Software Product Description

PRODUCT NAME: **HSZ70 Array Controller Operating Software HSOF Version 7.7 and Version V7.7a**

SPD: 64.81.09

Description

The HSZ70 StorageWorks™ Solutions Software provides storage controller software and storage management capability for products that incorporate the use of HSZ70 Array Controller from Compaq Computer Corporation. These products include the RAID Array 7000, the Enterprise Storage Array (ESA) 10000 storage systems and the HSZ70 controllers configured in specified StorageWorks enclosures and racks.

HSZ70 Solutions Software incorporates the features of the HSZ70 Array Controller Operating Software (HSOF) V7.7/V7.7a and the StorageWorks Command Console (SWCC) V2.2 storage management software. HSZ70 Solutions software kits may also contain installation scripts, device drivers, and other software required for use on a specific platform. Supported platforms as of the publication date are:

- Compaq Tru64™ UNIX V4.0d, V4.0e, V4.0f, V5.0 and V5.0a
- Compaq OpenVMS™ Alpha V6.2-1H3, 7.1-1H1, 7.1-1H2, 7.1-1H3, 7.1-2, 7.2 and 7.2-1
- Sun Solaris V2.5.1, V2.6 and V2.7
- HP-UX V10.20 and V11.0
- IBM AIX V4.2 and V4.3
- SGI IRIX V6.2, V6.4.1 and V6.5.x
- Windows 2000, Windows NT x86 V4.0 with SP6a
- Novell Netware V4.11

Please see your Solution documentation set for further information on supported platforms.

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HSZ70 Solutions Software is designed to be common across multiple O/S platforms. However, there may be operational differences between platforms, and there may also be features that are not supported on every platform. Platform dependencies, feature restrictions, and requirements for host software and hardware are shown within sections of this document or are identified in product documentation. Specific operating system revision levels including patches are required to assure proper operation.

The HSZ70 Array Controller Operating Software (HSOF) is the software component of the HSZ70 Array Controller. The HSZ70 Array Controller is an intelligent mass storage controller that interfaces between host computer systems using an Ultra Wide Differential SCSI bus and attached mass storage devices, using a Fast or Ultra Wide Single Ended SCSI bus. HSOF software executes in the HSZ70 Array Controller; it processes I/O requests from hosts, performing the device-level operations required to satisfy the requests.

HSZ70 Controller Software HSOF V7.7/V7.7a Software Functions

HSOF V7.7/V7.7a software includes the following capabilities:

- Dual Redundant Controller Operation
- Testing and Diagnosis of the HSZ70 Array Controller
- Host interconnect and Protocol Services
- SCSI Device Control
- Device Integrity Testing
- Save Configuration on Disk
- SCSI Multiple Bus Failover
- Asynchronous Disk Swap
- Simultaneous Multiple Operating System Support
- HSOF Storage Management Services
- Local Program Support
- Mirrored Write Back Cache Capability
- Disk Striping (RAID 0) Support
- RAID 3/5 Support
- Disk Mirroring (RAID 1) Support
- Partitioning

The following sections describe these capabilities:

Dual Redundant Controller Operation

HSZ70 controllers using HSOF can operate as a redundant pair of controllers when configured identically and connected in the same backplane. HSOF provides facilities to detect storage controller failure and perform automatic controller failover.

Testing and Diagnosis of the HSZ70 Array Controller

HSOF software internal diagnostics execute automatically whenever 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. A local serial connection asynchronous I/O port is provided for configuration and diagnosis.

Host Interconnect and Protocol Services

The HSZ70 Array Controller attaches to host computer systems using an Ultra Wide Differential SCSI bus (UWD). Up to eight SCSI target addresses can be set for either a single or a dual-redundant controller configuration. This allows support for up to 64 SCSI logical units (LUNs). One of the LUNS is required for an optional Graphical User Interface (GUI) usage provided by the SWCC software. Specific operating systems may limit the actual number of LUNS that can be used.

