and Diagnosis of the HSD50 Array Controller

HSOF software internal diagnostics execute automatically when controller power is turned on, whenever the array controller is reset, and periodically during use. LEDs on the controller's front bezel provide diagnostic information upon controller failure.

An asynchronous I/O port is also provided for configuration and diagnosis.

Host Interconnect and Protocol Services

The HSD50 Array Controller attaches to host computer systems using the DSSI bus. The controller may be installed in VMScluster configurations. Each DSSI bus supports up to eight nodes. Compaq Computer Corporation supports up to four HSD50 Array Controllers per DSSI bus.

SCSI Device Control

HSOF software converts host I/O requests expressed in the MSCP protocol into device-specific SCSI commands. It supports concurrent commands and data transfers on multiple SCSI device buses for each supported device type.

HSOF software device control functions include the following:

- Error Detection and Recovery - HSOF software recovers from device errors including bad block replacement for supported disk drives that do not perform this function for themselves.

  For errors on the DSSI interface, HSD50 Array Controller hardware and HSOF software cooperate to provide the following:

  - Automatic retransmission of data detected as being in error
  - Automatic detection of internal data path errors
  - Automatic failover of attached devices between identically configured HSD50 controllers installed in the same controller shelf

- Device Integrity Testing - HSOF software executes Device Integrity Test programs on system manager command. These tests perform the following:
  - Verify correct operation of individual devices
  - Place the HSD50 Array Controller under load to verify correct subsystem operation

- Disk Striping - HSOF software treats sets of disk drives as stripesets (2 to 14 members) for improved I/O performance through load balancing. A stripeset appears to the OpenVMS™ operating system as a single disk drive.

- Partitioning - HSOF software allows partitioning of disk drives for improved device management. A partitioned disk appears to the OpenVMS operating system as multiple unit numbers that are separately addressable. Up to 4 partitions may be created per disk.

- Error Logging - HSOF software uses DSSI protocol messages to report faulty or failing devices and controller faults to all connected hosts that have error logging enabled.

- Save Configuration on Disk - Saves device, controller configuration information, and HSOF software patches on a disk. This improves availability in the event of a controller replacement. This functionality is specific to HSD50 controller replacements for non-redundant configurations.

- Set SCSI Speed for Devices – Allows the controller to force a slower data rate when negotiating with the target device. This allows for a longer cable length than that supported by the speed that the controller and target device would normally negotiate. A CLI command switch can set the maximum data transfer rate between the controller and any device to10MHz or 5MHz.

Subsystem Management Services

HSOF software provides the following subsystem management services:

- Alteration of Subsystem Parameters - HSOF software includes a command language interpreter (CLI) utility that allows a system manager to display and manipulate controller parameters and device configuration information as needed.

  The CLI Utility provides type ahead, recall, and editing features. Any of the last four commands entered may be recalled and edited.

- Dynamic Status Display - The HSOF VTDPY utility allows a system manager to view the HSD50-based subsystem's state dynamically. This utility can use VT200-, VT300-, and VT400-series video terminals. Terminal port connections are supported at 4800, 9600,and 19200 BPS only.

- HSUTIL - The HSUTIL utility provides two functions: device format and device code load. Device format enables the system manager to perform a basic format operation on a disk device. Device code load provides the functionality to download device firmware onto supported disk and tape drives via the controller. Device code load is supported for some tape devices (check user documentation for support information). Refer to the *HSD50 Array Controller Operating Software Version 5.7 Release Notes*, EK-HSD50-RN. E01 for further detail.

Local Program Support

HSOF Software supports the following local programs and commands:

- CFMENU for configuring controller-attached storage devices

- CHVSN supports the ability to change volume serial numbers for disk drive devices

- CLONE utility for obtaining physical copies of data in concert with Disk Mirroring software

- Code Load/Code Patch (CLCP) for controller software changes

- CONFIG for automatically adding new devices to the configuration

- C_SWAP for controller and/or cache module warm swap (for dual-redundant configurations)

- DEFAULT_FORMAT=HOST_SELECTED can be used to set tape density for writes from the host operating system, as well as from controller CLI commands

- DILX disk inline exerciser

- TILX tape inline exerciser

- FMU for displaying controller last failure and memory system failure information as well as control of spontaneous event logging and last failure logging displays

- MAXIMUM HOSTS allows HSD controllers to calculate credits based on the number of *host* nodes, rather than on the total number of nodes

- VTDPY presents a user display of current controller state and performance data for attached disk drive devices

NOTE: The CLONE utility cannot be used with partitioned units.

