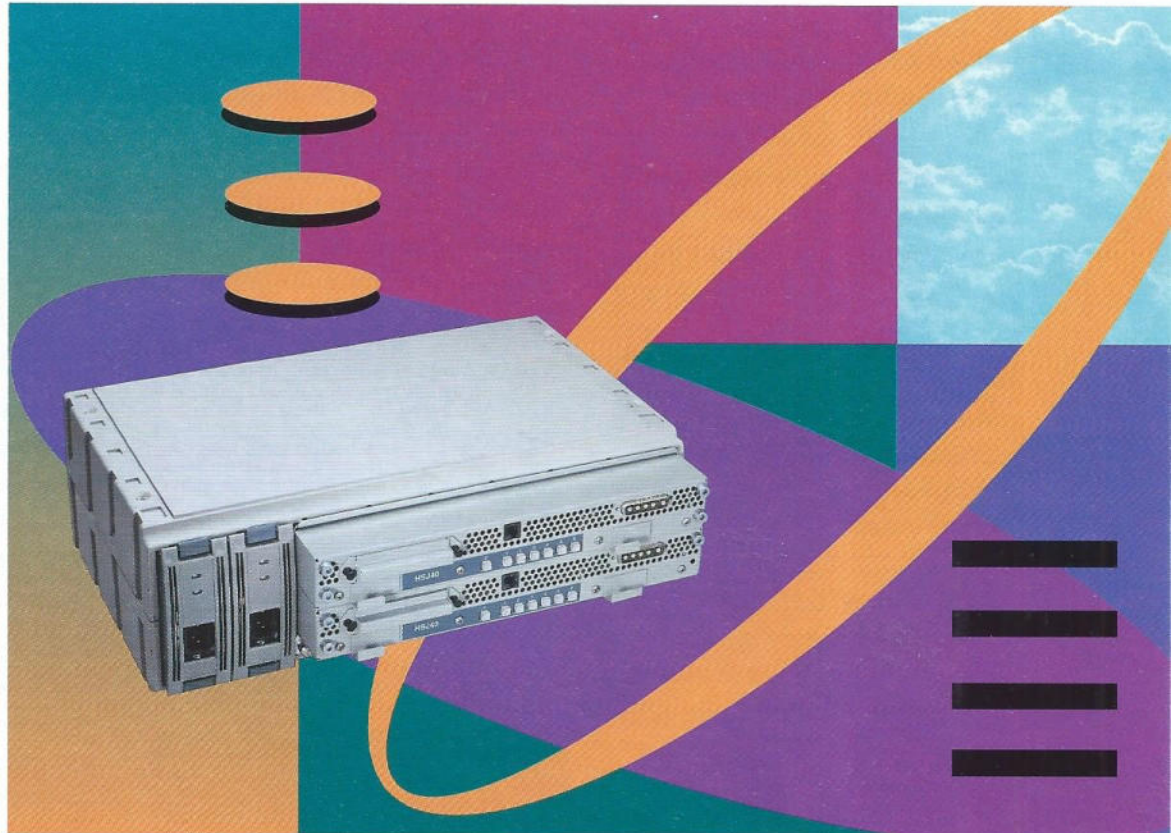# StorageWorks™

## STORAGEWORKS HSJ40 ARRAY CONTROLLER

### Providing Multiple Levels of Performance and Availability For VAX and Alpha AXP OpenVMS Clusters

digital



**Enables SCSI-2 storage to sustain high-end computing**

**On-board RAID and cache**

**Integrates with HSC servers**

**Dual-path support boosts performance and availability**

Now you can have the precise level of performance and availability you need — for any storage capacity you require. That's the storage breakthrough for the CI (Computer Interconnect) made possible by Digital's StorageWorks HSJ40 Array Controller.

StorageWorks solutions provide a multidimensional world in which you can select the optimum storage for every application. If your needs change, simply increase or reconfigure the modular storage elements to move to a different level of performance, availability, and capacity in your CI subsystem.