SCSI Device Control

HSOF software converts host I/O requests into device-specific SCSI commands. HSOF software 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 SCSI host interface, HSZ70 Array Controller hardware and HSOF software cooperate to provide the following:
  - Automatic retransmission of data, if errors are detected in the original transmission
  - Automatic detection of internal data path errors
  - Automatic failover of attached devices between HSZ70 controllers operating as dual redundant controllers

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

Device Integrity Testing

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

- Verify correct operation of individual disk devices and units
- Place the HSZ70 Array Controller under load to verify correct system operation

Save Configuration on Disk

HSOF software can save device information, HSZ70 controller configuration information and HSOF software patches on to a disk. The stored information can be re-stored for use by a HSZ70 replacement controller. This functionality is specific to HSZ70 to HSZ70 controller replacements in non-redundant configurations.

SCSI Multiple Bus Failover

The HSOF controller software allows the connection of separate host SCSI buses and separate host adapters to dual-redundant HSZ70 controller pairs. This configuration provides redundant paths from the host to the controllers for high availability. The use of this controller feature requires support from the host operating system.

> **NOTE:** Check documentation to verify support for this functionality with your specific operating system.

Asynchronous Disk Swap (Hot Swap)

HSOF software supports asynchronous disk swaps. This is also known as Disk Hot Swap. It is defined as disk removal and insertion without regard to a quiescent device bus. Disks can be removed or inserted at any time with some restrictions. Restrictions are noted in the User documentation.

Simultaneous Multiple Operating System Support

HSOF software provides support for a different host function mode for each controller target ID, thus allowing the controllers to work with different host operating systems on the same SCSI bus. HSOF software supports any two of the five host modes at one time. Operating system support is required to utilize this controller software feature.

> **NOTE:** Check documentation to verify support for this functionality with your specific operating system.

HSOF Storage System Management Services

HSOF software provides the following storage system management services:

- Alteration of Storage System Parameters - HSOF software includes a command language interpreter (CLI) that allows a system manager to display and manipulate controller parameters and device configuration information as required. The CLI utility provides type ahead, recall and editing features. Any of the last four commands entered may be recalled and edited.
- HSOF Dynamic Status Display - The HSOF software VTDPY utility allows a system manager to view the HSZ70-based storage system's state dynamically. This utility can use VT200-, VT300-, and VT400-series compatible video terminals. Terminal port connections are supported at 9600 and 19200 bps.
- 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 single or multiple disk device(s). Device code load provides the functionality to download device firmware onto supported drives via the controller.
- Environmental Monitor Unit (EMU) - HSOF software monitors data on the state of the HSZ70 controller and storage system. This data can be reported via Command Console and CLI and is reported in Environmental Monitor Unit (EMU) LEDs and in some cases activates an audible alarm.

Local Program Support

HSOF software supports the following local utilities and commands:

- AUTOSPARE as an option to aid in the replacement of failed disk drives
- 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 (the CLONE Utility cannot be used with partitioned units)
- Code Load/Code Patch (CLCP) for controller software changes
- CONFIG for automatically adding new devices to the configuration
- FRUTIL for controller and/or cache module warm swap (for dual-redundant configurations and batteries)
- DILX disk inline exerciser
- 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

Mirrored Write-Back Cache Capability

In dual redundant configurations, the write-back cache capability provides the following functions:

- Stores data to be written temporarily in the controller's write-back cache and if the mirrored option is set, the write-back data is mirrored in the redundant controllers cache for fault tolerance. The controller then informs the host that the write request is complete. This allows the host to continue working without waiting for data to be written to disk media.
- Writes the data stored in cache to the disk media based on a least-recently-used cache flushing policy or when a device has been inactive for a defined period of time.
- Consolidates contiguously located data blocks from multiple host write requests into a single device request to reduce average latency.
- On recovery from a controller failure (for example, a power outage), detects that unwritten data still exists in cache and writes it to disk media before enabling normal controller operations.

Disk Striping (RAID 0)

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 operating system as a single virtual disk drive.

