**COMPAQ**

# Software
# Product
# Description

**PRODUCT NAME:** **HSD30 and HS1CP StorageWorks™ Solutions Software, HSOF Version 3.7** SPD: 53.53.09

## Description

The HSD30 and HS1CP Array Controller Operating Software (HSOF) is the software component of the HSD30 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 HSD30 or HS1CP 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 array controller

* Host interconnect and protocol services

* SCSI device control

* Subsystem management services

* Local program support

The following sections describe these functions.

### *Testing and Diagnosis of the 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 HSD30 or HS1CP 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 HSD30/HS1CP 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, the HSD30 or HS1CP 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 HSD30 controllers installed in the same controller enclosure

- 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 HSD30 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.

- Optional Functionalities – RAID, disk mirroring, and write-back caching are available as options. Refer to the HS Family of Array Controllers Optional Operating Software for HSOF Software Version 2.7, V3.0, V3.1, V3.2, V3.4, and 3,7 Software Product Description, SPD 54.38.03, for further option information.

- 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 HSD30 or HS1CP controller replacements for non-redundant configurations.

**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 HSD30/HS1CP-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 *HSD30 or HS1CP Array Controller Operating Software Version 3.7 Release Notes*, EK-HSD30-RN for further detail.

**Local Program Support**

HSOF Software supports the following local programs and commands:

- CFMENU for configuring controller-attached storage 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

- FLS for enabling/disabling optional licensed features

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

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

**Hardware Requirements**

HSOF software V3.7 requires an HSD30 or an HS1CP Array Controller module on which to execute. The HS1CP Array Controllers includes six SCSI device ports for connecting storage devices. The HSD30 Array Controller includes three SCSI device buses for connecting storage devices. The specific devices supported by HSOF Software Version 3.7 are listed in the Device Tables.

The HSOF for the HSD30 Array Controller supports the configurations listed in Table 1.

**Table 1  Supported Configurations**

| Part Number | Description |
| --- | --- |
| HSD30-CA | StorageWorks Array Controller for 18 (dual-redundant) or 21 (single controller) SCSI-2 disk/tape/optical devices; No Read Cache |
| HSD30-CD | StorageWorks Array Controller for 18 (dual-redundant) or 21 (single controller) SCSI-2 disk/tape/optical devices; 16 MB of Read Cache |
| HSD30-CF | StorageWorks Array Controller for 18 (dual-redundant) or 21 (single controller) SCSI-2 disk/tape/optical devices; 32 MB of Read Cache |

**Configuration Restrictions**

The following configuration restrictions apply:

- A maximum of six devices may be attached to a single SCSI device bus on dual-redundant HSD30 Array Controller configurations.
- A maximum of seven devices may be attached to a single SCSI device bus on nonredundant HSD30 Array Controller configurations.
- In dual-redundant pairs, the HSOF software must be at identical revision levels (including any patch revisions).
- Up to four HSD30 or HS1CP 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 HSOF Software Version 2.5 or higher.
- A maximum total of 20 mirrorsets and RAIDsets are supported by the HSOF Software Version 3.1 or higher.

**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.

**Other Hardware**

The RAID and mirroring software options require the use of a write-back cache module. The write-back cache option requires the HSD30-YX write-back cache option kit or a write-back cache license and HSX30/40 batteries along with the appropriate cache module option.

> **NOTE:** Configuration guidelines for the HSD30 Array Controller are provided in the *HS Family of Array Controllers User's Guide*,
> EK-HSFAM-UG. D01.

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)

HSD30 Array Controllers, mounted in a BA350-MA controller enclosure, 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)

HSOF Software supports the following optional hardware:

- HSD30-XD upgrades the HSD30-AA option to include a 16 MB read cache option
- HSD30-XE 32 MB read cache module
- HSD30-YC  write-back cache batteries and bracket
- HSD30-YF  upgrades the HSD30-AA option to include a 32 MB read cache option
- HSD30-YX  HSD30 write-back cache option kit, includes two batteries, a battery bracket, and a write-back cache option license

HSOF Software supports the following optional software:

- QL-4DRA9-AA HSD Disk Mirroring Software License
- QL-4E3A9-AA HS1CP Mirroring Software License
- QL-3HYA9-AA HSD RAID Software License
- QL-4D7A9-AA HS1CP RAID Software License
- QL-3HVA9-AA  HSD30 Write-Back Cache License
- QL-4D6A0-AA  HS1CP Write-Back Cache Software License

> **NOTE:** Use of the Write-Back Cache software license requires that the HSD30 cache module and HSx30/40 cache batteries be installed. To purchase batteries, contact your local Compaq Customer Service Representative**.**

