COMPAQ
STORAGEWORKS

HSJ50 Array Controller Operating Software HSOF Version 5.4
Release Notes

This document summarizes features and characteristics of the HSJ50 array controller operating software Versions 5.4, 5.3, 5.2, and 5.1 that are not covered elsewhere in the documentation. These release notes also contain instructions for installing the software and should be retained for future reference.

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the manuals, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Restrictions apply to the use of the local-connection port on this series of controllers; failure to observe these restrictions may result in harmful interference. Always disconnect this port as soon as possible after completing the setup operation. Any changes or modifications made to this equipment may void the user's authority to operate the equipment.

Warning!
This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung!
Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.
Attention!
Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées.

　　この装置は，情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準
に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波
妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ず
るよう要求されることがあります。

This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC rules, which are designed to provide reasonable protection against such radio frequency interference. Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference. Any modifications to this device - unless expressly approved by the manufacturer - can void the user's authority to operate this equipment under part 15 of the FCC rules.

Contents

Introduction

These release notes provide information for the HSJ50 array controller running HSOF Version 5.4. This document should be used by individuals responsible for configuring, installing, and using the HSJ50 controller.

Read this entire document before upgrading the controller's software.

Topics Covered

These release notes cover the following topics:

■ Hardware and software supported by HSOF Version 5.4

■ Device Support–Lists of devices supported by HSOF Version 5.4

■ New Items–Modifications that are new for HSOF Version 5.4

■ Items from Previous Releases–Modifications to operating parameters or functions that were introduced in software versions prior to HSOF Version 5.4

■ Documentation Additions and Corrections–Additions and corrections to the documentation

■ Upgrading HSOF software–Installation and upgrade instructions

■ Identification of the software revision level

■ Order numbers

Release Package Contents

The Version 5.4 release package consists of the following:

■ A cover letter

■ A PCMCIA program card containing HSOF Version 5.4 software

■ The HSJ50 documentation set, which includes many documents produced for HSOF Version 5.1, all still applicable to HSOF Version 5.4:

❏ HSJ50 Array Controller HSOF Version 5.1 Configuration Manual

❏ HSJ50 Array Controller HSOF Version 5.1 Service Manual

❏ HSJ50 Array Controller HSOF Version 5.1 CLI Reference Manual

❏ HSJ50 Array Controller Operating Software Version 5.4 Release Notes

❏ Array Controller Operating Software (HSOF), Version 5.4 Software Product Description

Intended Audience

This document has been prepared for Compaq customers who currently use and maintain the HSJ50 array controller.

Hardware Support

HSOF Version 5.4 software supports the following revisions for your controller and associated hardware:

■ HSJ50 controller module, hardware revision A

■ Version 3 cache module, hardware revision A or B

■ BA350–MA controller shelf

■ BA350–Sx device shelf

■ BA350–Sx wide device shelf with 8-bit or 16-bit personality module (controller operates in 8-bit mode only)

■ BA35x–HF power supply

■ HS35X–BA Single External Cache Battery SBB (with 1 ECB)

■ HS35X–BB Dual External Cache Battery SBB (with 2 ECBs)

■ HSSIM–AA 32 MB SIMM Pack for Version 3 Cache module upgrades

Operating System Support

HSOF Version 5.4 software on HSJ50 controllers is supported by the following operating system versions:

■ OpenVMS Alpha™ Version 6.1, 6.2, 7.0, and 7.1

■ OpenVMS VAX™ Version 5.5-2, 6.1, 6.2, 7.0, and 7.1

Host Adapter Support

The following host adapters are supported by the the Compaq Tru64 UNIX operating system for HSJ50 controllers:

■ CIXCD-AB

■ CIXCD-AC (both for SMI-based systems)

■ CIBCA-Bx (for BI-based systems) This supersedes CIBCA-A, which is no longer supported

■ CIPCA (for PCI-based systems)

Device Support

HSOF Version 5.4 software supports the devices listed in Table 1 through Table 4 at the indicated minimum hardware and microcode levels.