RAID 3/5 Support

The RAID capability provides the following functions:

- Manages up to 20 sets of between 3 and 14 disks as RAIDsets (up to a maximum RAIDset size of 512 GB). A RAIDset is viewed by the host as a single virtual disk. RAIDsets can tolerate the failure of a single member disk without loss of ability to deliver data to hosts.
- Dynamically adjusts between RAID Level 3 and RAID Level 5-like data protection algorithms depending on instantaneous workload.
- Maintains consistency of data and parity across all member disks in a RAIDset. This includes recovery from media errors.
- Detects failure of a single RAIDset member disk and invokes data regeneration algorithms to provide continued data availability to hosts.
- Captures a designated spare (if one exists) in the event of a member disk failure and reconstructs the data and parity of the failed member disk onto it. For information regarding default chunksize, refer to *the HSZ70 Array Controller HSOF Version 7.3 Configuration Manual*.

Disk Mirroring Capability (RAID 1)

The disk mirroring capability provides the following functions:

- Real-time maintenance of up to six identical copies of data on mirrorsets of separate disks attached to a single HSZ70 Array Controller.
- Protects data against disk failure by replicating all data on each member of the mirrorset. Disk mirroring offers extremely high data reliability.
- Striping of mirrorsets, for high-performance access to large amounts of highly available data.
- Captures a designated spare (if one exists) in the event of a mirrorset member disk failure and copies the data of the failed member disk onto it.
- The ability to increase or decrease the number of members in a mirrorset as requirements change.
- Flexible policy options for determining both how read requests are satisfied and the speed of copying when a new member is being added.
- HSOF software disk mirroring can utilize the UNMIRROR command to change devices back to single-disk units.

Partitioning

HSOF software allows partitioning of disk drives or storage sets for improved device management. A partition appears to the operating system as a single virtual disk. Up to 8 partitions may be created per storage set or disk drive.

Limits on the Total Number of Storagesets

The following limits apply to storagesets configured on a single controller or dual-redundant controller configurations:

- A RAIDset or Stripeset may have a maximum of 14 disk devices. Supported disk devices are called out in the disk device tables listed below.
- A mirrorset can have a maximum of 6 members.
- There can be a maximum of 20 RAID-5 storagesets.
- There can be a maximum of 30 RAID-5 and RAID-1 storagesets.
- There can be a maximum of 45 RAID-5, RAID-1 and RAID-0 storagesets.
- There is a maximum of 512 GB LUN capacity.
- There can be a maximum of 32 physical device members total for a unit.

There may be host operating system limitation on the size of storage sets. See specific operating system documentation for information on any limitations.

HSOF Hardware Requirements

HSOF software requires an HSZ70 Array Controller on which to execute. The HSZ70 Array Controller includes six Ultra SCSI Wide Differential ports. Up to 72 devices can be supported. The specific devices supported are listed in the disk and tape tables below.

Configuration Restrictions

The following configuration restrictions apply:

- HSZ70 controllers require a minimum HSOF revision level of V7.1.
- Two controllers in the same controller backplane must be configured as a dual-redundant configuration.
- In dual redundant pairs, HSOF Software must have identical revision levels (including patch revisions).
- A maximum of 12 wide devices may be attached to a single SCSI device bus. A maximum of 72 devices may be configured on an HSZ70 when used in a RAID Array 7000 or ESA 10000 configuration.
- A maximum of 6 wide or narrow devices may be attached to a single SCSI device bus when utilizing the DS-SWXM1-xA or DS-BA356-MD shelves. Refer to platform specific documentation for operating system coverage.
- A maximum of 64 LUNs (63 when using SWCC) may be assigned. An operating system may impose further restrictions.
- A maximum of 8 host visible target IDs with 8 LUNs per target ID may be assigned.

HSOF Host Node Software and Hardware Required

A valid operating system configuration with a supported Wide SCSI interface, as referenced in the following section, is required to operate an HSZ70 controller with HSOF software.

- Table 1 contains the Compaq TRU64 UNIX Configuration
- Table 2 contains the Compaq OpenVMS Alpha Configuration
- Table 3 contains the SUN Solaris Configuration
- Table 4 contains the HP-UX Configuration
- Table 5 contains the IBM AIX Configuration
- Table 6 contains the SGI IRIX Configuration
- Table 7 contains the Windows 2000, Windows NT x86 Configuration
- Table 8 contains the Novell Netware Configuration