The HSJ40 controller gives you the capabilities of Digital's HSC servers — using the industry's broadest range of standard devices. The controller is an intelligent storage server that integrates storage devices based on the SCSI-2 (Small Computer Systems Interface-2) standard with the CI. It also delivers the performance and availability benefits of RAID (Redundant Array of Independent Disks) and caching technologies. And since the controller fully complies with DSA, the Digital Storage Architecture, it ensures reliable transmission of data in your cluster environment. Can you afford a solution that offers anything less?

## HIGHLIGHTS

Supports affordable, industry-standard SCSI-2 storage for CI clusters

Connects an expanding mix of up to 36 SCSI disk, tape, and optical devices

Two controllers can provide dual-path access for improved performance and higher availability

Comes standard with RAID 0 (disk striping) and supports host-based RAID 1 (Volume Shadowing)

Includes 16 MB read cache, optionally expandable to 32 MB

Provides investment protection by integrating easily with HSC servers in VAX and Alpha AXP OpenVMS Clusters

Makes ordering and expanding exceptionally easy when matched with SW series packaged solutions

Suitable for worldwide use

## OFFERS AFFORDABLE, INDUSTRY-STANDARD STORAGE

The HSJ40 controller makes it possible to build reliable high-end storage subsystems using low-cost devices built to the SCSI-2 standard. Unlike implementations that limit your options, StorageWorks subsystems include a wide and expanding range of devices available in the industry's most flexible, modular storage architecture.

## SUPPORTS MULTIPLE STORAGE DEVICES

Each HSJ40 controller supports the following disk, tape, and CDROM storage devices:

- RZ25-VA 425 MB 3.5-inch disk drive
- RZ26-VA 1.05 GB 3.5-inch disk drive
- RZ28-VA 2.1 GB 3.5-inch disk drive
- RZ74-VA 3.57 GB 5.25-inch disk drive
- TZ867-AE/AF 42 GB DLT (Digital Linear Tape) magazine subsystem
- TLZ06-VA 4 GB DAT (Digital Audio Tape) tape drive
- TLZ6L-VA 16 GB DAT magazine subsystem
- RRD42-VB CDROM drive

Additional SCSI devices will be supported in the near future.

## COMPLETE CONFIGURATION FLEXIBILITY

*Configuring for Expandability*

You can configure the StorageWorks HSJ40 Array Controller to expand as your business needs grow — supporting up to 36 storage devices on six independent, fast single-ended SCSI-2 device ports.

Install one or a pair of HSJ40 controllers in a StorageWorks controller shelf, which mounts along with building-block shelves in cabinets. Digital offers two SW series cabinets. One can hold up to 10 shelves; the other 22 shelves.

Both cabinets can hold TZ867 DLT magazine subsystems. Each of these subsystems, attached to an HSJ40 controller, can back up 42 GB of data without operator intervention.

Using this compatible combination of StorageWorks products satisfies the storage demands of a broad range of application environments — all in a single storage enclosure.

Digital's preconfigured SW series entry subsystems provide everything you need to use the controller and industry-standard disk building blocks in your CI clusters: StorageWorks cabinet, shelves, internal cables, and the first six disk drives.

When your storage requirements increase, insert additional building blocks into the shelves. Digital's 3.5-inch and 5.25-inch SCSI-2 disk drives make expansion a simple matter of "plug and play."

*Configuring for Availability*

It's easy to build a subsystem using redundant power supplies and shadowed disks dual-pathed to two StorageWorks controllers — thus eliminating single points of failure. Each controller shelf can house dual controllers and dual power supplies. Dual-pathing allows drives on a SCSI bus to be accessed by either of two controllers — so that if one controller fails, I/O requests will automatically be completed by the other controller. And, unlike third-party subsystems for the CI that emulate a single HSC server — potentially a single point of failure — both HSJ40 controllers are completely separate nodes on the CI.

The HSJ40 controller is compatible with Digital's host-based RAID software products, including VAX Disk Striping Driver and Volume Shadowing Phase II.

