RAID Storage Controllers
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Systems and Options Catalog

StorageWorks HSD50 Series DSSI Array Controller for OpenVMS Systems

StorageWorks HSJ50 Series CI Array Controller

StorageWorks HSZ50 Series SCSI Array Controller

StorageWorks HSZ70 UltraSCSI Array Controller

StorageWorks KZPAC RAID Array 230/Plus Storage Controller

RAID Array Controller Support Matrix

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StorageWorks HSD50 Series DSSI Array Controller for OpenVMS Systems

StorageWorks HSD50 array controller expands DSSI support in the StorageWorks family of products. Each HSD50 occupies one DSSI address location (there are 8 addresses per DSSI bus) on the DSSI bus, providing connectivity for up to 42 SCSI devices. The HSD50 allows customers to significantly expand the number of DSSI-connected storage devices.

HSD50 array controller features a StorageWorks controller shelf compatible form factor. It can be installed in StorageWorks SW500 or SW800 cabinets, controlling up to 42 SCSI-2 devices, connected to up to six SCSI ports. It can also be installed in the SW300 cabinet which allows connection for up to 24 SCSI-2 devices. Up to two HSD50 array controllers may be daisy-chained together on a single DSSI interconnect. A combined maximum of up to 7 DSSI targets may reside on the same DSSI bus. The DSSI targets include: HSD50 array controllers, TF tapes, RF drives, and HSD10 devices. The tri-link and bus terminator are shipped with the HSD50 array controllers. HSD50 array controllers standard features include RAID 0 and 1, and Adaptive RAID 3/5, 32 MB writeback cache, disk partitioning and all licenses. The HSD50 may be configured as a redundant pair of controllers providing multi-host bus connection. This high availability option eliminates all single points of failure between storage devices and host CPUs.

Features

- Direct connection to the DSSI Bus.
- Connection for up to 42 SCSI Devices, 7 SCSI devices per StorageWorks shelf.
- Multihost operation, up to 3 hosts on the DSSI bus.
- Redundant configuration with multi-host bus failover.
- Supports a 60-foot maximum DSSI bus length with up to 16 feet between DSSI nodes.
- Wide drives operate in 8-bit mode.
- Highest performance DSSI controller with 1700 QIOs/sec and 3.4 MB/sec bandwidth.
- Supports disks, tape, and solid state disks.
- For easy ordering, standard features include RAID levels 0, 1 and Adaptive RAID 3/5, 32 MB writeback cache, disk partitioning and all licenses.
- Optional 64 and 128 MB writeback cache enhances performance.
- Simm packs on cache modules allow easy field upgrades.
- External cache battery in SBB allows visual monitoring and easy replacement.
- Upgrade program from HSD30 to HSD50.
- HSOF software now ordered separately with each controller.

SCSI 8-bit Devices Supported

- RZ25 .426 MB 8-bit disk
- RZ26 1.05 GB 8-bit disk
- RZ26L 1.05 GB 8-bit disk
- RZ26N 1.05 GB 8-bit disk (V2.0 or above)
- RZ28 2.1 GB 8-bit disk
- RZ28B 2.1 GB 8-bit disk
- RZ28D 2.1 GB 8-bit disk (V2.0 or above)
- RZ28M 2.1 GB 8-bit disk (V2.0 or above)
- RZ29B 4.3 GB 8-bit disk (V2.0 or above)
- RZ40 9.1 GB disk
- RZ74 3.57 GB 8-bit disk, 5.25”
- EZ51/54/58R solid state disks
- EZ64 solid state disk
- EZ69 solid state disk
- RRD42/43/44/45/46/47 CD-ROM drives
- DS-RZ1CF 4.3 GB SCSI disk
- DS-RZ1DF 9.1 GB SCSI disk
- DS-RZ1EF 18.2 GB SCSI disk
- TLZ06/TLZ6L 4mm tape devices
- TLZ07/TLZ7L 4mm tape devices
- TLZ09/TLZ9L 4mm tape drive & autoloader
- TZ86/87/87N DLT tape drives
- TZ867/877/875 tape devices with loader
- TL820/810 DLT tape library
- TL812/822/826 DLT tape libraries
- TKZ60/61/62/63/64 tape devices
- TSZ07 reel to reel tape device
- RWZ52/53 optical devices
- RW524/525/530/531/532 optical juke boxes
- RW546/551/552/555/557 optical juke boxes
- TZ88N DLT tape drives
- TZ885 tape drive loader
- TZ887 tape drive loader

StorageWorks HSD50 Series DSSI Array Controller for OpenVMS Systems *(continued)*

SCSI 16-bit Drives Supported

- RZ26L-VW 1.05 GB 16-bit disk (V2.7)
- RZ26N-VW 1.05 GB 16-bit disk (V2.7)
- RZ28-VW 2.1 GB 16-bit disk (V2.7)
- RZ28D-VW 2.1 GB 16-bit disk (V2.7)
- RZ28M-VW 2.1 GB 16-bit disk (V2.7)
- RZ29B-VW 4.3 GB 16-bit disk (V2.7)
- DS-RZ1BB 2.1 GB UltraSCSI disk
- DS-RZ1CB 4.3 GB UltraSCSI disk
- DS-RZ1DB 9.1 GB UltraSCSI disk
- DS-RZ1CF 4.3 GB UltraSCSI disk drive
- DS-RZ1DF 9.1 GB UltraSCSI disk drive
- DS-RZ1EF 18.2 GB UltraSCSI disk drive
- EZ31/32-VW solid state disk
- EZ64-VW solid state disk
- EZ69-VW solid state disk

Tape Drives Supported

- TZ89 DLT
- TL893/894/896 DLT tape libraries

Refer to HSOF Array Controller documentation for device restrictions.

Adapters Supported

- KFESA/B, KFMSA, KFMSB, KFPSA based embedded, DEC 4000 embedded

StorageWorks Environments Supported

BA35X-MH	16-bit module for BA356
BA356-SC	Shelf, no personality module (V2.7 required)
BA35X-MG	8-bit module for BA356 (V2.7 required)
BA35X-HF	150 Watt 48 volt power supply
BA350-MA/MB	Storage controller shelf
SW300-AA	StorageWorks mini cabinet
SW500-AC/AD	StorageWorks departmental cabinet
SW800-AA/AB	StorageWorks data center cabinet

Operating System Support

OpenVMS VAX V5.5-2 or higher and OpenVMS Alpha V6.1 or higher (or mixed clusters) support the HSD50 with limitations. The limitations are the devices being identified as generic or unknown device types. The model type identifiers are not present in the operating system software. In addition, complete error log decoding is not provided under ERF.