Table 1 Compaq TRU64 UNIX Configuration

Adapter	O.S. Versions	Adapter Description
KZPBA-CB	4.0d, 4.0e, 4.0f, 5.0, and 5.0a	PCI bus-to-Ultra Wide Differential SCSI for Compaq AlphaServer systems 2000/2100/4000/4100/8200/8400
KZPSA-BB	4.0d, 4.0e, 4.0f, 5.0, and 5.0a	PCI bus-to-Fast Wide Differential SCSI for Compaq AlphaServer systems 2000/2100/4000/4100/8200/8400

Table 2 Compaq OpenVM*S* Alpha Configuration

Adapter	O.S. Versions	Adapter Description
KZPBA-CB	V6.2-1H3, 7.1-1H1, 7.1-1H2, 7.1-1H3, 7.1-2, 7.2 and 7.2-1	PCI bus-to-Ultra Wide Differential SCSI for Compaq AlphaServer systems 2000/2100/4000 [1] /4100/8200 /8400
KZPSA-BB	V6.2-1H3, 7.1-1H1, 7.1-1H2, 7.1-2, 7.2 and 7.2-1	PCI bus-to-Fast Wide Differential SCSI for Compaq AlphaServer systems 2000/2100/4000 [1] /4100/8200/8400

Table 2 Notes:

[1] Not Supported on V6.2-1H3

Table 3 Sun Solaris Configuration

Adapter	O.S. Versions	Adapter Description
SWSAP-BC	2.5.1, 2.6 and 2.7	SBUS-to-Fast Wide Differential SCSI
SWSA3-CA	2.5.1, 2.6 and 2.7	SBUS-to-ULTRA Wide Differential SCSI
SUN X1065A	2.5.1, 2.6 and 2.7	SBUS-to-ULTRA Wide Differential SCSI
SUN X1062A	2.5.1, 2.6 and 2.7	SBUS-to-Fast Wide Differential SCSI
SUN X6541A	2.6 and 2.7	PCI Bus-to-ULTRA Wide Differential SCSI

Table 4 HP-UX Configuration

Adapter	O.S. Versions	Adapter Description
HP28696A SWHAP-BC HPA2969A	10.20 and 11.00	800 series
Embedded	10.20	735/755/J/C/D
HPA4107A	10.20 and 11.00	700 series

Table 5 IBM AIX

Adapter	O.S. Versions	Adapter Description
FC2412	V4.2, 4.3	Micro Channel-to-Fast Wide Differential SCSI
FC2409	V4.2, 4.3	PCI Bus-to-Fast Wide Differential SCSI
FC6209	V4.2, 4.3	PCI Bus-to-Fast Wide Differential SCSI
FC6207	V4.2, 4.3	PCI Bus-to-UltraSCSI wide Differential SCSI

Table 6 SGI IRIX

Adapter	O.S. Versions	Adapter Description
PC-SCSIB-Q-DS-IP	V6.2 on Origin 200	PCI-to-Ultra Wide SCSI Differential
XT-SCSIB-4P	V6.4.1, 6.5.x on Origin 2000	XIO-to-Ultra Wide SCSI Differential
P-S-HIOSCSI	V6.2 on Challenge	HIO-to-Fast Wide SCSI Differential

Table 7 Windows 2000, Windows NT on Configuration

Adapter	O.S. Versions	Adapter Description
SWXA3-BD[1]	Windows 2000, Windows NT x86 V4.0 with SP6a	PCI-bus-to Ultra Wide Differential SCSI for Compaq AlphaServer systems 1200A, 2000,2100, 2100A, 4000, 4100, 8200, 8400 and for Compaq Server Models 3300/3305, 5300/5305, 7300/7305

Table 7 Notes;

[1] Note: SWXA3-BD is an Adaptec 2944UW

Table 8 Novell Netware

Adapter	O.S. Versions	Adapter Description
SWXA3-BD	V4.11	PCI bus-to-Ultra Wide Differential SCSI

Supported Storage Devices

The following tables (Tables 9 through 14), list the only storage devices that are supported by the HSZ70 Array Controller running HSOF V7.7/V7.7a. Compaq Computer Corporation neither supports nor recommends any device not listed for use with the HSZ70 Array Controller running HSOF V7.7/V7.7a, regardless of the supplier or stated conformance to ANSI SCSI standards. Compaq Computer Corporation 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 HSZ70 Array Controller itself, or on a Compaq Computer Corporation system configuration.

