Software Product Description

PRODUCT NAME: HSZ40 Array Controller Operating Firmware (HSOF), Version 2.5 **SPD 53.54.05**

DESCRIPTION

The HSZ40 Array Controller Operating Firmware (HSOF) is the software component of the HSZ40–A*x* and HSZ40–B*x* array controllers. These array controllers are intelligent mass storage servers that interface between host computer systems and SCSI-attached mass storage devices using a SCSI–2 bus. HSOF executes in the HSZ40 array controllers; it processes SCSI I/O requests from hosts, performing the device-level operations required to satisfy the requests.

HSOF FUNCTIONS

HSOF performs the following functions:

- Testing and diagnosis of the HSZ40 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 HSZ40 Array Controllers

HSOF internal diagnostics execute automatically when the controller power is turned on or when the array controller is reset.

LEDs on the controller's front bezel provide diagnostic information upon controller failure.

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

Host Interconnect and Protocol Services

The HSZ40 array controller attaches to host computer systems using a fast, wide, differential (FWD) SCSI–2 bus. Up to four SCSI target addresses can be set for either a single or a dual-redundant controller configuration. This allows support for up to 32 SCSI logical units (LUNs) per controller shelf.

SCSI Device Control

HSOF converts host I/O requests into device-specific SCSI commands. It supports concurrent commands and data transfers on multiple SCSI device buses to the maximum extent possible for each supported device type.

HSOF device control functions include the following:

Error Detection and Recovery

HSOF recovers from device errors including bad block replacement for supported disk drives that do not perform this function for themselves.

For errors on the SCSI host interface, HSZ40 array controller hardware and HSOF 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 controllers installed in the same controller shelf with the Digital UNIX (formerly called DEC OSF/1) Version 3.2 and higher operating system

Note: HSZ40–A*x* and HSZ40–B*x* array controllers cannot be mixed in the SAME controller shelf.

Device Integrity Testing

HSOF executes Device Integrity Test programs on system manager command. These tests perform the following:

- Verify correct operation of individual devices

- Place the HSZ40 array controller under load to verify correct subsystem operation

Disk Striping

HSOF treats sets of disk drives as stripesets (2 to 14 members) for improved I/O performance through load balancing. A stripeset appears to the Digital UNIX® operating system as a single virtual disk.

RAID (RAIDsets)

HSOF treats sets of disk drives as RAIDsets (3 to 14 members) when the separately licensed RAID option is installed. Each RAIDset is presented to the hosts as a single large virtual disk. Refer to the *HS Family of Array Controllers Optional Operating Firmware Software Product Description* (SPD 54.38.01) for HSOF Version 2.5 for further RAID option information.

Mirroring

HSOF treats sets of disk drives as mirrorsets (2 to 6 members) when the separately licensed Mirroring option is installed. Each mirrorset is presented to the hosts as a single large virtual disk. Refer to SPD 54.38.01 for HSOF Version 2.5 for further Mirroring option information.

Write-Back Cache

When the separately licensed Write-Back Cache option is installed, HSOF can provide improved I/O performance by supporting write-back caching for user selected disks, stripesets, RAIDsets, and mirrorsets. For further information concerning the Write-Back Cache option, refer to the SPD 54.38.01.

Error Logging

HSOF uses SCSI protocol messages to report faulty or failing devices and controller faults to all connected hosts that have error logging enabled.

Subsystem Management Services

HSOF provides the following subsystem management service:

Alteration of Subsystem Parameters

HSOF includes a Command Line Interpreter (CLI) utility that allows a system manager to display and manipulate controller parameters and device configuration information.

Dynamic Status Display

The HSOF VTDPY utility allows a system manager to view the HSZ40-based subsystem's state dynamically. This utility can use VT200-, VT300-, and VT400-series video terminals.

Environmental Monitor Unit (EMU)

HSOF Version 2.5 supports an EMU in SW300-series cabinets (for HSZ40–B*x* controllers only)

Local Program Support

HSOF supports the following local programs:

- DILX disk inline exerciser
- VTDPY user display of current controller state and performance data
- C_SWAP for controller and/or cache module warm swap (for dual-redundant configurations)
- FLS for enabling and disabling optional licensed features
- CFMENU for configuring controller-attached storage devices
- Code Patch (CLCP) for minor firmware changes
- FMU for displaying controller last failure and memory system failure information and control of spontaneous event logging and last failure logging displays
- CONFIG for automatically adding new devices to your configuration
- CLONE utility for obtaining snapshot copies of data (requires mirroring)

HARDWARE REQUIREMENTS

HSOF requires an HSZ40–A*x* or HSZ40–B*x* array controller on which to execute. The FWD SCSI bus must be properly terminated.