Device/Option Capabilities

- **Supported**
  - Up to seven disk storage devices on same SCSI bus from HSD50
  - Up to two tape storage devices on same SCSI bus from HSD50
  - Two solid-state storage devices on SCSI bus from HSD50
  - Up to two tapes and two disks or one tape and five disk devices on a SCSI bus from HSD50
  - Redundant configurations of two HSD50 on same, or separate, DSSI bus providing controller failover
  - Tri-host DSSI clusters
  - Use of devices attached to the HSD30 as boot device on VAX 7000/10000 processors provided the VAX 7000/10000 console code is at V4.0 or higher.
  - Use of devices attached to the HSD30 as boot device on DEC 7000/10000 systems provided the DEC 7000/10000 console code is at V3.1 or higher.
- **Not Supported**
  - Combined use of HSD50 and DWZZA/B
  - More than two HSD50 on same DSSI bus

HSD50	Single controller with single external cache battery. Order HSOF software kit separately. Supports up to 42 drives.
HSD52	Two HSD50 controllers for use in a dual redundant configuration with dual external cache batteries. Order two HSOF software kits separately. Supports up to 36 drives.

StorageWorks HSD50 Series DSSI Array Controller for OpenVMS Systems *(continued)*

Ordering Information

HSD50-AF	StorageWorks 6-channel DSSI controller, 32 MB writeback cache
HSD50-AH	StorageWorks 6-channel DSSI controller, 64 MB writeback cache
HSD50-AJ	StorageWorks 6-channel DSSI controller, 128 MB writeback cache
HSD52-AF	StorageWorks dual 6-channel DSSI controller, 32 MB writeback cache
HSD52-AH	StorageWorks dual 6-channel DSSI controller, 64 MB writeback cache
HSD52-AJ	StorageWorks dual 6-channel DSSI controller, 128 MB writeback cache
HSD5X-AA	HSD50-AF upgrade for HSD30-AA/CA
HSD5X-AD	HSD50-AD upgrade for HSD30-AD/CD
HSD5X-AF	HSD50-AF upgrade for HSD30-AF/CF
QB-5C5AA-SA	HSOF software/license for one HSD50 controller
HSSIM-AA	32 MB SIMM pack for HSD50 cache upgrade

StorageWorks Cables for the HSD50

BC29S-xx	DSSI cable to VAX or DEC 7000, 10000 Alpha systems to HSD
BC29R-xx	DSSI cable to VAX or DEC 4000 Alpha systems to HSD
BC29T-09	9-foot DSSI cable horizontal shelf to vertical shelf link for shelves that have one in front and one in back to HSD
BC29U-02	2-foot DSSI cable horizontal shelf to horizontal shelf link for shelves on same side of cab to HSD
BC29V-01	1-foot DSSI cable StorageWorks HSD30 to HSD30 cable for when DSSI bus is continued from HSD30 to HSD30 in same StorageWorks shelf HSD
BC29V-06	6-foot DSSI cable StorageWorks pedestal to pedestal cable for when DSSI bus is continued from pedestal to pedestal HSD

StorageWorks HSJ50 Series CI Array Controller

StorageWorks HSJ50 subsystems improve CI support to the StorageWorks family. These subsystems interface directly to the CI Star Coupler to provide scalability and customer defined SCSI-2 storage capacity with high performance and availability.

HSJ50 array controller features a StorageWorks controller shelf. It can be installed in StorageWorks SW500 or SW800 cabinets, controlling 36 SCSI-2 devices in a dual redundant configuration and 42 devices in a single controller configuration. The HSJ50 must be connected using the star coupler. HSJ50 array controller has 32 MB of cache as a standard feature. HSOF software is purchased separately and includes one PCMCIA card, licenses for RAID 1, RAID 3/5 and writeback cache. The HSJ50 may be configured as a redundant pair of controllers providing multi-host bus connection. This high availability option eliminates all single points of failure between storage devices and host CPUs.

Features

- Direct connection to CI— channel card functionality included.
- Performance increased over the HSJ40 Array Controller to 4600 I/O per second and 12.7 MB/sec, the highest for the CI platform.
- Writeback cache design supports 32, 64, or 128 MB of SIMMs pack memory, assuring maximum performance for large capacity disks.
- RAID 0,1,3/5 levels and writeback cache are standard features of HSOF V5.1.
- Disk partitioning is a new standard feature that allows users create logical disk drives and guarantees dedicated disk capacity for users and applications.
- External cache battery allows visual checking and easy operator replacement of cache battery.
- HSOF software is ordered separately from the controller.
- Controller operates in 8-bit mode and is wide drive ready support.

HSJ50 Array Controllers

The expanded family of HSJ50 Array subsystems provides scaleable solutions for OpenVMS CI Clusters. For all models, storage device support includes a broad range of disk, tape, solid state disk and optical alternatives. HSOF V5.1 software includes standard RAID 0 (striping), Disk Mirroring (RAID 1) and Adaptive RAID 3/5 and writeback cache license. Disk partitioning is also a standard feature.

For high availability and performance, HSJ50 Array Controllers may be deployed in dual-redundant configurations for dual path access with automatic failover. Up to 128 MB of Read cache is available on each Array Controller.

Device support has been expanded to include the following storage devices.

