StorageWorks RAID Array 230/Plus Subsystem

StorageWorks RAID Array 230/Plus subsystem is a hardware-based RAID solution for Alpha system platforms that use the industry-standard PCI bus. The StorageWorks RAID Array 230/Plus controller (KZPAC) is used in conjunction with supported drives and enclosures to build a complete RAID subsystem. Depending upon the workload, system and storage configurations, and RAID subsystem parameter setttings, the StorageWorks RAID Array 230/Plus will demonstrate higher performance and throughput than its predecessor, the StorageWorks RAID Array 230.

RAID Array 230/Plus provides RAID levels 0 (striping), 1 (mirroring), 0+1 (striped mirrored sets), and 5 (striping with distributed parity). By providing RAID functionality, it binds a collection of disk drives into logical drives to provide data redundancy and/or increased performance. Performance improvements are obtained by striping user data across a number of disk drives, thus overlapping disk operations (RAID 0, 0+1).   JBOD (Just a bunch of disks) is available if no RAID is required and offers connectivity options with single disks.

Redundancy is obtained by keeping additional copies of user data on a redundant disk drive (RAID 1), or by generating and storing data parity so that user information can be reconstructed in the event of a disk failure (RAID 5). In either case, the application continues to run without data loss in the event of a single disk drive failure.

For more information on RAID, see the *Buyer's Guide to RAID Storage* (EC-G2412-45).

The StorageWorks RAID Array 230/Plus subsystem comprises a PCI backplane RAID controller, operating system specific RAID drivers and utilities (software), documentation, and disk drives with appropriate cables and enclosures. The controller provides RAID functionality. It is a backplane controller, and plugs directly into the PCI bus inside the system enclosure. Therefore, RAID functionality can be provided for disk drives inside, as well as outside, the system enclosure.

In a standalone RAID subsystem, controllers and disks are housed in separate StorageWorks pedestal enclosures while the PCI-to-SCSI adapter resides in the server. In a server based solution such as the RAID Array 230/Plus, controller acts as both the controller and adapter in a single component. This provides a lower-cost solution than traditional standalone RAID controllers.

The StorageWorks RAID Array 230/Plus controller is available in three models:
- a single SCSI channel model with 4 MB of cache that supports up to 7 disk drives,
- a three SCSI channel model with 4 MB of cache that supports up to 21 drives, and
- a three SCSI channel model with 8 MB of cache that supports up to 21 drives

RAID drivers and utilities provide the following functionality:

- RAID subsystem configuration (display drive array map, bind disks into RAID sets, configure array parameters, etc.)
- RAID subsystem monitoring and fault reporting. Status changes are reported to OPCOM (OpenVMS), System Console (Digital UNIX) Event Viewer (Windows NT); written to a log file (Digital UNIX and OpenVMS); and notification can be sent via MAIL (OpenVMS).
- RAID subsystem maintenance (parity check and repair, firmware updates)

System Support

The StorageWorks RAID Array 230/Plus subsystem is supported on Alpha systems that use the industry-standard PCI bus. Currently, the Alpha 4000/4100 servers are supported. Other Alpha servers will be supported in the near future.   Please refer to the system specific ordering menu for currently supported options and configuration guidelines.

Operating System Support

StorageWorks RAID Array 230/Plus subsystem is supported on

- Digital UNIX V3.2G; Digital UNIX V4.0A

- OpenVMS 6.2-1H3 or later, and

- Windows NT for Alpha V3.51 with Service Pack 4 or later

StorageWorks RAID Array 230 Plus Subsystem

Ordering Information

StorageWorks RAID Array 230/Plus Subsystem consists of the following key components:

- PCI RAID controller, which plugs in directly to the server's PCI bus (KZPAC).
- Software and documentation kit
- Device drivers and RAID utilities for chosen system platform.

Ordered separately are:

- StorageWorks disk drives
- Enclosures, as required, to house disks
- Cables to connect controller to disk drives
- Additional StorageWorks components (redundant power supplies, fans, etc.)

Controllers, Cables, and Battery Backup Components

KZPAC-AA   **Single (FWSE) SCSI channel PCI backplane RAID controller with 4 MB of cache memory** for Alpha systems, 68-pin HD connector on the module for internal connection and an 0.8 mm 68 pin connector on the module's stannadard PCI bulkhead for external connections. Includes StorageWorks RAID Array 230/ Plus Subsystem Software, StorageWorks RAID Array 200 Management Utility for OpenVMS and Digital UNIX, StorageWorks RAID Array 200 Management Utility for Windows NT, media licenses, and documentaition. Requires SCSI cables, not included.

KZPAC-CA   **Three (FWSE) SCSI channel PCI backplane RAID controller with 4 MB of cache memory** for Alpha systems, 68-pin HD connectors on the module for internal connection, two channels available through 0.8 mm 68 pin connectors on the module's standard PCI bulkhead for external connection, the third channel can be connected to a 0.8 mm 68-pin connector on a standard PCI bulkhead connector via an adapter cable. Includes StorageWorks RAID Array 230/ Plus Subsystem Software, StorageWorks RAID Array 200 Management Utility for OpenVMS and Digital UNIX, StorageWorks RAID Array 200 Management Utility for Windows NT, media licenses, and documentaition. RequiresSCSI cables, not included.