Write-Back Cache Capability

The write-back cache capability provides the following functions:

- Stores data to be written temporarily in the controller's write-back cache and informs the host that the write request is complete. This allows the host to continue working without waiting for data to be written to disk media.

- Writes the data stored in cache to the disk media based on a least-recently-used cache flushing policy or when a device has been inactive for a defined time.

- Consolidates contiguously-located data blocks from multiple host write requests into a single device request to reduce average latency.

- On recovery from a controller failure (for example, a power outage), detects that unwritten data still exists in cache and writes it to disk media before enabling normal controller operations.

RAID Capability

The RAID capability provides the following functions:

- Manages up to 14 sets of between 3 and 14 disks as RAIDsets (limited by the controller configuration restrictions). A RAIDset is viewed by the host as a single disk and can tolerate the failure of a single member disk without loss of ability to deliver data to hosts.

- Dynamically adjusts between RAID Level 3 and RAID Level 5-like data protection algorithms depending on instantaneous workload.

- Maintains consistency of data and parity across all member disks in a RAIDset. This includes recovery from media errors.

- Detects failure of a single RAIDset member disk and invokes data regeneration algorithms to provide continued data availability to hosts.

- Captures a designated spare (if one exists) in the event of a member disk failure and reconstructs the data and parity of the failed member disk onto it.

For information regarding default chunksize, refer to the *Configuring Your StorageWorks Subsystem HSD50 Array Controllers HSOF Version 5.1 Software*, part number EK-HSD50-CG. B01.

Disk Mirroring Capability

The disk mirroring capability provides the following functions:

- Real-time maintenance of up to six identical copies of data on mirrorsets of separate disks attached to a single HSD50 Array Controller.

- Protects data against disk failure by replicating all data on each member of the mirrorset. Disk mirroring offers extremely high data reliability.

- Striping of mirrorsets, for high-performance access to large amounts of highly-available data.

- Captures a designated spare (if one exists) in the event of a mirrorset member disk failure and reconstructs the data of the failed member disk onto it.

- Ability to increase or decrease the number of members in a mirrorset as requirements change.

- Flexible policy options for determining both how read requests are satisfied and the speed of copying when a new member is being added.

- HSOF Software disk mirroring can utilize the UNMIRROR CLI command to change devices back to a single-disk unit.

Storageset Limits

The following limits apply to storagesets configured on a single controller or a dual-controller configuration:

- A mirrorset can have a maximum of 6 members

- There can be a maximum of 20 mirrorsets and/or RAIDsets

- There can be a maximum of 30 storagesets (RAIDsets, mirrorsets, and/or stripesets)

- There can be no more than 32 physical device members total for any given unit

- There can be a maximum of 4 partitions per disk or storageset

Hardware Requirements

HSOF software V5.7 requires an HSD50 Array Controller module on which to execute. The HSD50 Array Controller includes six SCSI device ports for connecting storage devices. The specific devices supported by HSOF Software Version 5.7 are listed in the Device Tables.

The HSD50-Ax Array Controller supported configurations are listed in Table 1.

Table 1 Supported Configurations

Part Num	Description
HSD50-AF	StorageWorks Array Controller for 36 (dual-redundant) or 42 (single controller) SCSI-2 disk/tape/optical devices; 32 MB Read/Write-Back Cache, RAID, Disk Mirroring, and one single External Cache Battery unit (ECB). Prerequisite: one HSOF V5.7 Software Kit (ordered separately; (1) QB-5C5AA-SA)
HSD50-AH	StorageWorks Array Controller for 36 (dual-redundant) or 42 (single controller) SCSI-2 disk/tape/optical devices; 64 MB of Read/Write-back Cache, RAID, Disk Mirroring, and one single External Cache battery unit (ECB). Prerequisite: one HSOF V5.7 Software Kit ordered separately; (1) QB-5C5AA-SA
HSD50-AJ	StorageWorks Array Controller for 36 (dual-redundant) or 42 (single controller) SCSI-2 disk/tape/optical devices; 128 MB of Read/Write-back Cache, RAID, Disk Mirroring, and one single External Cache battery unit (ECB). Prerequisite: one HSOF V5.7 Software Kit ordered separately; (1) QB-5C5AA-SA
HSD52-AF	Two HSD50-AF StorageWorks Array Controllers for 72 SCSI-2 disk/tape/optical devices; 64 MB of Read/Write-back Cache, RAID, Disk Mirroring, and one dual External Cache battery unit (ECB). Prerequisite: two HSOF V5.7 Software Kits ordered separately; (2) QB-5C5AA-SA
HSD52-AH	Two HSD50-AJ StorageWorks Array Controllers for 72 SCSI-2 disk/tape/optical devices; 128 MB of Read/Write-back Cache, RAID, Disk Mirroring, and one dual External Cache battery unit (ECB). Prerequisite: two HSOF V5.7 Software Kits ordered separately; (2) QB-5C5AA-SA
HSD52-AJ	Two HSD50-AJ StorageWorks Array Controllers for 72 SCSI-2 disk/tape/optical devices; 256 MB of Read/Write-back Cache, RAID, Disk Mirroring, and one dual External Cache battery unit (ECB). Prerequisite: two HSOF V5.7 Software Kits ordered separately: (2) QB-5C4AA-SA