SCSI 8-bit Devices Supported

- RZ25 426 MB 8-bit disk
- RZ26 1.05 GB 8-bit disk
- RZ26L 1.05 GB 8-bit disk
- RZ26N 1.05 GB 8-bit disk (V2.0 or above)
- RZ28 2.1 GB 8-bit disk
- RZ28B 2.1 GB 8-bit disk
- RZ28D 2.1 GB 8-bit disk (V2.0 or above)
- RZ28M 2.1 GB 8-bit disk (V2.0 or above)
- RZ29B 4.3 GB 8-bit disk (V2.0 or above)
- RZ40 9.1 GB 8-bit disk
- RZ74 3.57 GB 8-bit disk 5.25”
- EZ51/54/58R solid state disks
- EZ64 solid state disk
- EZ69 solid state disk
- RRD42/43/44/45/46 optical devices
- DS-RZ1CF 4.3 GB SCSI disk
- DS-RZ1DF 9.1 GB SCSI disk
- DS-RZ1EF 18.2 GB SCSI disk
- TLZ06/TLZ6L 4 mm tape devices
- TLZ07/TLZ7L 4 mm tape devices (V2.0 /V2.5 or above)
- TLZ09/TLZ9L 4 mm tape drive & autoloader
- TZ86/87/87N tape devices
- TZ867/77/75 tape devices with loader
- TL820/810 DLT tape libraries
- TL812/822/826 DLT tape libraries
- TKZ60/61/62/63/64 tape devices
- TSZ07 reel to reel tape device
- RWZ52/53 optical devices
- RW524/525/530/531/532 optical juke boxes
- RW 546/551/552/555/557 optical juke boxes
- TZ88N tape device
- TZ885 tape drive loader
- TZ887 tape drive loader

StorageWorks HSJ50 Series CI Array Controller *(continued)*

16-bit Wide SCSI Drives Supported

- RZ28-VW 2.1 GB 16-bit disk (V2.7)
- RZ28D-VW 2.1 GB 16-bit disk (V2.7)
- RZ29B-VW 4.3 GB 16-bit disk (V2.7)
- RZ26L-VW 1.05 GB 16-bit disk (V2.7)
- RZ26N-VW 1.05 GB 16-bit disk (V2.7)
- RZ28M-VW 2.1 GB 16-bit disk (V2.7)
- SWXD3-WF 1.05 GB 16-bit disk
- SWXD3-WG 2.1 GB 16-bit disk
- SWXD3-WH 2.1 GB 16-bit disk
- SWXD3-WE 4.3 GB 16-bit disk
- DS-RZ1BB 2.1 GB UltraSCSI disk
- DS-RZ1CB 4.3 GB UltraSCSI disk
- DS-RZ1DB 9.1 GB UltraSCSI disk
- DS-RZ1CF 4.3 GB UltraSCSI disk drive
- DS-RZ1DF 9.1 GB UltraSCSI disk drive
- DS-RZ1EF 18.2 GB UltraSCSI disk drive
- TZ89 DLT Tape Drive
- TL893/894/896 DLT Tape Libraries
- EZ31-VW 0.134 GB solid disk device
- EZ32-VW 0.268 GB solid disk device

Refer to HSOF Software SPD (60.68.00) for device restrictions.

Adapters Supported

- CIBCA, CIXCD, CIPCA

StorageWorks Environments Supported

BA356-SC	Shelf, no I/O personality module (V2.7 required)
BA35X-MG	8-bit I/O personality module for BA356 (V2.7 required)
BA35X-MH	16-bit I/O personality module for BA356
BA35X-HF	150 Watt 48 volt power supply
BA350-MA/MB	Storage controller shelf
SW500-AC/AD	StorageWorks departmental cabinet
SW800-AA/AB	StorageWorks data center cabinet
BN21K-xx	68-pin HD straight male to 68-pin HD right angle male SCSI cable

HSJ50—HSJ50 Array Controller supports up to 36 SCSI-2 devices in dual redundant mode, 42 in single mode. Internal performance is 4600 I/O per second. Fast response time requirements are met by the standard 32 MB Read cache (expandable to 128 MB). Writeback cache options may improve performance times. Includes single external cache battery. Order HSOF Software kit separately.

HSJ52—Packaged as a dual-redundant HSJ50 configuration, the HSJ52 provides support for a maximum of 36 storage devices per controller in high performance/availability subsystem. Includes dual external cache battery. Order 2 HSOF Software kits separately.

HSJ54—The HSJ54 contains two dual-redundant HSJ52s, supporting tape, solid state disk, and optical devices. Includes two dual external cache batteries. Order 4 HSOF software kits separately.

HSJ-series controller subsystems supported by OpenVMS VAX V5.5-2 and above, and OpenVMS Alpha V6.1 or above.

Ordering Information

HSJ50-AF	StorageWorks 6-channel CI controller, 32 MB writeback cache
HSJ50-AH	StorageWorks 6-channel CI controller, 64 MB writeback cache
HSJ50-AJ	StorageWorks 6-channel CI controller, 128 MB writeback cache
HSJ52-AF	StorageWorks dual 6-channel CI controller, 64 MB writeback cache
HSJ52-AH	StorageWorks dual 6-channel CI controller, 128 MB writeback cache
HSJ52-AJ	StorageWorks dual 6-channel CI controller, 256 MB writeback cache
HSJ54-AJ	StorageWorks dual 6-channel CI controller, 512 MB writeback cache

StorageWorks HSJ50 Series CI Array Controller *(continued)*

HSJ5X-AD	HSJ50-AF upgrade for HSJ40-AD/CD
HSJ5X-AF	HSJ50-AF upgrade for HSJ40-AF/CF
QB-5C4AA-SA	HSOF software and license for one HSJ controller
HSSIM-AA	32 MB SIMM pack for HSJ50 cache upgrade
HS35X-BA	Single external cache battery in one SBB
HS35X-BB	Dual eternal cache battery in one SBB

StorageWorks HSZ50 Series SCSI Array Controller

HSZ50 controller series has been designed with new components and HSOF software to provide superior levels of performance in the HSZ50 series of controllers. Designed for open SCSI computing environments, writeback cache, RAID, disk mirroring and partitioning, and the StorageWorks Command Console are now standard features of the HSOF controller software package. Competitively priced, the HSZ50-series also features an easy upgrade process for existing HSZ40 customers. The HSZ50 controllers can be configured as redundant paths to provide high availability management of subsystems.

Features

- HSZ50 dual redundant configurations can deliver improved I/O and Bandwidth performance.
- 32 MB of standard onboard controller cache
- Easy cache expansion to 128 MB with 32 MB SIMMs packs
- Easy upgrade program for HSZ40-series
- HSOF controller software warranty and ordering process
- Standard features include Adaptive RAID 3/5, writeback cache, disk mirroring, disk partitioning, StorageWorks Command Console, and a graphical user interface
- An externally mounted cache battery in SBB

HSZ50 Array Controllers

The expanded family of HSZ50 Array subsystems provide, scaleable solutions for OpenVMS and Tru64 UNIX customers. For all models, storage device support includes a broad and increasing range of disk, tape, solid state disk and optical alternatives. HSOF V5.1 software includes standard RAID 0 (striping), disk mirroring (RAID 1) and adaptive RAID 3/5 and writeback cache license.