*Configuring for Performance*
I/O response time of the HSJ40 controller is the fastest of any CI storage controller. This is a significant benefit for single-stream applications, batch jobs, and many interactive environments. Most OpenVMS applications will generate performance between that of Digital's HSC90 and HSC95 controllers. For multistream interactive applications, a single HSJ40 controller can handle up to 1,100 I/O requests per second, communicating over the CI at up to 4 MB/s.

When you choose a dual-controller configuration for high availability, you can also balance the workload between the two controllers, using the preferred path facility of OpenVMS. Net result: a two-controller subsystem capable of twice the I/O activity that a single-controller subsystem provides.

The controller subsystem meets high-throughput demands with its multiple levels of cache and the industry's most advanced cache management firmware. A 16 MB read cache is included within the HSJ40 controller. This complements the cache already within Digital's SCSI disk drives, and is expandable to 32 MB. Controller caching is selectable by device address, so you can direct its performance advantage to exactly where it is most needed. Controller-based disk striping (RAID 0) is also included for I/O load-balancing in interactive applications.

By selecting different disk drives, you can optimize your StorageWorks subsystem for performance and maximum cost-effectiveness. To reach your required capacity, use more small-capacity disk drives to increase the overall I/O performance. Less frequently accessed data can be stored on high-capacity disks that cost less per megabyte. StorageWorks disk building blocks — which span a range of 426 MB to 3.57 GB — let you configure subsystems to meet your cost and performance goals.

## MODULAR CONSTRUCTION WITH UPGRADABLE FIRMWARE

The StorageWorks controller's modular construction makes upgrades efficient and easy. Plug-in firmware provides the base controller functions plus user-selectable RAID 0. As additional RAID options become available, you can upgrade and enhance your configuration.



*Preconfigured solutions, matched with HSJ40 controllers and CI cables, provide everything you need to attach industry-standard storage to your CI cluster.*

## PACKAGED SOLUTIONS PROVIDE A QUICK START

We've made it exceptionally easy to configure and order HSJ40 based subsystems. Our StorageWorks pre-configured entry solutions, combined with your choice of HSJ40 controller and CI cables, provide everything you need to obtain high-performance, ready-to-run subsystems — including all the internal cables. Adding capacity and boosting performance is as easy as ordering more disk storage building blocks. Configuring for higher availability can be as simple as ordering a second controller and dual power sources. And plenty of room remains in the cabinets to add tape magazine subsystems and additional components.

The HSJ40 controller dramatically expands your choices for CI-based storage. As a core element of Digital's modular storage architecture, it gives you unprecedented flexibility to configure storage to meet your precise needs — now and for generations of computing technology to come.

## SPECIFICATIONS

| | |
|---|---|
| Models | HSJ40-AD (includes 16 MB read cache) |
| | HSJ40-AF (includes 32 MB read cache) |
| Maximum per shelf | 2 (dual path) |
| Host interface | CI |
| Drive interface | Fast single-ended SCSI-2 |
| Peak I/O requests/s | |
|     Single controller | 1,100 |
|     Dual controllers | 2,200 |
| Peak controller bandwidth (MB/s) | 4.0 |
| SCSI ports | 6 |
| Maximum drives/controller | 36 |
| Operating system support | OpenVMS VAX 5.5-1 or higher |
| | OpenVMS AXP 1.5 |
| Power requirements (controller shelf): | |
| Voltage | 100 to 240 VAC |
| Frequency | 50/60 Hz |
| Power supply rating | 164 Watts input/131 Watts output |
| Redundant power | Optional |
| Battery backup | Optional |
| Environmental: | |
| Operating temperature | 10°C to 40°C |
| Non-operating | −40°C to 66°C |
| Relative humidity | 10% to 80% |
| Regulatory approvals | FCC-B, UL, CSA, VDE, TÜV |
| Physical (controller shelf): | |
| Height | 565 mm (22.2 in) |
| Width | 209 mm (8.2 in) |
| Depth | 432 mm (17.0 in) |