Configuration Restrictions

The following configuration restrictions apply:

- HSD50-Ax controllers may not be used in a dual-redundant pair with HSD30-Ax or HSD30-Cx controllers.

- The HSD50-Ax minimum HSOF software revision level is V5.1.

- A maximum of six devices may be attached to a single SCSI device bus on dual-redundant HSD50 Array Controller configurations.

- A maximum of seven devices may be attached to a single SCSI device bus on non-redundant HSD50 Array Controller configurations.

- In dual-redundant pairs, the HSOF software must be at identical revision levels (including any patch revisions).

- Up to four HSD50 Array Controllers per DSSI host bus are currently supported.

- The maximum unit size is 256GB.

- A maximum combined total of 30 storagesets (mirrorsets, RAIDsets, and stripesets) are supported by the HSD50.

- A maximum total of 20 mirrorsets and RAIDsets are supported by the HSD50.

Host Node Hardware and Software Required

A valid OpenVMS VAX, OpenVMS Alpha, or VMScluster configuration with a supported DSSI interface host adapter, as defined in the following section, is required to run the HSOF software.

HSOF software supports the following DSSI host bus adapters:

- SHAC-based embedded/native (for various VAX and DEC systems)

- Embedded native adapters (for DEC4000 systems)

- KFPSA PCI-to-DSSI adapter

- KFMSA and KFMSB (for XMI-based systems)

- KFESA and KFESB (for EISA-based AlphaServers)

HSD50-Ax controllers, mounted in a BA350-MA, BA355, or SW300 controller enclosures, support the following packaging components (based upon StorageWorks packaging configuration guidelines):

- BA350-Sx 8-bit SCSI device enclosure with up to two single-ended buses

- BA356-Sx 16-bit SCSI device enclosure with up to two single-ended buses

- BA35x-HF 150 Watt, 48 Volt Power Supply in System Building Block (SBB), 3.5 inch form factor

- BA35X-MG 8-bit I/O module

- BA35X-MH 16-bit I/O module (controller operates in 8-bit mode only)

Optional Hardware

The HSD50 Array Controller running HSOF Software V5.7 supports the following optional hardware:

- HSSIM-AA 32 MB SIMM Pack for HSx50 Array Controllers. Add additional 32 MB SIMMs to upgrade HSD50 controllers to the supported HSD50-AH (64 MB) and HSD50-AJ (128 MB) configurations
- HS35X-BA Replacement Single External Cache Battery (ECB)
- HS35X-BB Replacement Dual External Cache Battery (ECB)

Supported Storage Devices

The following tables (Tables 2 through 8), list the only storage devices that are supported by the HSD50 Array Controller running HSOF V5.7. Compaq Computer Corporation neither supports nor recommends any device not listed for use with the HSD50 Array Controller running HSOF V5.7, regardless of the supplier or stated conformance to ANSI SCSI standards. Compaq will not assure correct operation of any unqualified device nor assure that such devices will not have an impact on other supported devices, or on the HSD50 Array Controller itself, or on a Compaq system configuration.

