COMPAQ

Software Product Description

PRODUCT NAME: **HSJ30 and HSJ40 Family Array Controller Operating Software HSOF Version 3.7** **SPD: 47.26.13**

Description

The HSJ Family Array Controller Operating Software (HSOF) is the software component of the HSJ30 and HSJ40 Array Controller. Using Compaq™ Computer Corporation's Computer Interconnect (CI) bus, these array controllers are intelligent mass storage controllers that interface among host computer systems and attached mass storage SCSI devices. HSOF software executes in the HSJ 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 HSJ30 or HSJ40 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 HSJ40 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 HSJ30 or HSJ40 Array Controller attaches to host computer systems using the CI bus. The controller may be installed in VMScluster configurations that include up to 32 nodes, of which up to 31 can be hosts.

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 CI interface, HSJ30/40 Array Controller hardware and HSOF software cooperate to provide the following:
  - Automatic retransmission of data detected as being in error
  - Automatic retransmission on an alternate path if one CI path fails
  - Automatic detection of internal data path errors
  - Automatic failover of attached devices between identically configured HSJ30 or HSJ40 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 HSJ30 or HSJ40 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.
- Error Logging - HSOF software uses CI 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 HSJ30 or HSJ40 controller replacements for non-redundant configurations.
- Optional Functionalities – RAID, disk mirroring, and write-back cache are available as options. Refer to the *HS Family of Array Controllers Optional Operating Software for HSOF Software Version 2.7, 3.0, 3.1, 3.2, 3.4, and 3.7 Software Product Description*, *SPD 54.38.03* for further option information.
- 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.
- Dynamic Status Display - The HSOF VTDPY utility allows a system manager to view the HSJ30 or HSJ40 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 *HSJ40 Array Controller Operating Software Version 3.7 Release Notes*, EK-HSFAM-RM. S01 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
- FLS for enabling and 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

Host Node Hardware and Software Required

A valid OpenVMS VAX, OpenVMS Alpha, or VMScluster configuration with a supported CI interface host adapter (identified in the following section) is required to run HSOF software.

Hardware Requirements

HSOF software V3.7 requires an HSJ30-Ax/Cx or HSJ40-Ax/Cx Array Controller module on which to execute. The HSJ40 Array Controller includes six SCSI device ports for connecting storage devices. The HSJ30 Array Controller includes three such SCSI device. The specific devices supported by HSOF Software Version 3.7 are listed in the Device Tables.
The HSJ Family Array Controller supported configurations are listed in Table 1.

Table 1 Supported Configurations

Part Number	Description
HSJ40-AD/CD	StorageWorks™ Array Controller for 36 (dual-redundant) or 42 (single controller) SCSI-2 disk/tape/optical devices; 16 MB Read Cache
HSJ40-AF/CF	StorageWorks Array Controller for 36 (dual-redundant) or 42 (single controller) SCSI-2 disk/tape/optical devices; 32 MB of Read Cache
HSJ30-AA/CA	StorageWorks Array Controller for 18 (dual-redundant) or 21 (single controller) SCSI-2 disk/tape/optical devices; no Read cache
HSJ30-AD/CD	StorageWorks Array Controller for 18 (dual-redundant) or 21 (single controller) SCSI-2 disk/tape/optical devices; 16 MB Read cache
HSJ30-AF/CF	StorageWorks Array Controller for 18 (dual-redundant) or 21 (single controller) SCSI-2 disk/tape/optical devices; 32 MB Read cache

Configuration Restrictions

The following configuration restrictions apply:

- HSJ30/40-Ax and HSJ30/40-Cx controllers may be used in a dual-redundant pair with HSOF V2.7 and higher. The configuration HSJ30/40-Cx is not supported on HSOF V2.5 and lower.
- A maximum of six devices may be attached to a single SCSI device bus on dual-redundant HSJ30 or HSJ40 Array Controller configurations.
- A maximum of seven devices may be attached to a single SCSI device bus on non-redundant HSJ30 or HSJ40 Array Controller configurations.
- In dual-redundant pairs, the HSOF software must be at identical revision levels (including any patch revisions).
- The HSJ40-YC option requires the use of Version 2 Read Cache modules. Refer to the *HS Family of Array Controllers User's Guide*, EK-HSFAM-UG. D01, for information in determining the version type of the Read Cache module.
- The maximum unit size is 256GB.
- A maximum total of 20 disk mirrorsets and RAIDsets are supported by HSOF Version 2.5 or higher.
- A maximum combined total of 30 storagesets (mirrorsets, RAIDsets, and stripesets) are supported by HSOF Version 2.5 or higher.

The RAID and mirroring options require a write-back cache option. The write-back cache option requires that the HSJ40-Yx cache option or the write-back license and HSx30/40 cache batteries be installed.

> **NOTE:** Hardware configuration guidelines for the HSJ40 and HSJ30 Array Controllers are provided in the *HS Family of Array Controllers User's Guide*, EK-HSFAM-UG. D01.