Table 1 Supported Disk Drives

Device	Capacity in Gigabytes	Minimum Microcode Version	Minimum Hardware Version
RZ25-VA	0.43	0900	B01
RZ26-VA	1.05	T392	D02
RZ26L-VA/VW[1]	1.05	440C	A01
RZ26N-VA/VW[1]	1.05	446	A01
SWXD3-SF/WF[1]	1.05	446	A01
DS-RZ26N-VZ[1]	1.05	1003	A01
DS-RZ1BB-VW	2.10	LYJO/0656	A01
RZ28-VA/VW[1]	2.10	435E	A01
RZ28B-VA	2.10	0003	A01
RZ28D-VA/VW[1]	2.10	0008	A01
SWXD3-SG/WG[1]	2.10	0008	A01
RZ28M-VA/VW[1]	2.10	0466	A01
DS-RZ28M-VZ[1]	2.10	1003	A01
SWXD3-SH/WH[1]	2.10	0466	A01
RZ74-VA	3.57	T427B	B07
DS-RZ1CB-VW	4.1	LYJO/0656	A01
RZ29B-VA/VW[1]	4.3	0007	B01
SWXD3-SE/WE[1]	4.3	0007	C02/A01
DS-RZ1CF-VA/VW	4.3	0372/N1H1/1214	A01
DS-RZ1DB-VW	9.1	LYJO/0307	A01
DS-RZ1DF-VA/VW	9.1	0372/N1H1/1214	A01
DS-RZ40-VA	9.1	LYGO	A01
DS-RZ1DD-VA/VW	9.1	0305	A01
DS-RZ1EF-VA/VW	18.2	0372/N1H1	A01
DS-RZ1ED-VW	18.2	0305	A01

Table 1 Notes:

[1] Wide disk drives require a SWXSS−06 shelf.

All drive "VW" models require DS-SWXSS−06 wide device shelves.

NOTE

Any accidental use of the ADD TAPE command will result
in conditions requiring reinitialization of the controller.

Table 2 Supported Tape Drives

Device	Capacity **G= Gigabytes** **T=Terabytes**	Minimum Microcode Version	Minimum Hardware Version	Notes
TKZ60-EC	.440	1111B01	B01	1,6
TKZ61	4.4	0611	A01	1
TKZ62	24.0	0616	A01	1,3
TKZ63	2.4	0616	A01	1,3
2T-TKZ64	144	0616	A01	1,3
TL810	480/960	1.10robot/v40drive	A01	1,2,3
TL812	960/1920G	1.2 robot /CC33 drive	A01	1,2,3,4,5
TL820	2640/5280	1d3M robot/v40	L1	1,2,3
TL822	5280/10560G	1g4F robot /CC33 drive	A01	1,2,3,4,5
TL826	3520/7040G	1g4F robot /CC33 drive	A01	1,2,3,4,5
DS-TL893	924/1848T	V2A/5A	A01	1,2,3,4,5
DS-TL894	1.68/3.36T	V1.24	A01	1,2,3,4,5
DS-TL895	3.1/6.2	230	A01	
DS-TL896	6.16/12.32T	V2A/5A	A01	1,2,3,4,5
TLZ06-VA	4	0491	A04	3
TLZ07-VA	8	04Aq	AX01	3
TLZ09-VA	4/8	V165		5
TLZ6L-VA	16	0491	A01	3,6
TLZ7L-VA	8	4BQE	A02	3,6
TLZ9L-VA	32	A020	AX01	3,6
TSZ07-AA	0.140	0309	A01	1
TZ86-VA	6	430B	A02	5
TZ87-VA	10/20G	930A	A01	3,5,6
TZ87N-VA	10/20G	930A	A01	3,4,5,6
TZ87-TA	10/20G	9514	B02	1,2,3,6
TZ87N-TA	10/20	930A	A01	1,3,5
TZ867-AE/AF	42	430B	A01	1,3,5

Table 2 Supported Tape Drives

Device	Capacity G= Gigabytes T=Terabytes	Minimum Microcode Version	Minimum Hardware Version	Notes
TZ875-NE	50/100	930A	A01	1,3,5
TZ875-NT	50/100G	930A	A01	1,3,5,6
TZ875-TA	50/100G	930A	A01	1,3,5,6
TZ875-AE/AF	50/100G	930A	A01	1,3,5
TZ877-AE/AF	7140	930A	A01	1,3,5
TZ877-NE	70/140	930A	A01	1,3,5
TZ88N-VA/TA	20/40G	CC33	A01	3,4,5,6
TZ885-NT/NE	100/200G	CC33	A01	1,3,4,5,6
TZ887- NT/NE	140/280G	CC33	A01	1,3,4,5,6
DS-TZ89N-VW	35/70G	141F	A01	3,4,5,6,7
DS-TZ89N-TA	35/70G	141F	A01	1,3,4,5,6
DS-TL890	560/1120G	3.23 robot/V55 drive	A01	1,2,3,4,5
DS-TL891	350/700G	3.23 robot/V55 drive	A02	1,2,3,4,5
DS-TL892	350/700G	3.23 robot/V55 drive	A02	1,2,3,4,5
DS-TZS20-VW	25/50	01aj	A01	

Table 2 Notes:

1. Requires 0.2 meter SCSI-1 to SCSI-2 transition cable, Compaq internal part number 17-03831-01 for DWZZA-AA, and Compaq part number 17-04367-01 for SSB DWZZA-VA and DWZZB-VW.