The HSZ40 array controller includes six SCSI device buses for connecting storage devices. The specific devices supported by HSOF are listed in the *OTHER HARDWARE* section of this document. Up to 42 (in a nonredundant configuration) or up to 36 (in a dual-redundant configuration) SCSI–2 and solid state disk devices may be attached to the HSZ40 array controller via 32 SCSI LUNs.

The HSZ40–A*x* or HSZ40–B*x* array controller is ordered as follows:

HSZ40–AA	StorageWorks Array Controller for 36 (dual-redundant) or 42 (nonredundant) SCSI-2 and SSD devices; no Read Cache
HSZ40–AD	StorageWorks Array Controller for 36 (dual-redundant) or 42 (nonredundant) SCSI-2 and SSD disk devices; 16 MB Read Cache
HSZ40–AF	StorageWorks Array Controller for 36 (dual-redundant) or 42 (nonredundant) SCSI-2 and SSD disk devices; 32 MB Read Cache

HSZ40–BA	StorageWorks Array Controller for 36 (dual-redundant) or 42 (nonredundant) SCSI-2 and SSD devices; no Read Cache
HSZ40–BD	StorageWorks Array Controller for 36 (dual-redundant) or 42 (nonredundant) SCSI-2 and SSD disk devices; 16 MB Read Cache
HSZ40–BF	StorageWorks Array Controller for 36 (dual-redundant) or 42 (nonredundant) SCSI-2 and SSD disk devices; 32 MB Write-Back Cache, Disk Mirroring, and RAID

HSOF supports the following optional hardware:

HSZ40–XD	Upgrades the HSZ40–AA and –BA options to include a 16 MB Read Cache option
HSZ40–XE	Upgrades the HSZ40–AD and –BD option's 16MB Read Cache to a 32 MB Read Cache option
HSZ40–XF	Upgrades the HSZ40–AA and –BA options to include a 32 MB Read Cache option
HSZ40–XX	HSZ40 Write-Back Cache option kit, includes two batteries, a battery bracket, and a Write-Back Cache option license

Configuration Restrictions

The following configuration restrictions apply:

- A maximum of six devices may be attached to a single SCSI device bus on dual-redundant HSZ40 array controller configurations.
- A maximum of seven devices may be attached to a single SCSI device bus on nonredundant HSZ40 array controller configurations.
- CD–ROM readers and tape drives are not supported.
- Do not mix HSZ40–A*x* and HSZ40–B*x* controller modules in the same controller shelf for dual-redundant controller configurations.
- For HSZ40–A*x* and HSZ40–B*x* controller dual-redundant failover configurations, Digital UNIX Version 3.2 or higher operating system software is required or OpenVMS Alpha Version 6.2 or higher for dual-redundant HSZ40–B*x* only controller configurations.
- Two controllers in the same controller shelf must be configured as a dual-redundant configuration.
- A maximum combined total of 20 mirrorsets and RAIDsets are supported with HSOF Version 2.5.
- A maximum combined total of 30 storagesets (mirrorsets, RAIDsets, and stripesets) are supported with HSOF Version 2.5.

The RAID and mirroring options require a write-back cache module.

The Write-Back Cache option requires the HSZ40–YX cache option along with the appropriate cache module option.

Note: Configuration guidelines for HSZ40 array controllers are provided in the *HS Family of Array Controllers User's Guide*.

Host Node Hardware and Software Required

A valid Digital UNIX (formerly called DEC OSF/1) or OpenVMS Alpha configuration with a supported FWD SCSI interface (see *OTHER HARDWARE* section) is required to run HSOF.