Table 2 Supported Disk Drives

Device	Capacity in Gigabytes	Minimum Microcode Version	Minimum Hardware Version
RZ25-VA	0.43	0900	B01
RZ26-VA	1.05	T392	D02
RZ26L-VA/VW[1]	1.05	440C	A01
RZ26N-VA/VW[1]	1.05	446	A01
SWXD3-SF/WF[1]	1.05	446	A01
DS-RZ26N-VZ[1]	1.05	1003	A01
DS-RZ1BB-VW	2.10	LYJO/0656	A01
RZ28-VA/VW[1]	2.10	435E	B03
RZ28B-VA	2.10	0003	A01
RZ28D-VA/VW[1]	2.10	0008	A01
SWXD3-SG/WG[1]	2.10	0008	A01
RZ28M-VA/VW[1]	2.10	0466	A01
DS-RZ28M-VZ[1]	2.10	1003	A01
SWXD3-SH/WH[1]	2.10	0466	A01
RZ74-VA	3.57	T427B	B07
DS-RZ1CB-VW	4.1	LYJO/0656	A01

Table 2 Supported Disk Drives

Device	Capacity in Gigabytes	Minimum Microcode Version	Minimum Hardware Version
RZ29B-VA/VW[1]	4.3	0007	B01
SWXD3-SE/WE[1]	4.3	0007	C02/A01
DS-RZ1CF-VA/VW	4.3	0370/0371	A01
DS-RZ1DB-VW	9.1	LYJO/0307	A01
DS-RZ1DF-VA/VW	9.1	0372/1614	A01
DS-RZ40-VA	9.1	LYGO	A01
DS-RZ1DD-VA/VW	9.1	0305/3B07	A01
DS-RZ1EF-VA/VW	18.2	0372/N1H1	A01
DS-RZ1ED-VW	18.2	0306/0305/3B07	A01
DS-RZ1EA-VW	18.2	3B05/ B016	A01
DS-RZ1DA-VW	9.1	3B06/ B016	A01
DS-RZ1FC-VW	36.4	3B07	A01

Table 2 Notes:

[1] Wide disk drives require a SWXSS–06 shelf.

All drive "VW" models require DS-SWXSS–06 wide device shelves.

Table 3 Supported Solid State Devices

Device	Capacity in Gigabytes	Minimum Microcode Version	Minimum Hardware Version	Notes
EZ31-VW	0.134	V064	A01	2, 3
EZ32-VW	0.268	V064	A01	2, 3
EZ51R-VA	0.10	V096	D01	2, 3
EZ54R-VA	0.42	V109	C02	2, 3
EZ58R-VA	0.85	V110	D01	1, 2, 3
EZ64-VA	0.475	V064	A01	2, 3
EZ64-VW	0.475	V070	A01	2, 3
EZ69-VA	0.950	V064	A01	2, 3
EZ69-VW	0.950	V070	A01	2, 3
EZ454	.536	Y018	A01	2, 3
EZ832	3.2	Y018	A01	2, 3
EZ41	0.134	V012	A01	2, 3
EZ42	0.268	V012	A01	2, 3
EZ51	.107	V109	C02	2, 3
EZ54	.428	V109	C02	2, 3
EZ705	0.536	V012	A01	2, 3
EZ711	1.1	V012	A01	2, 3
EZ716	1.6	V012	A01	2, 3

Table 3 Notes:
1   Code load is not supported for these drives.
2   Formatting supported for these drives.
3   Do not warm-swap solid-state disk drives. Make sure power to the device shelf is
      turned off before removing or inserting this device.

Table 4   Tape Drive Loader Support

Device	Capacity GB	Minimum Microcode Version [2]	Minimum H/W Revision [2]
TKZ60-EC [3]	0.44	111	B01
TKZ61 [3]	4.4	0611	A01
TKZ62 [3]	24.0 [5]	0616	A01
TKZ63 [3]	2.4 [5]	0616	A01
2T-TKZ64 [3]	144 [5]	0616	A01
TLZ6L-VA	16 [5]	0491	A01
TLZ7L-VA [6]	8 [5]	4BQE	A02
TLZ9L-VA [6]	32 [5]	A020	AX01
TZ867–AE/AF [3,10]	42	430B	A01
TZ875–NE [3,10]	50/100 [5]	930A	A01
TZ875–AE/AF [3,10]	50/100 [5]	930A	A01
TZ877–NE [3,10]	70/140 [5]	930A	A01
TZ875-NT [3,10]	50/100 [5]	930A	A01
TZ877–AE/AF [3,10]	70/140 [5]	930A	A01
TZ885–NE/NT [3,7,10]	100/200 [5]	CC33	A01
TZ887–NE/NT [3,7,10]	140/280 [5]	CC33	A01

Table 4 Notes:

[1]   Minimum microcode version and hardware revision supported

[2]   Requires 0.2 meter SCSI–1 to SCSI–2 transition cable, Compaq internal part number 17–03831–01 for DWZZA-AA, and Compaq part number 17-04367-01 for SBB DWZZA-VA and DWZZB-VW

[3]   Requires DWZZA/DWZZB single-ended to differential SCSI signal converter

[4]   Values represent compressed data. The compression factor is device dependent based on individual device algorithms.