For high availability and performance, HSZ50 Array Controllers may be deployed in dual-redundant configurations, with automatic failover. Up to 128 MB of read cache is available on each Array Controller.

SCSI 8-bit Narrow Devices Supported

- RZ25 426 MB 8-bit disk
- RZ26 1.05 GB 8-bit disk
- RZ26L 1.05 GB 8-bit disk
- RZ26N 1.05 GB 8-bit disk (V2.0 or above)
- RZ28 2.1 GB 8-bit disk
- RZ28B 2.1 GB 8-bit disk
- RZ28D 2.1 GB 8-bit disk (V2.0 or above)
- RZ28M 2.1 GB 8-bit disk (V2.0 or above)
- RZ29B 4.3 GB 8-bit disk (V2.0 or above)
- RZ40 9.1 GB 8-bit disk
- RZ74 3.57 GB 8-bit disk 5.25”
- DS-RZ1CF 4.3 GB SCSI disk
- DS-RZ1DF 9.1 GB SCSI disk
- DS-RZ1EF 18.2 GB SCSI disk
- EZ51/54/58R solid state disks
- EZ64/69 solid state disks
- RRD42/43/44/45/46 optical devices
- TZ87/87N tape devices
- TZ877/75 tape devices with loader
- TL812/822/826 DLT tape libraries
- TZ88N tape device
- TZ885/887 DLT tape libraries

16-bit Wide SCSI Devices Supported

- RZ26L-VW 1.05 GB 16-bit disk (V2.7)
- RZ26N-VW 1.05 GB 16-bit disk (V2.7)
- RZ28-VW 2.1 GB 16-bit disk (V2.7)
- RZ28D-VW 2.1 GB 16-bit disk (V2.7)
- RZ29B-VW 4.3 GB 16-bit disk (V2.7)
- RZ28M-VW 2.1 GB 16-bit disk (V2.7)
- DS-RZ1BB 2.1 GB UltraSCSI disk
- DS-RZ1CB 4.3 GB UltraSCSI disk
- DS-RZ1DB 9.1 GB UltraSCSI disk
- DS-RZ1CF 4.3 GB UltraSCSI disk drive
- DS-RZ1DF 9.1 GB UltraSCSI disk drive
- DS-RZ1EF 18.2 GB UltraSCSI disk drive
- SWXD3-WF 1.05 GB 16-bit disk
- SWXD3-WG 2.1 GB 16-bit disk
- SWXD3-WH 2.1 GB 16-bit disk
- SWXD3-WE 4.3 GB 16-bit disk
- TZ89 DLT
- TL893/894/896 DLT tape libraries
- EZ31-VW 0.134 GB solid disk device
- EZ32-VW 0.268 GB solid disk device

Refer to HSOF Software SPD (61.36.02) for device restrictions.

StorageWorks HSZ50 Series SCSI Array Controller *(continued)*

Adapters Supported

- KZMSA, KZPSA, KZTSA, PMAZC, KZPAA, KFTIA (OpenVMS only)

StorageWorks Environments Supported

BA356-SC	Shelf, no personality module (V2.7 required)
BA35X-MG	8-bit module for BA356 (V2.7 required)
BA35X-HF	150 Watt 48 volt Power Supply
BA350-MA/MB	Storage controller shelf
SW300	StorageWorks Mini Cabinet
SW500-AC/AD	StorageWorks departmental cabinet
SW800-AA/AB	StorageWorks data center cabinet
BN21K-xx	68-pin HD straight male to 68-pin HD right angle male SCSI cable

HSZ50—HSZ50 Array Controller supports up to 36 SCSI-2 devices in dual redundant with a 32 LUN maximum mode, 42 in single mode. Internal performance is 4600 I/O per second. Fast response time requirements are met by the standard 32 MB read cache (expandable to 64 or 128 MB). Includes single external cache battery. Order HSOF Software kit separately.

HSZ52—Packaged as a dual redundant HSZ50 configuration, the HSZ52 provides support for a maximum of 36 with a 32 LUN maximum storage devices per controller in high performance/availability subsystem. Includes dual external cache battery. Order two HSOF software kits separately.

HSZ54—The HSZ54 contains two dual redundant HSZ52s, supporting tape, solid state disk, and optical devices. Includes two dual external cache batteries. Order four HSOF software kits separately.

Operating System Support

- Tru64 UNIX V3.2C, 3.2D, 3.2G, 4.0A, 4.0B
- OpenVMS Alpha V6.2, V7.0, V7.1
- Windows NT 3.5/4.0 or later

Ordering Information

HSZ50-AF	StorageWorks 32 MB cache SCSI-2 Controller
HSZ50-AH	StorageWorks 64 MB cache SCSI-2 Controller
HSZ50-AJ	StorageWorks 128 MB cache SCSI-2 Controller
HSZ52-AF	StorageWorks 64 MB cache SCSI-2 Controller
HSZ52-AH	StorageWorks 128 MB cache SCSI-2 Controller
HSZ52-AJ	StorageWorks 256 MB cache SCSI-2 Controller
HSZ54-AJ	StorageWorks 512 MB S cache CSI-2 Controller
HSZ5X-AA	1 HSZ50-AF upgrade for HSZ40-AA,BA,CA
HSZ5X-AD	1 HSZ50-AF upgrade for HSZ40-AD,BD,CD
HSZ5X-AF	1 HSZ50-AF upgrade for HSZ40-AF,BF,CF
QB-5CJAA-SA	HSOF V5.0 software license for single controller
HSSIM-AA	32 MB SIMM pack for HSZ50 series controllers
HS35X-BA	Single external cache battery in one SBB
HS35X-BB	Dual eternal cache battery in one SBB

StorageWorks HSZ70 UltraSCSI Array Controller

HSZ70 represents the next generation of high performance high availability SCSI controllers targeted for the mid to high end open systems market. The HSZ70 design is highly leveraged from the current HSZ50 design, but with optimized performance features to meet the needs of bandwidth and throughput sensitive applications. HSZ70 features an UltraSCSI (Fast20) host interconnect for burst transfer rates of 40 MB/Second (double the performance of the HSZ50 array controller) and >12000 I/O requests per second. The HSZ70 features six UltraSCSI device ports and supports up to 72 UltraSCSI or Fast10 wide storage devices. The HSZ70 also offers 128 MB fault tolerant writeback cache with mirroring for enhanced data protection, and up to 256 MB of cache in a dual redundant pair. HSOF V7.0 software includes standard RAID 0 (striping), disk mirroring (RAID 1) and Adaptive RAID 3/5 and mirrored writeback cache license. HSZ70 is a key building block of the ESA10000 and RA7000 UltraSCSI solutions which can be easily upgraded to Fibre Channel.