OTHER HARDWARE

HSOF supports the following SCSI host adapters:

For HSZ40–A*x* and HSZ40–B*x* array controllers supported under the **Digital UNIX** operating system:

- KZTSA (for DEC 3000 systems)
- PMAZC (for DEC 3000 system via DWZZA)
- KZMSA (for DEC 7000 and DEC 10000 systems via DWZZA)
- KZPSA (for Digital AlphaServers 1000/2000/2100 systems)

For HSZ40–B*x* array controllers supported under the **OpenVMS Alpha** Version 6.2 and higher operating system:

- KZTSA (for DEC 3000 systems)
- PMAZC (for DEC 3000 system via DWZZA)
- KZMSA (for DEC 7000 and DEC 10000 systems via DWZZA)
- KZPAA (for Digital AlphaServers 1000/2000/2100 systems)
- KZPSA (for Digital AlphaServers 1000/2000/2100 systems)

HSOF supports the SCSI-attached devices listed in Table 1:

Table 1
HSZ40 Array Controller Supported Devices

Device	Type	Capacity Gbytes	Minimum Microcode Version	Min. H/W Rev.†
RZ25–VA	disk drive	0.426	0900	B01
RZ26–VA	disk drive	1.05	T392	D02
RZ26L–VA	disk drive	1.05	440C	A01
RZ26N–VA	disk drive	1.05	466	A01
RZ28–VA	disk drive	2.1	435E	B01
RZ28B–VA	Disk drive	2.1	0003	A01
RZ28M–VA	Disk drive	2.1	466	A01
RZ29B–VA	Disk drive	4.3	0007	B01
RZ74–VA	disk drive	3.57	T427B	B07
EZ51R–VA‡	solid state disk	0.1069	V096	D01
EZ54R–VA‡	solid state disk	0.4277	V096	A01
EZ58R–VA‡	solid state disk	0.8553	V109	C01

†Hardware revision.

‡Do not use warm swap procedures for this device. Use a cold swap method for device replacement.

Note: Refer to the Version 2.5 *StorageWorks Array Controllers HSZ40 Array Controller Operating Firmware Release Notes*, order number EK–HSZ40–RN. F01, for the most current information on device support and device restrictions.

This list represents the **only** devices that are supported. Digital Equipment Corporation neither supports nor recommends any device not listed for use with the HSZ40 array controller and HSOF, regardless of supplier or stated conformance to ANSI SCSI specifications. Digital will not assure correct operation of any unqualified device, nor assure that such devices will not have impact on other supported devices, on the controller itself, or on a Digital system configuration.

SOFTWARE REQUIREMENTS

Digital UNIX (formerly called DEC OSF/1) Version 2.0 operating system or higher

Note: Digital UNIX Version 3.2 operating system or higher is required for failover operations.

The Digital UNIX operating system is supported with limitations identified in Chapter 8 of the *HS Family of Array Controllers User's Guide*.

OpenVMS Alpha Version 6.2 operating system or higher (for HSZ40–B*x* controllers only)

DISTRIBUTION MEDIA

HSOF is shipped on PCMCIA program card media only.

ORDERING INFORMATION

HSOF is shipped preinstalled with every hardware configuration that includes an HSZ40 Array Controller.

For self-maintenance customers, or others who require separate ordering of software, HSOF for the HSZ40 array controllers may be ordered separately as follows:

Software Licenses: QL–2YJA*–**

Software Media and Docs: QA–2YJA*–HS

Software Documentation: QA–2YJAA–GZ

Software Product Services: QT–2YJ9A*–**

* Denotes variant fields. For additional information on available licenses, services, and media, refer to the appropriate price book.

Refer to SPD 54.38.01 for RAID, Write-Back Cache, and Mirroring software license ordering information.

If you require more information please call 1–800–786–7967 (Digital StorageWorks Resource Center) in the United States, or Don Melanson at 603–884–2427 from outside the U.S. You also can send a FAX to Don Melanson at 603–884–3920.

SOFTWARE LICENSING

An HSOF license is shipped with every hardware configuration that includes an HSZ40 array controller.

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

The RAID, Write-Back Cache, and Mirroring options require separate licenses and require that a license key be installed for correct operation. When the RAID, Write-Back Cache, and Mirroring options are ordered with the controller, the license keys are factory installed. Refer to SPD 54.38.01 for more information. The following are the license order numbers for the Write-Back cache, RAID, and disk mirroring options:

- QL–3HXA9–AA CACHE FW HSZ40 TRAD LIC
- QL–3HXA9–RA CACHE FW HSZ40 TRAD UPD LIC
- QL–3J0A9–AA RAID FW HSZ40 TRAD LIC
- QL–3J0A9–RA RAID FW HSZ40 TRAD UPD LIC
- QL–4DTA9–AA MIRRORING FW HSZ40 TRAD LIC
- QL–4DTA9–RA MIRRORING FW HSZ40 TRAD UPD LIC

SOFTWARE PRODUCT SERVICES

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

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

SOFTWARE WARRANTY

Warranty for this software product is provided by Digital as defined in the Software Warranty Addendum of this SPD.

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