2. Requires SWXA2 single-ended to differential SCSI signal converter.

3. Capacity values represent compressed data. The compression factor is device dependent based on individual device algorithms.

4. Cannot read TK50, TK70 or TZ30 formatted tapes.

5. Requires a KZPSA or PMAZC host adapter.

6. Tape device code load is supported.

7. Wide tape devices require a SWXSS−06 shelf with an 8-bit I/O module

Table 3 Supported Solid State Devices

Device	Capacity in Gigabytes	Minimum Microcode Version	Minimum Hardware Version	Notes
EZ31-VW	0.134	V064	A01	2, 3
EZ32-VW	0.268	V064	A01	2, 3
EZ51R-VA	0.10	V096	D01	1, 2, 3
EZ54R-VA	0.42	V096	A01	1, 2, 3
EZ58R-VA	0.85	V109	C01	2, 3
EZ64-VA	0.475	V064	A01	2, 3
EZ64-VW	0.475	V070	A01	2, 3
EZ69-VA	0.950	V064	A01	2, 3
EZ69-VW	0.950	V070	A01	2, 3
EZ454	.536	Y018	A01	2, 3
EZ832	3.2	Y018	A01	2, 3

Table 3 Notes:
1   Code load supported for these drives
2   Formatting supported for these drives
3   Do not warm-swap solid-state disk drives. Make sure power to the device shelf is
     turned off before removing or inserting this device.

Table 4 Supported CD-ROM Readers

Device	Capacity in Gigabytes	Minimum Microcode Version	Minimum Hardware Version
RRD42-VB/VU	0.6	1.1a	A01
RRD43-VA	0.6	0064	A02
RRD44-VA	0.6	3493	A02
RRD45-VA/VU	0.6	1645	A01
RRD46-VA	0.6	1337	A01
RRD47-VA	0.6	1206	A01
RWZ52-VA	0.6 per side	3403	A01
RWZ53-VA	2.3/2.6	1.35	AX02
RW524	19	1.37 juke box/3404 drive	A01
RW525	19	2.17 juke box / 3404 drive	A01
RW530	38	6.15 juke box / 3404 drive	A01
RW531	38	0.35 juke box / 3404 drive	A01
RW532	76	0.35 juke box / 3404 drive	A01
RW534	104	5.20 juke box / 3404 drive	A01
RW536	170	5.20 juke box / 3404 drive	A01
RW546	36.8	1.36 juke box / 1.35 drive	A01
RW551	64	1.36 juke box / 1.35 drive	A01
RW552	147	1.36 juke box / 1.35 drive	A01
RW555	294	1.36 juke box / 1.35 drive	A01
RW557	547	1.36 juke box / 1.35 drive	A01

Table 4 Notes:
Do not warm-swap CD-ROM drives. Make sure power to the device shelf is
turned off before removing or inserting this device.

New Items

HSOF Version 5.4 corrects someproblems that were identified after the release of HSOF Version 5.2.

Correction for TILX Incompatibility with Disks

In previous versions of HSOF software, data integrity problems could infrequently occur if the tape in-line exerciser (TILX) was run on tapes attached to a controller on which disks were also configured. This problem is corrected in HSOF Version 5.4.

Action for Repeated Reboots

Very rarely, a hardware failure might cause a controller to reboot repeatedly, preventing preferred disk devices from completing failover to the dual-redundant partner. HSOF Version 5.4 contains a modification so that if the same bugcheck repeats itself three times in a ten minute period, the controller will shutdown with no restart to permit the disk devices to failover to the working controller in a dual-redundant pair.

NOR/DDL Errors

A small number of NOR/DDL (No Response/Dual Data Link) errors may occur during cluster transitions and other normal cluster events. However, some customers have experienced a NOR/DDL error rate higher than expected. Under certain rare conditions on the CI bus, the HSJ controller CI interface ASIC may become unable to recognize the host's acknowledgment that a packet from the controller has been received. When this condition persists on both paths, the controller closes the virtual circuit with an error log of NOR/DDL. This version of HSOF software corrects this specific problem.