Features

- HSZ70 dual redundant configurations can deliver improved I/O and bandwidth performance.
- 64 MB of standard controller cache.
- Easy cache expansion to 128 MB with 64 MB SIMMs.
- Integrates higher capacity disks such as 4.3 GB, 9.1 GB and 18.2 GB.
- Common component across solutions (ESA10000 and RA7000).
- Standard features include adaptive RAID 3/5, mirrored writeback cache, disk mirroring, disk partitioning, and StorageWorks Command Console with a user graphical interface.

Multi Platform Support and Host Adapter Support

HSZ70 Solutions Software kits and host bus adapters provide the custom tools needed to link the HSZ70 to a wide variety of vendor platforms. The following platforms are qualified by StorageWorks for use with the HSZ70.

Host Bus Adapter	Operating System	HSZ70 Solutions Software Kit
KZPBA-CB (Ultra), KZPSA-BB	Tru64 UNIX V3.2G,4.0B, 4.0D	QB-5SBAB-SA/SB
KZPBA-CB[1] (Ultra), KZPSA-BB	OpenVMS V6.2-1H3,7.1-1H1	QB-5SBAC-SA/SB
KZPBA-CB (Ultra), KZPSA-BB	Windows NT/Alpha V3.51,4.0	QB-5SBAD-SA/SB
KZPSA-BB, SWXA3-BD (Ultra)	Windows NT/Intel/PCI	QB-5SBAE-SA/SB
SWSA3-CA (Ultra)	SUN Solaris V2.5,2.5.1	QB-5SBAG-SA/SB
SWHAP-BC	HP-UX 800/700 series V10.10,10.2	QB-5SBAJ-SA/SB
A2969A (F10),A4107A (F10) Embedded 735/755/J/C/D	HP-UX 700 Series	QB-5SBAJ-SA/SB
HPA4107A, FC6207	IBM V4.1.5, 4.2	QB-5SBAK-SA/SB

1. The KZPBA-CB is not supported in clusters with OpenVMS V6.2-1H3.

Device Support

The following devices are supported in ESA10000 and RA7000 subsystem configurations.

UltraSCSI Disk Drives

2 GB, 4 GB and 9 GB UltraSCSI disks recommended.

- DS-RZ1BB-VW 2.1 GB
- DS-RZ1CB-VW 4.3 GB
- DS-RZ1CD-VW 4.3 GB
- DS-RZ1DB-VW 9.1 GB
- DS-RZ1DF-VW 9.1 GB
- DS-RZ1EF-VW 18.2 GB

Fast10 Wide Disk Drives

- DS-RZ26N-VZ 1.05 GB
- RZ26L-VW 1.05 GB
- RZ26N-VW 1.05 GB
- SWXD3-WF 1.05 GB
- RZ28-VW 2.1 GB
- RZ28D-VW 2.1 GB
- RZ28M-VW 2.1 GB
- SWXD3-WG 2.1 GB
- SWXD3-WH 2.1 GB
- DS-RZ28M-VZ 2.1 GB
- RZ29B-VW 4.3 GB
- SWXD3-WE 4.3 GB

StorageWorks HSZ70 UltraSCSI Array Controller *(continued)*

Solid State Disk Drives

- EZ31-VW 134 MB
- EZ32-VW 268 MB

Tape Drives

The following tape devices may be mounted externally to the BA370 enclosure but require a DWZZB single-ended differential signal converter:

- TZ89 DLT
- DS-TL893 DLT tape library
- DS-TL894 DLT tape library
- DS-TL896 DLT tape library
- TZ87-TA
- TZ875-TA
- TZ875-NT
- TZ877-AE/AF
- TZ885-TA
- TZ887-AE/AF tape drive loader
- DS-TZ89N-TA
- DS-TZS20-VW
- TL812 tape library
- TL820 tape library
- TL822 tape library
- TL826 tape library

StorageWorks SCSI Controller Shelf Upgrade Kit Support

The following devices are supported in the SCSI Controller Shelf Upgrade Kit (DS-SWXM1-AA/BA).

Fast10 Narrow Disk Drives

- RZ25-VA 426 MB
- RZ26-VA 1.05 GB
- RZ26L-VA 1.05 GB
- RZ26N-VA 1.05 GB
- RZ28-VA 2.1 GB
- RZ28B-VA 2.1 GB
- RZ28D-VA 2.1 GB
- RZ28M-VA 2.1 GB
- DS-RZ28L-VA 2.1 GB
- RZ29B-VA 4.3 GB
- DS-RZ29L-VA 4.3 GB
- DS-RZ40-VA 9.1 GB
- RZ74-VA 3.5 GB
- SWXD3-SF 1.05 GB
- SWXD3-SG 2.1 GB
- SWXD3-SH 2.1 GB
- SWXD3-SE 4.3 GB

Fast10 Wide Disk Drives

- DS-RZ26N-VZ 1.05 GB
- RZ26L-VW 1.05 GB
- RZ26N-VW 1.05 GB
- RZ28-VW 2.1 GB
- RZ28D-VW 2.1 GB
- DS-RZ28M-VZ 2.1 GB
- RZ29B-VW 4.3 GB
- SWXD3-WF 1.05 GB
- SWXD3-WG 2.1 GB
- SWXD3-WH 2.1 GB
- SWXD3-WE 4.3 GB