Host Node Hardware and Software Required

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

HSOF software supports the following CI host bus adapters:

- CIXCD-AB (for XMI-based systems)
- CIXCD-AC (for XMI-based systems)
- CIBCA-Bx (for BI-based systems)
- CIPCA (for PCI-based systems)
- CI780 (for SBI-based systems)

Supported Packaging Components

HSJ40 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)

Optional Hardware

The HSJ30/40 Array Controllers running HSOF Software V3.7 support the following optional hardware:

- HSJ40-XE upgrades the HSJ40-AD/CD to 32 MB Read Cache; mandatory return of previously installed cache
- HSJ40-YA upgrades an HSJ40-AD/CD with a 16 MB Read Cache (Version 1) Read Cache option to a 16 MB Write-Back Cache option (includes a 16 MB Read Cache option [version 2] and an HSJ40-YC Write-back Cache kit)
- HSJ40-YB upgrades an HSJ40-AD/CD with a 32 MB Read Cache (Version 1) Read Cache option to a 32 MB Write-Back Cache option (includes a 32 MB Read Cache option [version 2] and an HSJ40-YC Write-back Cache kit)
- HSJ40-YC Write-Back Cache kit contains two batteries, a battery bracket, and a Write-back Cache option license for HSJ40 controllers with Version 2 Read Cache modules
- HSJ30-XD upgrades the HSJ30-AA/CA option to include a 16 MB read Cache option
- HSJ30-XF upgrades the HSJ30-AA/CA option to include a 32 MB read Cache option
- HSJ30-YC HSJ30 Write-Back Cache Kit, contains two batteries, a battery bracket, and a Write-Back Cache option license

Optional Software

HSOF Software supports the following optional software:

- QL-4DSA9-AA HSJ Disk Mirroring Software License
- QL-3HZA9-AA HSJ RAID Software License
- QL-3HWA9-AA HSJ Write-Back Cache Software License

> **Note:** Use of the Write-Back Cache software license requires that HSJ30/40 cache module and HSx30/40 cache batteries be installed. To purchase batteries contact your local Compaq Customer Service representative.

Supported Storage Devices

Tables 2, through 8 list the only storage devices that are supported by the HSJ30/40 Array Controllers running HSOF V3.7. Compaq Computer Corporation neither supports nor recommends any device not listed for use with the HSJ30/40 Array Controllers 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 HSJ30/40 Array Controllers themselves, 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
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

Table 3 Supported Solid State Devices

Device	Capacity in Gigabytes	Minimum Microcode Version	Minimum Hardware Version	Notes
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[6]	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

Table 4 Tape Drive Loader Support

Device	Capacity GB	Minimum Microcode Version [2]	Minimum H/W Revision [2]
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 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

Table 5 Tape Libraries Support

Device	Capacity GB	Minimum Microcode Version [2]	Minimum H/W Revision [2]
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:

[1] Device types are indicated as follows: TD for tape drive, TDL for tape drive loader, TLB for tape libraries.

[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 Drive 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]	q.1405	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

Table 6 Tape Drive Support

Device	Capacity GB	Minimum Microcode Version [2]	Minimum H/W Revision [2]
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	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 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

Table 8 Optical Support

Device	Type [1]	Capacity GB	Minimum Microcode Version [2]	Minimum Hardware Revision [2]
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 HSJ30 or HSJ40 Array Controller may be used as initialization devices for DEC7000 or DEC10000 processors provided the processor console code is at Version 3.1 or higher.

Disks attached to an HSJ30 or HSJ40 Array Controller may be used as manual and automatic initialization devices for VAX7000 or VAX10000 processors provided the VAX console code is at Version 3.2 and include the “Single Path” patch. Later versions of the console code include the patch.

Software Requirements

HSOF software V3.7 on HSJ30 or HJSJ40 Array Controllers is supported by the following operating system versions with the limitations described in the *HS Family of Array Controllers User’s Guide*, part number EK-HSFAM-UG. D01 and current release notes:

- 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 HSJ30 or HSJ40 Array Controllers may be ordered using the part numbers listed in Table 9.

Table 9 Distribution and Documentation Options

Part Number	Description
QL-0W9A9-AA	SWKS HSJ MSC TRAD LIC
QL-0W9A9-RA	SWKS HSJ MSC TRAD UPD LIC
QL-0W9AB-HS	SWKS HSJ MSC PCRM KIT
QL-0W9AA-GZ	SWKS HSJ MSC DOC KIT
QT-0W9A*-**	HSOF MCS Software Product Services

Software Licensing

An HSOF license is shipped with every hardware configuration that includes and HSJ30 or HSJ40 Array Controller. An upgrade license is required with the purchase of upgraded media.

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 *HS Family of Array Controllers Optional Operating Software (HSOF) Version 2.7, V3.0, V3.1, V3.2, V3.4, and 3.7 SPD # 54.38.03* for further option licensing information.

Software Product Services

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

Multivendor Customer Services for the HSJ controller and HSOF 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