Table 9 Supported Ultra SCSI Wide Disks

				Controller Enclosures	
Device	**Capacity GB**	**Minimum Microcode Version [1]**	**Minimum H/W Revision[2]**	**DS-BA370-AA[3]**	**DS-SWXM1-xA DS-BA356-MD**
DS-RZ1BB-VW	2.1	LYJ0/0656	A01	YES	YES
DS-RZ1CB-VW	4.3	LYJ0/0656	A01	YES	YES
DS-RZ1CD-VW	4.3	0306	A01	YES	YES
DS-RZ1CF-VA	4.3	0370/N1H1/ 1614	A01	NO	YES
DS-RZ1CF-VW	4.3	0370/N1H1/ 1614	A01	YES	YES
DS-RZ1DB-VA	9.1	LYJ0/0307	A01	NO	YES
DS-RZ1DB-VW	9.1	LYJ0/0307	A01	YES	YES
DS-RZ1DF-VA	9.1	0370/N1H1/ 1214	A01	NO	YES
DS-RZ1DF-VW	9.1	0370/N1H1/ 1614	A01	YES	YES
DS-RZ1DA-VW	9.1	3B06/B016	A01	YES-VW	YES
DS-RZ1DD-VW	9.1	0305/3B07	A01	YES-VW	YES
DS-RZ1ED-VW	18	0306/0305/	A01	YES-VW	YES

Table 9 Supported Ultra SCSI Wide Disks

				Controller Enclosures	
Device	**Capacity GB**	**Minimum Microcode Version [1]**	**Minimum H/W Revision[2]**	**DS-BA370-AA[3]**	**DS-SWXM1-xA DS-BA356-MD**
		3B07			
DS-RZ1EF-VA	18	0370/N1H1	A01	NO	YES
DS-RZ1EF-VW	18	0370/N1H1	A01	YES	YES
DS-RZ1EA-VW	18.2	3B05/B016	A01	YES-VW	YES
DS-RZ1FB-VW	36.4	3B05	A01	YES-VW	YES
DS-RZ1FC-VW	36.4	3B07	A01	YES-VW	YES

Table 9 Notes:

[1] Minimum Microcode Version

[2] Minimum Hardware Revision supported

[3] Only Ultra SCSI Wide drives supported and installed in a DS-BA370-AA run in Ultra Mode

Table 10 Supported SCSI-2 Disks

				Controller Enclosures	
Device	**Capacity GB**	**Minimum Microcode Version[2]**	**Minimum H/W Revision[2]**	**DS-BA370-AA[4]**	**DS-SWXM1-xA DS-BA356-MD**
RZ25–VA	0.426	0900	B01	NO	YES
RZ26–VA	1.05	T392	D02	NO	YES
RZ26L–VA/VW [3]	1.05	440C	A01	YES-VW	YES
RZ26N–VA/VW[3]	1.05	446	A01	YES-VW	YES
SWXD3-SF/WG[3]	1.05	446	A01	YES-WG	YES
DS-RZ26N-VZ [3]	1.05	1003	A01	YES	YES
RZ28–VA/VW [3]	2.1	435E	B01	YES-VW	YES
RZ28B–VA	2.1	0003	A01	NO	YES
RZ28D–VA/VW [3]	2.1	0008	A01	YES-VW	YES
SWXD3-SF/WF [3]	2.1	0008	A01	YES-WF	YES
RZ28L–VW [3]	2.1	LYJO	A01	YES-VW	YES
RZ28M–VA/VW [3]	2.1	466	A01	YES-VW	YES
DS-RZ28M–VZ [3]	2.1	1003	A01	YES	YES
SWXD3-SH/WH [3]	2.1	466	A01	YES-WH	YES
RZ29B–VA/VW [3]	4.3	0007	B01	YES-VW	YES
SWXD3-SE/WE [3]	4.3	0007	C02/A01	YES-WE	YES
DS–RZ40–VA	9.1	LYJO/0656	A01	NO	YES

Table 10 Notes:

[2] Minimum Microcode Version and Hardware Revision supported

[3] Wide disks require BA356 wide device shelves and 8-bit or 16-bit I/O modules

[4] Only Ultra SCSI Wide drives supported and installed in a DS-BA370-AA run in Ultra Mode

Table 11 HSZ70 Array Controller Supported Solid State Disks

				Controller Shelves	
Device	**Capacity GB**	**Minimum Microcode Version [2]**	**Minimum H/W Revision [2]**	**DS-BA370-AA**	**DS-SWXM1-xA DS-BA356-MD**
EZ31–VW	0.134	V064	A01	YES	YES
EZ32–VW	0.268	V064	A01	YES	YES
DS-EZ41–VW [4]	0.134	V012	A01	YES	YES
DS-EZ42–VW [4]	0.268	V012	A01	YES	YES
DS-EZ705–VW [4]	0.536	V012	A01	NO	YES
DS-EZ711–VW [4]	1.07	V012	A01	NO	YES
DS-EZ716–VW [4]	1.6	V012	A01	NO	YES
EZ64–VA	0.475	V064	A01	NO	YES
EZ64–VW	0.475	V064	A01	NO	YES
EZ69–VA	0.950	V070	A01	NO	YES
EZ69–VW	0.950	V070	A01	NO	YES

Table 11 Notes:

[2] Minimum microcode version and hardware revision supported

[4] Do not warm swap solid state devices. Make sure the device shelf power is off when inserting or removing a solid state disk device

Table 12 HSZ70 Supported Tape Libraries

				Controller Shelves	
Device	**Capacity GB**	**Minimum Microcode Version [2]**	**Minimum H/W Revision [2]**	**DS-BA370-AA**	**DS-SWXM1-xA DS-BA356-MD**
TL812 [3,4,7]	960/1920 [5]	1.2 robot/ CC33drive	A01	YES [11]	YES
TL820, Rev A01 [3,4]	2640/5280 [5]	1d3M robot/ v40 drive	L1	YES [3]	YES
TL822 [3,4,7]	5280/10560 [5]	1g4F robot/ CC33drive	A01	YES [3]	YES
TL826 [3,4,7]	3520/7040 [5]	1g4F robot/ CC33drive	A01	YES [3]	YES
DS-TL893 [3,4,7,8]	9.24/18.48T [5]	V2A/5A	A01	YES [3]	YES
DS-TL894 [3,4,7,8]	1.69/3.36T [5]	V1.24	A01	YES [3]	YES
DS-TL895 [3,4,7,8]	3.1/6.2 [5]	230	A01	YES [3]	YES
DS-TL896 [3,4,7,8]	6.1/12.32T [5]	V2A/5A	A01	YES [3]	YES

Table 12 Notes:

[2] Minimum microcode version and hardware revision supported

[3] Requires 0.2 meter SCSI–1 to SCSI–2 transition cable, Compaq Computer Corporation internal part number 17–03831–01 for DWZZA-AA, and 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

[7] Cannot read TK50, TK70 or TZ30 format tapes

[8] Do not warm swap this device. Make sure that the device shelf power is off when inserting or removing this device

[9] Wide Tape Devices require BA356 with 8-bit I/O module

[10] Tape Device Code load is supported

[11] May be connected via cable to the SA370

Table 13 HSZ70 Tape Loader Support

				Controller Shelves	
Device	**Capacity GB**	**Minimum Microcode Version [2]**	**Minimum H/W Revision [2]**	**DS-BA370-AA**	**DS-SWXM1-xA DS-BA356-MD**
TZ875-NT/TA [3,10]	50/100 [5]	930A	A01	YES [3]	YES
TZ877–AE/AF [3,10]	70/140 [5]	930A	A01	YES [3]	YES
TZ885–TA [3,7,10]	100/200 [5]	CC33	A01	YES [3]	YES
TZ885–NE [3,7,10]	100/200 [5]	CC33	A01	YES [3]	NO
TZ887–AE/AF [3,7,10]	140/280 [5]	CC33	A01	YES [3]	YES
TZ887–NE/ NT [3,7,10]	140/280 [5]	CC33	A01	NO	YES

Table 13 Notes:

[2] Minimum microcode version and hardware revision supported

[3] Requires 0.2 meter SCSI–1 to SCSI–2 transition cable, Compaq Computer Corporation internal part number 17–03831–01 for DWZZA-AA, and 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

[7] Cannot read TK50, TK70 or TZ30 format tapes

[8] Do not warm swap this device. Make sure that the device shelf power is off when inserting or removing this device

[9] Wide Tape Devices require BA356 with 8-bit I/O module

[10] Tape Device Code load is supported

[11] May be connected via cable to the SA370

Table 14 HSZ70 Tape Drive Support

				Controller Shelves	
Device	**Capacity GB**	**Minimum Microcode Version [2]**	**Minimum H/W Revision [2]**	**DS-BA370-AA**	**DS-SWXM1-xA DS-BA356-MD**
TZ87–VA [10]	10/20 [5]	930A	A01	NO	YES
TZ87N–VA [7,10]	10/20 [5]	930A	A01	NO	YES
TZ87–TA [3,4,10]	10/20 [5]	9514	B02	YES [3]	YES
TZ87N–TA [3,4,10]	10/20 [5]	930A	A01	YES [3]	YES
TZ88N-VA/ TA/TA [7,10]	20/40 [5]	CC33	A01	NO	YES
DS-TZ89N-VW [7,9,10,12]	35/70 [5]	V80	A01	NO	YES
DS-TZ89N–TA [3,7,10]	35/70 [5]	141F	A01	YES [3]	YES
DS-TZS20-VW	25/50 [5]	01aj	A01	YES	YES
DS-AIT35-VW	35/70	4.03	A01	YES	YES
DS-TLZ10-VA [12]	12/24	4.05	A01	YES	YES

Table 14 Notes:

[2] Minimum microcode version and hardware revision supported

[3] Requires 0.2 meter SCSI–1 to SCSI–2 transition cable, Compaq Computer Corporation internal part number 17–03831–01 for DWZZA-AA, and 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

[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

[11] May be connected via cable to the SA370

[12] Code Load is not supported on this device

Tapes and Tape libraries listed in the tables are supported by HSOF with the HSZ70 controller on Compaq OpenVMS and Compaq Tru64 UNIX as specified in the specific operating system documentation. Direct attachment of these devices may be supported on other platforms as specified in the product literature.

StorageWorks Command Console

Please see your Solution documentation set for StorageWorks Command Console support and component information.

Description

Command Console is a feature-rich, graphical user interface (GUI) providing local and remote management of StorageWorks controllers. It is a user-friendly tool for monitoring, configuring, and troubleshooting storage systems.

Command Console can be connected to your StorageWorks controller in several ways. Once connected, the program issues commands and interprets the responses sent by the controller. The user interface displays the logical and physical layout and status of a selected storage system in graphical form.

Command Console consists of two major components: the Client and the Agent. The Client includes the user interface and some additional services also provides a window into your storage systems. The Agent is a host-resident program that is an interface between the Client and the host's storage controller to interpret and transfer information.

Features

The major features of the Command Console include:

- Easy, graphical configuration of the storage system using an interface similar to Windows Explorer
- Graphical view of the controller and its physical and logical storage elements
- Status monitoring of the storage system using intuitive icons
- Fault notification by pager, electronic mail, and event log entries
- Management of multiple host systems through a TCP/IP network connection
- Direct serial port connection
- Direct host port connection
- Robust security that prevents unauthorized access to configuration capabilities

Command Console Agent

The Agent is the Client's assistant in controlling your storage system. The Agent monitors the storage system and notifies the Client of changes.

Commands sent from the Client are received by the Agent and are routed to the storage system via the storage system's host bus. Storage system status is transmitted back to the Client from the Agent via the network connection.

The Agent also authenticates users based on the operation being performed to the storage system. In addition, the Agent can also provide notification to the user of changes via SNMP. The Agent can monitor the storage system without an active client.