[5]   Loaders operate in sequential mode only.

[6]   Cannot read TK50, TK70 or TZ30 format tapes

[7]   Wide Tape Devices require BA356 with 8-bit I/O module.

[9]   Tape Device Code load is supported.

Table 5 Tape Libraries Support

Device	Capacity GB	Minimum Microcode Version [2]	Minimum H/W Revision [2]
TL810 [3,4]	480/960 [5]	1.10 robot/V40 drive	A01
TL812 [3,4,7]	960/1920 [5]	1.2 robot/CC33drive	A01
TL820, Rev A01 [3,4]	2640/5280 [5]	1d3M robot/v40 drive	L1
TL822 [3,4,7]	5280/10560 [5]	1g4F robot/CC33drive	A01
TL826 [3,4,7]	3520/7040 [5]	1g4F robot/CC33drive	A01
DS-TL890 [3,4,7,8]	560/1.12T [5]	3.23 robot/V55 drive	A01
DS-TL891 [3,4,7,8]	350/700 [5]	3.23 robot/V55 drive	A02
DS-TL892 [3,4,7,8]	350/700 [5]	3.23 robot/V55 drive	A02

Table 5 Tape Libraries Support

Device	Capacity GB	Minimum Microcode Version [2]	Minimum H/W Revision [2]
DS-TL893 [3,4,7,8]	9.24/18.48T [5]	V2A/5A	A01
DS-TL894 [3,4,78]	1.69/3.36T [5]	V1.24	A01
DS-TL896 [3,4,7,8]	6.1/12.32T [5]	V2A/5A	A01

Table 5 Notes:

[2] Minimum microcode version and hardware revision supported

[3] Requires 0.2 meter SCSI–1 to SCSI–2 transition cable, Compaq internal part number 17–03831–01 for DWZZA-AA, and Compaq part number 17-04367-01 for SBB DWZZA-VA and DWZZB-VW

[4] Requires DWZZA/DWZZB single-ended to differential SCSI signal converter

[5] Values represent compressed data. The compression factor is device dependent based on individual device algorithms.

[6] Loaders operate in sequential mode only.

[7] Cannot read TK50, TK70 or TZ30 format tapes

[9] Wide Tape Devices require BA356 with 8-bit I/O module.

[10] Tape Device Code load is supported.

Table 6 Tape Drives Support

Device	Capacity GB	Minimum Microcode Version [2]	Minimum H/W Revision [2]
TLZ06-VA	4 [5]	0491	A04
TLZ07-VA	8 [5]	04AQ	AX01
TLZ09-VA	4/8 [5]	v165	
TSZ07-AA [3]	0.140 [5]	0309	A01
TL86-VA [10]	6 [5]	430B	A02
TZ87–VA [10]	10/20 [5]	930A	A01
TZ87N–VA [7,10]	10/20 [5]	930A	A01
TZ87–TA [3,4,10]	10/20 [5]	9514	B02
TZ87N–TA [3,4,10]	10/20 [5]	930A	A01
DS-TZ89N–VW [7,9,10]	35/70 [5]	V80	A01
DS-TZ89N–TA [3,9,10]	35/70 [5]	141F	A01
DS-TZS20–VW [3,7,10]	25/50 [5]	01Aj	A01
DS-AIT35-VW [9,10]	35/70	4.03	A01

Table 6 Notes:

[2]   Minimum microcode version and hardware revision supported

[3]   Requires 0.2 meter SCSI–1 to SCSI–2 transition cable, Compaq internal part number 17–03831–01 for DWZZA-AA, and Compaq part number 17-04367-01 for SBB DWZZA-VA and DWZZB-VW

[4]   Requires DWZZA/DWZZB single-ended to differential SCSI signal converter

[5]   Values represent compressed data. The compression factor is device dependent based on individual device algorithms.

[6]   Loaders operate in sequential mode only.

[7]   Cannot read TK50, TK70 or TZ30 format tapes

[9]   Wide Tape Devices require BA356 with 8-bit I/O module.

[10]   Tape Device Code load is supported.

Table 7 CD-ROM Support

Device	Capacity GB	Minimum Microcode Version [2]	Minimum Hardware Revision [2]
RRD42-VB/VU [8]	0.6	1.1a	A01
RRD43-VA [8]	0.6	0064	A02
RRD44-VA [8]	0.6	3493	A02
RRD45-VA/VU [8]	0.6	1645	A01
RRD46-VA [8]	0.6	1337	A01
RRD47-VA [8]	0.6	1206	A01

Table 7 Notes:

[2]   Minimum microcode version and hardware revision supported

[3]   Requires 0.2 meter SCSI-1 to SCSI-2 transition cable, Compaq internal part number 17-03831-01.