KZPAC-CB   **Same as the KZPAC-CA, but includes 8 MB of cache memory.**

KZPAC-SB   **Dual bulkhead interconnect assembly.** Allows the third channels from two PCI backplane RAID controllers, in any combination of KZPSC or KZPAC, to share one additional PCI bulkhead positionassembly, thereby saving a bulkheadPCI slot in comparison to utilizing two BN31K-0Es.

BN31K-0E   **SCSI cable and bulkhead assembly** for internal connection from KZPAC-CA/CB module to system cabinet bulkhead (17-04108-01). Use to connect a single KZPAC-CA/CB 3rd SCSI channel to system bulkhead. - 16 bit capable - 0.5m

BN31L-1E   **External 1.5 m, 8-bit SCSI-2 cable**. (17-04107-01). Connects 0.8 mm 68-pin HD connector from PCI bulkhead connector to 50-pin HD SCSI connector on StorageWorks 8-bit device enclosure. Use one for each KZPSC external SCSI channel.

BN31M-1E   **External 1.5 m, 16-bit SCSI-2 cable** (17-04107-02). Connects 0.8 mm 68-pin HD connector from PCI bulkhead connector to 68-pin HD SCSI connector on StorageWorks 16-bit enclosure (BA354). Use one for each KZPSC or KZPAC external SCSI channel.

BN31S-1E   **External 1.5 m, 16-bit SCSI-2 cable** (17-04107-03) Connects 0.8 mm connector from the PCI bulkhead to 68-pin HD SCSI connector on a BA356, StorageWorks 16-bit enclosure, I/O personality module (BA35X-MH). Use one for each KZPSC or KZPAC external SCSI channel.

BN31S-02   **External 2.0 m, 16-bit SCSI-2 cable** (17-04107-03Connects 0.8 mm connector from the PCI bulkhead to 68-pin HD SCSI connector on a BA356, StorageWorks 16-bit enclosure, I/O personality module (BA35X-MH). Use one for each KZPSC external SCSI channel. Specific to Alphaserver 4000 systems. **(This cable is required with Alphaserver 4000 configurations only when one of three internal storage shelf is at the maximum distance from the CPU. For all other storage shelves, the BN31S-1E is the required cable.)**

KZPSC-UB   **Battery module for all KZPSC or KZPAC cache memories.** Provides up to 12 hours of memory retention for 4 Mbyte of cache memory or 8 hours with the 8 MB cache memory with KZPAC. Provides up to 20 hours of memory retention with KZPSC. These guidelilnes are based upon new, fully-charged batteries. If batteries are not fully charged, a decrease Some deterioration in memory retention time will occur.should be expected over time.

StorageWorks RAID Array 230/Plus Subsystem

RAID Level/Drives supported

RAIDLevel	Physical Drives per logical drive	Usable Storage	Data Redundancy	Max. Number drives KZPAC-AA	Max. Number drives KZPAC-CA/CB
0	2-8	100%	No	7	21
1	2	50%	Yes	6	16
0+1	3-8	50%	Yes	7	21
5	3-8	66%-87%	Yes	7	21
JBOD	1	100%	No	7	8

Specifications

Non-RAID device support	Yes, disk drives (JBOD)
Non-Disk device support	Yes, Tape drives and CD-ROM drives for Windows NT only
	Tape Drives: TLZ06, TLZ07, TZ86, TZ88
	CD-ROM Drives: RRD43, RRD44, RRD45
Supported Disk Drives	RZ26N-VA/VW (1.05 Gbytes) RZ28D-VA/VW (2.1 Gbytes) RZ28M-VA/VW (2.1 Gbytes) RZ29B-VA/VW (4.3 Gbytes)
Drive Reconstruct	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 Group	Yes
Configurable reconstruct time	Yes
Stripe size	Variable, 8K-64KB
Write through cache	Yes, User Selectable (default)
Write back cache	Yes, User Selectable (optional)
Battery Backup for Cache	Yes
Boot capability	Bootable from RAID set (System dependant)
Number of controllers/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 - 8 Mbytes as specified in model numbers

Technical Information

System bus interface	Industry-standard 32 bit PCI
Controller form factor	Industry-standard full length PCI card
Supported RAID levels	0, 1, 0+1, 5, JBOD ("just a bunch of disks")
Supported drive channels	1 or 3 SCSI channels
Number of drive groups	Up to 8 per controller
SCSI channels	SCSI-2, 8 and 16 bit, Single-Ended,Fast (10/20 Mbytes/second)
Number of disks supported per controller	Up to 7 per SCSI channel: KZPAC-AA - 7 disk drives maximum, per 'Drives supported' table KZPAC-CA/CB - 21 disk drives maximum, per 'Drives supported' table