UltraSCSI Disk Drives

- DS-RZ1BB-VW 2.1 GB
- DS-RZ1CB-VW 4.3 GB
- DS-RZ1DB-VW 9.1 GB
- DS-RZ1DF-VW 9.1 GB

Solid State Drives

- EZ31-VW 134 MB
- EZ41-VW 134 MB
- EZ32-VW 268 MB
- EZ42-VW 268 MB
- EZ69-VW 950 MB

StorageWorks HSZ70 UltraSCSI Array Controller *(continued)*

Tape Drives

- TZ87-VA tape device
- TZ87-TA tape device
- DS-TZ89N-TA tape device
- DS-TZ89N-VW tape device
- DS-TZS20-VW tape device
- TZ88N-TA tape device
- TZ88N-VA tape device
- TL812 tape library
- TL820 tape library
- TL822 tape library
- TL826 tape library
- DS-TL893 tape library
- DS-TL894 tape library
- DS-TL896 tape library
- TZ875-NT tape device loader
- TZ877-AE/AF tape device loader
- TZ885-TA tape device loader

Operating System Support

AlphaServer 1200	OpenVMS V7.1-1H1, Tru64 UNIX V3.2G, Windows NT 4.0 Service Pack 3
AlphaServer 4000	OpenVMS V6.2-1H3, Tru64 UNIX V3.2G, Windows NT 4.0 Service Pack 3
AlphaServer 4100	OpenVMS V6.2-1H3, Tru64 UNIX V3.2G, Windows NT 4.0 Service Pack 3
AlphaServer 8200	OpenVMS V7.1-1H1, Tru64 UNIX V3.2G, Windows NT 4.0E
AlphaServer 8400	OpenVMS V7.1-1H1, Tru64 UNIX V3.2G, Windows NT 4.0E

Ordering Information

DS-HSZ70-AH	StorageWorks 64 MB UltraSCSI Controller

StorageWorks KZPAC RAID Array 230/Plus Storage Controller

StorageWorks RAID Array 230/Plus Controller is a member of the PCI-based SCSI RAID controller family. Available in one and three channel versions, it offers all features of the StorageWorks RAID Array 230 with increased performance. It supports both UltraSCSI and Fast Wide SCSI storage enclosures and subsystems.

StorageWorks RAID Array 230/Plus Controller can coexist with StorageWorks RAID Array 210 and 230 controllers in the same server. The product includes hardware controller, RAID Configuration Utility (RCU), graphical user interface (GUI) for managing and monitoring the controller, and documentation. The RCU and online GUI utilities, included with RAID Array 230/Plus, support the entire RAID Array 200 family of products. In additional, an optional battery backup module (KZPSC-UB) retains the contents of the cache for approximately 8 to 12 hours, depending on size of cache.

RAID Array 230/Plus Controller offers a wide, 16-bit support environment. Compaq recommends Ultra BA356 storage shelves are recommended with the -VW variants of the disk drives for highest performance. The KZPAC is fully compatible with existing subsystems based on non-Ultra BA356 storage shelves.

4 MB and 8 MB cache options are available on the RAID Array 230/Plus; cache options are not interchangeable with other members of the RAID Array 200 family.

The performance of StorageWorks RAID Array 230/Plus Controller (KZPAC), compared to the RAID Array 230 Controller (KZPSC), shows an approximate increase of 25 percent in I/O per second throughput, and approximately a 30 percent increased in bandwidth. Exact performance is dependent on a large number of parameters, including RAID level; RAID subsystem specific attributes (type and size of cache); number of RAID controllers on the system; number and type of disks used; application parameters (read/write ratio, file size, and block size); type of system; overall system activity; and operating system. The default settings in the configuration utility are set to optimize performance for most applications.

StorageWorks RAID Array 230/Plus Controller comes with 3-year warranty: first year on-site; second and third year, return to dealer (RTD).

Features

- Supports UltraSCSI storage subsystems.
- High performance RAID controller for AlphaServer systems.
- UltraSCSI support for new and existing KZPAC controllers can be enabled by using the RAID Configuration Utility (RCU).
- Backplane compatible to existing Fast-10 SCSI enclosures and devices.
- Replacement for RAID Array 230, PCI-based SCSI RAID controller.
- Provides RAID Levels 0 (striping), 1 (mirroring), 0+1 (striped mirroring), and 5 (striping with parity).
- Supports up to 21 disk drives per controller; up to 8 logical drives.
- MS100-BB cache memory allows customers to upgrade an existing KZPAC-CA to a KZPAC-CB at minimal cost and to obtain the highest performance possible from a KZPAC RAID controller.

Ordering Information

StorageWorks RAID Array 230/Plus Controller (KZPAC) subsystem is available in three models. It can be configured with disk drives inside system enclosure or in standalone StorageWorks pedestal enclosures.

StorageWorks RAID Array 230/Plus Controller

Note: SCSI cables must be ordered separately

KZPAC-AA	One port UltraSCSI (Single-Ended) PCI-based RAID Controller with 4 MB of cache memory, 68-pin HD connector on module for internal connection, 0.8 mm 68 pin connector on module's standard PCI bulkhead for external connection, StorageWorks RAID Array 230/Plus Subsystem Software, StorageWorks RAID Array 200 Management Utility, media; licenses and documentation. Requires SCSI cable.
KZPAC-CA	Three port UltraSCSI (Single-Ended) PCI-based RAID Controller with 4 MB of cache memory, 68-pin HD connectors on module for internal connection, two ports are available through 0.8 mm 68 pin connectors on module's standard PCI bulkhead for external connection (third port can be connected to a 0.8 mm 68-pin connector on a standard PCI bulkhead connector via an adapter cable), StorageWorks RAID Array 230/Plus Subsystem Software, StorageWorks RAID Array 200 Management Utility Media, license, and documentation. Requires SCSI cables.

StorageWorks KZPAC RAID Array 230/Plus Storage Controller *(continued)*

StorageWorks RAID Array 230/Plus Controller

KZPAC-CB	Three port UltraSCSI (Single-Ended) PCI-based RAID Controller with 8 MB of cache memory, 68-pin HD connectors on module for internal connection, two ports available through 0.8 mm 68 pin connectors on module's standard PCI bulkhead for external connection (third port can be connected to a 0.8 mm 68-pin connector on a standard PCI bulkhead connector via an adapter cable), StorageWorks RAID Array 230/Plus Subsystem Software, StorageWorks RAID Array 200 Management Utility, media; licenses, and documentation. Requires SCSI cables.
KZPSC-UB	Battery module for all KZPAC cache memory
KZPAC-SB	Dual bulkhead assembly for connecting two third channels from KZPAC and/or KZPSC to one bulkhead slot.