[8]   Do not warm swap this device. Make sure that the device enclosure power is off when inserting or removing this device.

[9]   To add this device to your configuration you must enter the following CLI command:
SET OPTICAL *container-name*
<PTL>*TRANSFER_RATE_REQUESTED=ASYNC*

Table 8 Optical Drive Support

Device	Type [1]	Capacity GB	Minimum Microcode Version [2]	Minimum Hardware Revision [2]
RWZ52-VA [8]	OP	0.6 per side	3403	A01
RWZ53-VA [8]	OP	2.3/2.6	1.35	AX02
RW524 [3]	OPJ	19	1.37 jukebox/3404 drive	A01
RW525 [3]	OPJ	19	2.17 jukebox/3404 drive	A01
RW530 [3]	OPJ	38	6.15 jukebox/3404 drive	A01
RW531 [3]	OPJ	38	0.35 jukebox/3404 drive	A01
RW532 [3]	OPJ	76	0.35 jukebox/3404 drive	A01
RW534 [3]	OPJ	104	5.20 jukebox/3404 drive	A01
RW536 [3,9]	OPJ	170	5.20 jukebox/3404 drive	A01
RW546 [3,9]	OPJ	36.8	1.36 jukebox/1.35 drive	A01
RW551 [3,9]	OPJ	64	1.36 jukebox/1.35 drive	A01
RW552 [3,9]	OPJ	147	1.36 jukebox/1.35 drive	A01
RW555 [3,9]	OPJ	294	1.36 jukebox/1.35 drive	A01
RW557 [3,9]	OPJ	547	1.36 jukebox/1.35 drive	A01

Table 8 Notes:

[1]   Device types are indicated as follows: OP for magneto-optical disk devices, and OPJ for optical jukebox

[2]   Minimum microcode version and hardware revision supported

[3]   Requires 0.2 meter SCSI-1 to SCSI-2 transition cable, Compaq internal part number 17-03831-01.

[8]   Do not warm swap this device. Make sure that the device enclosure power is off when inserting or removing this device.

[9]   To add this device to your configuration, you must enter the following CLI command:
SET OPTICAL *container-name*
<PTL>*TRANSFER_RATE_REQUESTED=ASYNC*

Configuration Restrictions

- Disks attached to an HSD50 Array Controller may be used as initialization devices for VAX7000 or VAX10000 processors provided the processor console code is at Version 4.0 or higher.
- Controller-attached devices may serve as initialization devices for DEC7000 and DEC10000 systems provided the console code is as Version 3.1 or higher.

Software Requirements

HSOF software V3.4 on HSD50 Array Controllers is supported by the following operating system versions with the limitations described in *HS Family of Array User's Guide,* part number EK-HSD50-UG. B01:

- OpenVMS Alpha: V6.2-1H3, V7.1-1H1/2/3, V7.1-2, V7.2, and V7.2-1
- OpenVMS VAX: V6.2, V7.1, and V7.2

Distribution Media

HSOF Software is shipped on PCMCIA program card media only.

Ordering Information

HSOF software kits and licenses for the HSD50 Array Controllers may be ordered using the part numbers listed in Table 9.

Table 9 Distribution and Documentation Options

Part Number	Description
QB-5C5AA-SA	HSOF HSD50 License, media and documentation
QB-5C5AA-SC	HSOF HSD50 License and media
QB-5C5GZ	HSOF HSD50 documentation
QT-5C5**_**	HSOF HSD50 Software Product Services

Software Licensing

This software is furnished only under a license. For more information about Compaq's licensing terms and policies, contact your local Compaq office.

Software Product Services

A variety of service options are available from Compaq. For more information, contact your local Compaq office or distributor.

Software service for HSOF software is covered under the terms and conditions of the integrated Hardware and Software Customer Service contracts.

Multivendor Customer Services for the HSD50 Array Controller and HSOF Software are covered under the terms and conditions of the following:

- Hardware Customer Service Contract
- Software Customer Service Contract
- Media and Documentation Distribution Service (MDDS) contract

Software Warranty

Warranty for this software product as provided by Compaq, includes 90 days conformance to Software Product Description (SPD) and 90 days telephone support.

Notice