EMU Alarm Clarification

The environmental monitoring unit (EMU) alarm sounds for individual device failures, but does not sound for storageset failures.

Write-Back Cache (WBC) Battery Replacement

Please observe the two year posted replacement period for the write-back cache batteries as specified in the *Instructions for Write-Back Cache Battery Service Label* (FRU Insert EK-WBCIN-FI rev B01).

Updated Storagesets Limits

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

■ A mirrorset can have a maximum of 6 members.

■ A stripeset or RAIDset can have a maximum of 14 members.

- There can be a maximum of 20 mirrorsets and/or RAIDsets.

- There can be a maximum of 30 storagesets (RAIDsets, mirrorsets, and/or stripesets).

- There can be no more than 32 physical device members for a unit.

- Each storageset can store a maximum of 256 GB.

Support Large-Drive Formatting

This release supports formatting of large disk devices (9 GB and 18 GB)

Support for up to Fourteen 18 GB Drives

The maximum storageset size has been increased to 256 GB so that this controller can support up to fourteen 18 GB drives.

New Host Mode "F" for Support of Sun Solaris Operating System

Host Function Mode "F" has been added to the list of available operating system options in support of multiple-bus failover on Sun operating systems platforms. Host Function Modes are described in the *HSD50, HSJ50, and HSZ50 Array Controller HSOF V5.1 CLI Reference Manual* under the SET THIS_CONTROLLER and SET OTHER_CONTROLLER CLI command description.

NOTE: All customers running the Sun Solaris operating system should select Host Mode "F" even if they are not using multiple-bus failover mode. Improper host operation may occur if Sun Solaris systems are connected to an array controller set to a host mode other than "F". Select Host Mode "F" through the CLI window.

Table 5 Host Mode Function Table

Mode	Description
A	Normal (default) mode:
	OpenVMS®
	Tru64 UNIX®
	Hewlett-Packard® UNIX
B	IBM AIX®
C	HSZ15
D	Microsoft® WindowsNT®
F	Sun Solaris®

NOTE: When loading an older version of HSOF code that does not support Host Function Mode F:

■ Change the host function mode to one that is supported by the older (previous) code version.

■ Reboot the controller before loading the older code.

The controller goes into an "UNKNOWN" Host Mode Function state after:

■ Host Function Mode "F" is the selected mode and

■ The controller is rebooted with an older code version not supporting mode "F".

Controller behavior is unpredictable at this point.

Hot Swapping Devices

When hot swapping a device, wait 90 seconds after you restore power before enabling the bus, issuing CLI commands to the controller, or allowing any activity to the controller.

Features from Previous Releases

The following list describes HSOF Version 5.1 and 5.2 features not documented in other manuals. For more information on theHSOF Version 5.1 features, refer to

■ *HSJ50 Array Controller HSOF Version 5.1 Configuration Manual*

■ *HSJ50 Array Controller HSOF Version 5.1 Service Manual*

■ *HSD50, HSJ50,and HSZ50 Array Controller HSOF Version 5.1 CLI Reference Manual*

Battery Handling

Diagnostic testing is performed on the write-back cache batteries when the controller first initializes, and then periodically after it has become fully charged. This section clarifies battery-related topics.

Battery Handling and the CACHE_UPS Switch

If the CACHE_UPS switch is activated, the following behavior is true at all times:

■ no battery checks are performed

■ no battery condition is reported or messages sent

■ no action is taken in the event of battery failure

> △ **CAUTION:** Use of this setting without a functional uninterruptible power supply (UPS) in place may result in data loss if power is interrupted and batteries have failed.

When the CACHE_UPS switch is enabled, the controller ignores the condition of the write-back cache batteries because a UPS is assumed to be in use. Note that HSOF software does not have the capability to monitor the remaining capacity of a UPS. There are many variables in a UPS

configuration; some configurations may put data at risk if the UPS is exhausted. For example, if UPS power is lost to the entire host/storage system without warning, write-back cache data is maintained by the cache batteries only. With CACHE_UPS set, the state of the batteries is unknown and data could be at risk.

Battery Handling and Cache Policy

The settings you choose for Cache Policy (A or B) affects access to RAIDsets and mirrorsets during the initial test only, and determines the cache mode the controller uses during initial test only.

Initial test begins when the controller is turned on and continues until the battery is charged, or up to ten hours. Initial testing includes a recharge of the battery after potential discharge during shutdown. Every four minutes, the software tests the battery. Full caching operations begin when the battery is fully charged.