**Supported Storage Devices**

The following tables (Tables 2 through 8), list the only storage devices that are supported by the HSD30 or HS1CP Array Controller running HSOF V3.7. Compaq Computer Corporation neither supports nor recommends any device not listed for use with the HSD30 or HS1CP Array Controller running HSOF V3.7, 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 HSD30 or HS1CP 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 |

**Table 2  Supported Disk Drives**

| Device | Capacity in Gigabytes | Minimum Microcode Version | Minimum Hardware Version |
|--------|-----------------------|---------------------------|--------------------------|
| 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 |
| 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 |

**Table 3  Supported Solid State Devices**

| Device | Capacity in Gigabytes | Minimum Microcode Version | Minimum Hardware Version | Notes |
|--------|------------------------|----------------------------|---------------------------|-------|
| 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  HSD30/HS1CP Tape Drive Loader Support**

| Device | Capacity GB | Minimum Microcode Version [2] | Minimum Hardware 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:

[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 5  HSD30/HS1CP  Tape Libraries Support

| Device | Capacity in Gigabytes | Minimum Microcode Version [2] | Minimum Hardware 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 |
| 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  HSD30/HS1CP Tape Drive Support**

| Device | Capacity in Gigabytes | Minimum Microcode Version [2] | Minimum Hardware 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 |
| TZ88N-VA/TA [7,10] | 20/40 [5] | CC33 | 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 | Type [1] | Capacity in Gigabytes | Minimum Microcode Version [2] | Minimum Hardware Revision [2] |
|---|---|---|---|---|
| RRD42-VB/VU [8] | CD | 0.6 | 1.1a | A01 |
| RRD43-VA [8] | CD | 0.6 | 0064 | A02 |
| RRD44-VA [8] | CD | 0.6 | 3493 | A02 |
| RRD45-VA/VU [8] | CD | 0.6 | 1645 | A01 |
| RRD46-VA [8] | CD | 0.6 | 1337 | A01 |
| RRD47-VA [8] | CD | 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 |
| 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 HSD30 or HS1CP 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 V3.7 on HSD30 or HS1CP Array Controllers is supported by the following operating system versions with the limitations described in the *HS Family of Array Controllers User's Guide* EK-HSFAM-UG. D01:

- 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 HSD30 and HS1CP Array Controllers may be ordered using the part numbers listed in Table 9.

**Table 9  Distribution and Documentation Options**

| Part Number | Description |
| --- | --- |
| QL-2YHA9-AA | SWKS HSD30 MSC TRAD LIC |
| QL-2YHA9-RA | SWKS HSD30 MSC TRAD UPD LIC |
| QL-2YHAA-HS | SWKS HSD30 MSC PCRM KIT |
| QL-2YHAA-GZ | SWKS HSD30 MSC DOC KIT |
| QT-2YH9A*-** | HSOF HSD30 Software Product Services |
| QL-4D5A9-AA | SWKS HS1CP MSC TRAD LIC |
| QL-4D5A9-RA | SWKS HS1CP MSC TRAD UPD LIC |
| QL-4D5AA-HS | SWKS HS1CP MSC PCRM KIT |
| QL-4D5AA-GZ | SWKS HS1CP MSC DOC KIT |
| QT-4D59A*-** | HSOF HS1CP Software Product Services |

**Optional Software**

Refer to the *HS Family of Array Controllers Optional Operating System Software (HSOF), Version 2.7, 3.0, 3.1, 3.2, 3.4, and 3.7 SPD* 54.38.03, for further information regarding the following optional software products:

- RAIDsets – HSOF Software treats sets of disk drives as RAIDsets when the separately licensed RAID option is installed. RAIDsets may have from 3 to 14 members. Each RAIDset is presented to the hosts as a single large virtual disk.

- Disk Mirroring - HSOF Software treats sets of disk drives as mirrorsets when the separately licensed disk mirroring option is installed. Mirrorsets may have from 2 to 6 members. Each mirrorset is presented to the hosts as a single large virtual disk.

- Write-back Cache - When the separately licensed write-back cache option is installed, HSOF Software can provide improved I/O performance by supporting write-back cache for user-selected disks, stripesets, RAIDsets, and mirrorsets.

**Software Licensing**

An HSOF Software license is shipped with every hardware configuration that includes an HSD30 or HS1CP Array Controller.

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

The RAID, write-back cache, and disk mirroring options require separate licenses and require that a license key be installed for correct operation. Refer to the *HSOF Array Controllers Optional Operating Software (HSOF), Versions 2.7, 3.0, 3.1, 3.2, 3.4, and 3.7 SPD* 54.38.03, for further licensing information.

**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 HSD30 or HS1CP 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 the Software Product Description (SPD) and 90 days telephone support.

**Notice**