SCSI cables and Cache Options

BN31L-1E	8-bit narrow SCSI cable (1.5 meter)
BN31M-1E	16-bit wide SCSI cable (1.5 meter)
BN31S-1E	16-bit wide SCSI right angle cable (1.5 meter) for BA356 StorageWorks enclosure
BN31S-02	16-bit wide SCSI right-angle cable (2.0 meter) for BA356 StorageWorks enclosure. Note: BN31S-1E 1.5 meter cable should be used if possible.
BN31K-0E	16-bit wide SCSI internal cable with bulkhead (0.5 meter) for KZPSC/KZPAC third port external connections
BN37A-xx	UltraSCSI cable for connecting the KZPAC to BA356 storage shelves (xx designates required length)
MS100-BB	8 MB EDRAM cache memory SIMM which upgrades KZPAC-CA to KZPAC-CB. (Note: The MS100-BB is not supported on the one-channel KZPAC-AA; also MS100-AA and MS100-AB, expanded cache modules for the KZPSC, are not applicable to KZPAC.)

Hardware Support

Firmware Revision required V2.42

Note: All servers except AlphaServer 800 require external drives for UltraSCSI support; see system configuration menus for requirements

- AlphaServer 800
- AlphaServer 1000
- AlphaServer 1200
- AlphaServer 2000
- AlphaServer 2100A
- AlphaServer 4000/4100
- AlphaServer 8200/8400
- AlphaServer DS20
- AlphaServer ES40
- AlphaServer GS60
- AlphaServer GS60E
- AlphaServer GS140
- Alpha Workstation XP900
- Alpha Workstation XP1000
- Alpha Workstation 500a, 600a
- Alpha Workstation 500au
- Alpha Workstation 600au

Software Support

Note: See system configuration menus for requirements

- TRU64 UNIX V3.2G and V4.0B or later
- Windows NT 3.51 with Service Pack 4, 4.0 or later
- OpenVMS V6.2-1H3 or later, V7.1 or later
- Tru64 UNIX V4.0G, Windows NT 4.0, and OpenVMS V7.1 required for AlphaServer 800, AlphaServer 1000A 5/333, 5/400, and 5/500 systems

CD-ROM and Tape Support

- CD-ROM or tape support is not available for TRU64 UNIX or OpenVMS.
- Windows NT pass through capabilities are provided for the following:
  - CD-ROM drives RRD43-VA, RRD44-VA, RRD45-VA, RRD46-VA, and DS-RRD47-VA
  - Tape drives TKZ10-VA, TKZ11-VA, TLZ06-VA, TLZ07-VA, TLZ09-VA, TZ86-VA, TZ87-VA, TZ88-VA, and TZ89-VW

StorageWorks KZPAC RAID Array 230/Plus Storage Controller *(continued)*

Disk Drives Supported

- RZ26N-VA/VW 1.05 GB
- RZ28D-VA/VW 2.1 GB
- RZ28M-VA/VW 2.1 GB
- RZ29B-VA/VW 4.3 GB
- DS-RZ28L-VA 2.1 GB 7200 RPM SCSI
- DS-RZ29L-VA 4.3 GB 7200 RPM SCSI
- DS-RZ40-VA 9.1 GB 7200 RPM SCSI
- DS-RZ1CF-VA 4.3 GB UltraSCSI
- DS-RZ1DF-VA 9.1 GB UltraSCSI
- DS-RZ1BB-VW 2.1 GB UltraSCSI
- DS-RZ1CB-VW 4.3 GB UltraSCSI
- DS-RZIDB-VW 9.1 GB UltraSCSI
- DS-RZ1CF-VW 4.3 GB UltraSCSI
- DS-RZ1CD-VW 4.3GB UltraSCSI
- DS-RZ1DA-VW 9.1GB UltraSCSI
- DS-RZ1DF-VW 9.1 GB UltraSCSI
- DS-RZ1DD-VW 9.1 GB UltraSCSI

Note: KZPAC RAID Array 230/Plus Controller Supports SCSI and UltraSCSI 9 GB drives, however, there is a limit of 32 GB of user addressable space per logical drive. User addressable space is the amount of disk capacity available to the user, not including parity, and varies according to RAID level. This limit was not an issue before the support of 9 GB drives since users were less likely to exceed a logical drive size of 32 GB with 4.3 GB drives. The RA230/Plus can support an all 9 GB drive environment provided that no logical drive exceeds a maximum capacity of 32 GB. Please be aware of this 32 GB logical drive limit when KZPAC RA230/Plus controllers are ordered with 9 GB drives.

The user addressable space is set with the RAID Configuration Utility (RCU). When the RAID level is selected, the RCU states the amount of available user addressable space. If the number exceeds 32 GB the user must divide that space so that one logical drive does not exceed 32 GB. Up to 8 logical drives per controller are supported (8 x 32 GB).

A RAID logical unit can be a partition of several physical drives. Using one KZPAC-CA/-CB RAID controller, twenty-one 9 GB drives can be connected for a total of 63 physical GB per channel or 189 physical GB per 3 channel controller. Depending on the RAID level selected, a portion of this physical capacity is used for parity. The remaining space is available to the user, called user addressable. With the ability to support up to eight logical drives, the physical capacity can easily accommodated (32 GB x 8 logical drives = 256 GB), far higher than the 189 physical capacity. For more information on RAID level capacities, see Customer Update for StorageWorks RAID Array 230/Plus Controller with UltraSCSI Support dated 15 August 1997 at: http://webir.das.dec.com/info/CU5911/CU5911HM.HTM

Chart shows number of drives supported per KZPAC controller

RAID Level	Physical Drive per logical drive	Usable Storage	Data Redundancy	Maximum # of drives per KZPAC-AA	Maximum # of drives per KZPAC-CA/CB
0	2 to 8	100	No	7	21
1	2	50 percent	Yes	6	16
0+1	3-8	50 percent	Yes	7	21
5	3-8	66-87 percent	Yes	7	21
JBOD	1	All	No	7	8