RAID Support

Command Console provides graphical configuration support for the following RAID configurations:

- RAID 0 - disk striping
- RAID 1 - disk mirroring
- RAID 0+1 - striped mirroring
- RAID 5/3 - striped parity
- JBOD

Connection Options

You can connect the Command Console client to your storage system in three ways:

- Network Connection - Command Console Client can connect to a TCP/IP network connection. From the Client, you can manage the agents on multiple host platforms.
- Direct Serial Port Connection - Command Console Client can also be connected to the storage system via a direct cable connection (RS232) from the PC to the storage system controller's serial maintenance port, where available. No Agent is required for this configuration.
- Host-Bus Connection - You can run the Command Console Client on Windows NT host systems and manage the storage system using the host bus.

Controller Compatibility

The Command Console supports the RAID Array 7000 and ESA 10000 with the HSZ70 Array Controller.

Command Console Client V2.3 is compatible with the Agent V2.3. Client can monitor and configure controllers on hosts running the Agent V2.3. Only one version of Command Console Agent can run on a host.

Command Console Scalability

You can connect concurrently to up to 128 host systems, each with up to 32 storage systems for a maximum of up to 4096 concurrent storage system connections and a total of 2.65 PB of storage.

Using a network connection, you can configure and monitor your storage system from anywhere on your LAN. If your LAN has WAN or Internet connectivity, you can monitor your storage system with TCP/IP network reliability from anywhere in the world.

Error Handling

Command Console provides pass-through error information for all types of controller problems. The Agent can issue errors without an active Client. The errors can be directed to the syslog facility, to a pager, can be mailed to specific users (supported under Compaq Tru64 UNIX and Compaq OpenVMS), or can use the standard SNMP asynchronous notification.

Pager Fault Notification

Command Console offers the capability to notify multiple alphanumeric or numeric pagers, in user-specified shifts, when a storage system faults. Pager information consists of both storage system identification and fault category codes. The application event service must be running on the Client in order for pager notification to be received.

Command Console Security

A client has three levels of security access for communicating with the storage system. The user configures the privilege levels within the Agent:

- Overall status - Monitor event changes with notification.
- Detailed Status - View event changes with the GUI.
- Configuration - Allow configuration of the storage system(s) and above features noted.

Minimum System Requirements

Table 15 contains the minimum system requirements for Command Console Client.

Table 15 Minimum System Requirements

Requirement	Description
Architecture	Windows NT on Proliant or x86-compatible, 66 MHz with 16MB of memory
Operating system	Windows NT V4.0 SP3 or Windows 2000
Disk space	All programs and files <5 MB
Monitor	VGA
Input devices	Keyboard, mouse
SCSI adapter	Fast Wide Differential (FWD)
Modem	Hayes-compatible (required for paging only)
Serial port	For connection via serial port only for HSx Array Controllers
Network adapter	TCP/IP-compatible network card (required for network connection only)
Pagers	Alphanumeric pagers: PageNet and MobileComm. Any numeric pager is supported. Required for paging only.

Enclosure Hardware Compatibility

Command Console provides specific, graphical representations for the StorageWorks enclosures supported by the controller.

Ordering Information

HSZ70 Solutions Software kits are available for the platforms specified in Table 16. The kits provide HSOF V7.7/V7.7a, SWCC V2.3 and the appropriate installation scripts and drivers for each operating system.

Table 16 HSZ70 Solutions Software Package Part Numbers

Part Number	Description
QB-5SBAB-SA	HSZ70 Solutions Software for Compaq Tru64 UNIX, Media, Documentation and License
QB-5SBAC-SA	HSZ70 Solutions Software for Compaq OpenVMS, Media Documentation and License
QB-5SBAG-SA	HSZ70 Solutions Software for SUN Solaris Media, Documentation and License
QB-5SBAJ-SA	HSZ70 Solutions Software for HP-UX, Media, Documentation and License
QB-5SBAK-SA	HSZ70 Solutions Software for IBM AIX, Media, Documentation and License.
QB-5SBAL-SA	HSZ70 Solution Software for SGI IRIX Media, Documentation, and License.

Software Product Services

A variety of service options are available from Compaq Computer Corporation. For more information, contact your local Compaq Computer Corporation office. Software service for HSZ70 Solution Software is covered under the terms and conditions of the Integrated Hardware and Software Customer Service contracts. Multivendor Customer Services for the HSZ70 controller and HSZ70 Solutions Software 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

HSZ70 Solutions Software is provided with 90 day Telephone Support and 90 days conformance to the Software Product Description.