StorageWorks KZPAC RAID Array 230/Plus Storage Controller *(continued)*

Specifications

System bus interface	Industry standard PCI 2.1-compliant
Supported RAID levels	0, 1, 0+1, 5, JBOD (Just a Bunch of Disks)
SCSI channels	SCSI-2, 16-bit Fast Wide Single-ended, (20 MB per second) supports 8-bit and 16-bit drives
Non-RAID device support	Yes, disk drives (JBOD)
Non-disk device support	Yes, CD-ROM and tapes supported on Windows NT only -- RRD43, RRD44, RRD45, RRD46, TLZ06, TLZ07, TLZ09, TZ86, TZ87, TZ88, TZ89
Drive reconstruction	Automatic
Disk hot swap	Yes
Disk hot spare	Yes
Redundant power supplies	Yes
Redundant controllers	No
Redundant fans	Yes
Mixed drive types	Yes
Mixed RAID levels within drive	Yes, group
Configurable reconstruct time	Yes
Stripe size	Variable 8 to 64 KB
Write-through cache	Yes, user-selectable (default)
Writeback cache	Yes, user-selectable (optional)
Battery backup for cache	Yes
Boot capability	Bootable from RAID set (system dependent)
Number of controllers per system	4 RAID controllers per system in any combination of RAID Array 210, 230, or 230/Plus; subject to minimal operating system levels and system specific configuration guidelines
Cache support	4 MB on KZPAC-AA, 4 MB on KZPAC-CA, 8 MB on KZPAC-CB
Enclosure support	UltraSCSI Enclosures: Seven device Pedestal—DS-BA356-KF, DS-BA356-KG UltraSCSI Storage Shelves -- DS-BA356-SD/SE, DS-BA356-RC/RD, DS-BA356-JD/JE Fast Wide SCSI enclosures: Seven device pedestal -- BA356-KC, BA356-KD Storage shelves -- BA356-JC, BA356-SB, BA356-SC

RAID Array Controller Support Matrix

Operating Systems	HSD10	HSD30	HSD50	HSJ30	HSJ50	HSZ50
Tru64 UNIX V3.2c or higher						X
Open VMS ALPHA V6.1 or higher	X	X	X	X	X	X
Open VMS VAX V5.5-2 or higher	X	X	X	X	X	
Windows NT Alpha Server 3.51 or higher						X
Windows NT Intel Server V3.51 or higher						X
Sun Solaris V 2.4 or higher						X
HP-UX V10.0 or higher						X
IBM AIX V4.1.4 or higher						X
Novell NetWare V4.1						X
Adapters						
DEC 4000 embedded		X	X			
SHAC-based embedded		X	X			
EDA670	X					
KFDDA/B	X					
KFPSA		X	X			
KFMSA	X	X	X			
KFMSB	X	X	X			
KFESA	X	X	X			
KFESB			X			
KFTIA						X
KFQSA	X					
CIXCD-AB/AC				X	X	
CIBCA-BX				X	X	
CIPCA				X	X	
CI780				X		
KZMSA						X
KZPAA						X
KZPSA						X
KZTSA						X
PMAZC						X

RAID Array Controller Support Matrix

Operating Systems	HSD10	HSD30	HSD50	HSJ30	HSJ50	HSZ50
SWXA3-BC						X
SWIA3-BB						X
SWSAP-BC						X
SWHAP-BC						X
SWXA3-BC						
8-bit Narrow SCSI Devices						
EZ64-VA	X	X		X	X	X
EZ69-VA	X	X		X	X	X
RZ25		X	X	X	X	X
RZ26	X	X	X	X	X	X
RZ26L	X	X	X	X	X	X
RZ26N		X	X	X	X	X
RZ28	X	X	X	X	X	X
RZ28B	X	X	X	X	X	X
RZ28D	X	X	X	X	X	X
RZ28M	X	X	X	X	X	X
RZ29B	X	X	X	X	X	X
RZ40	X	X	X	X	X	X
RZ73	X					
RZ74	X	X	X	X	X	X
EZ51/54/58R	X	X	X	X	X	X
RRD42/43/44/45/46	X	X	X	X	X	X
TLZ06/TLZ6L	X	X	X	X	X	
TLZ09/TLZ9L	X	X	X	X	X	
TLZ07/TLZ7L	X	X	X	X	X	
TZ86/87/87N	X	X	X	X	X	
TZ885/887		X	X	X	X	X
TZ867/77/75	X	X	X	X	X	X
TZ87	X	X				X
TZ88	X	X	X	X	X	X
TL820/810/812/822/826	X	X	X	X	X	X
TKZ60/61/62/63/64	X	X	X	X	X	
TSZ07	X	X	X	X	X	
RW524/525/530/531/532	X	X	X	X	X	
RWZ52/53	X	X	X	X	X	
RW546/551/552/555/557	X	X	X	X	X	
SWXD3-SF		X	X		X	X
SWXD3-SG		X	X		X	X
SWXD3-SH		X	X		X	X
SWXD3-SE		X	X			X

RAID Array Controller Support Matrix

16-bit Wide SCSI Devices	HSD10	HSD30	HSD50	HSJ30	HSJ50	HSZ50
DS-RZ1BB-VW		X	X	X	X	X
DS-RZ1CB-VW		X	X	X	X	X
DS-RZ1DB-VW		X	X	X	X	X
DS-RZ26N-VZ		X	X		X	X
DS-RZ28M-VZ		X	X		X	X
DS-RZ40-VA		X	X		X	X
EZ31-VW		X	X	X	X	X
EZ32-VW		X	X	X	X	X
EZ64-VW		X	X	X	X	X
EZ69-VW		X	X	X	X	X
RZ28-VW			X	X		
RZ28D-VW		X	X	X		X
RZ29B-VW		X	X	X		X
RZ26L-VW		X	X	X		X
RZ26N-VW		X	X	X		X
RZ28M-VW		X	X	X		X
SWXD3-WF		X	X		X	X
SWXD3-WG		X	X		X	X
SWXD3-WH		X	X			X
SWXD3-WE		X	X		X	X
TZ89		X	X	X	X	X
TLZ893/TLZ894/TLZ896		X	X	X	X	X