Cache Policy A is the default setting. Cache Policy A and B apply only to a "low" battery from initialization until either:

■   the battery becomes fully charged or

■   10 hours elapse without the battery becoming fully charged. In this case, failed battery action is taken, as described in "Failed Battery Action", in these release notes.

After a battery has become fully charged, Cache Policy A or B no longer applies, and regular periodic battery tests are performed.

The following table summarizes the effect of both cache policy settings on access to RAIDsets and mirrorsets when a battery is "low" during the initial test period.

Table 6 Cache Policy

Policy	RAID/Mirrorset access	Cache Mode
Cache Policy A	no access	write-through on individual disk units (also called JBOD)
Cache Policy B	access	write-through on RAID/mirrorsets and individual disk units

NOTE: Write-through cache mode is not a 100% guarantee of user data consistency within storagesets (RAID and mirrorsets). This is because in these storagesets, there is an inherent delay in the writing of data to the different members. If a power failure occurs between the writing of some members and others (an extremely narrow window), data on the various members will be inconsistent. Therefore, Cache Policy A (which denies access to RAIDsets /mirrorsets on controllers with low batteries) is the only 100% guarantee of user data consistency. That is why Cache Policy A enforces loss of storageset access in the event of a battery that does not pass the battery test.

NOTE: HSOF software makes every attempt to notify the user that a battery problem (not good or open circuit) has occurred by printing a message to the console and posting an error to the host errorlog. However, not all operating systems present errorlogs reliably.

Failed Battery Action

If a battery passes the initial test, cache policy no longer applies, and periodic testing begins. During periodic testing, the battery is tested every 24 hours. When a failed battery is detected during either initial or periodic testing, the following failed battery action is taken:

Dual HSJ50s (dual batteries on each cache module and partner are running and have good batteries):

■ RAIDsets and mirrorsets migrate to partner under VMS control without shutdown

■ Individual disk units accessed in write-through mode

Single HSJ50:

■ no shutdown

■ no RAIDset or mirrorset access permitted

■ individual disk units accessed in write-through mode

Extending the Life of Your External-Cache Batteries

Occasionally, circumstances will require you to shut down your controller and restart it. If the correct steps for turning off power to an HSJ50 array controller configuration with write-back cache are not followed, there is potential for loss of data that may exist on any devices connected with them. In addition, if you are turning off the power to the controller subsystem for any reason for longer than 1 day (such as a holiday, system move, or replacing a bad SCSI host cable), you will need to turn off the external cache batteries (ECBs) to prevent them from discharging. To avoid problems when the controller restarts, always use the following process to shut it down.

$\triangle$ **CAUTION:** Allowing the write-back cache batteries to discharge completely, and leaving them in a discharged state for any length of time, could result in permanent and irreversible degradation to the batteries.

Shutting Down a Controller

1. Use the proper procedures for shutting down the operating system if the host system is also going to be turned off.

2. If the host is not going to be turned off, it is not necessary to shut down the host system, but use the proper operating system procedures to dismount any units that are accessed through the HSJ50 array controllers.

3. If the controller configuration contains any devices or storagesets that are write-back cache enabled, and the system is going to be turned off for an extended length of time, the batteries on the write-back cache modules drain, causing the data in the cache modules to be lost. If you have RAIDset or mirrorset units, or single devices with write-back caching turned on, SET NORUN on all units.

4. When the dismount and/or the operating system shutdown procedures are complete, invoke the controller SHUTDOWN commands on the controllers.

> ⚠️ **CAUTION:** Do not turn off the power to the controller subsystem until all shutdown procedures have successfully completed.

5. If you have a dual-redundant controller configuration, shut down each controller one at a time, using the following commands:

   SHUTDOWN OTHER_CONTROLLER

   SHUTDOWN THIS_CONTROLLER

   If you have a non-redundant controller configuration, only the SHUTDOWN THIS_CONTROLLER command is necessary.

   The green reset LED stops blinking when the SHUTDOWN command completes.

6. When the controller SHUTDOWN command successfully completes, turn off power to the controller subsystem (or just the controller shelf, if you are not shutting down the entire system, by unplugging the power supplies in the controller shelf).

Disabling the Write-Back Cache Batteries

1. Press the battery disable switch, which is the small button labeled SHUT OFF next to the flashing status LED on the ECB and hold it in for approximately 2 seconds. The cache LED will flash once, then shut off.
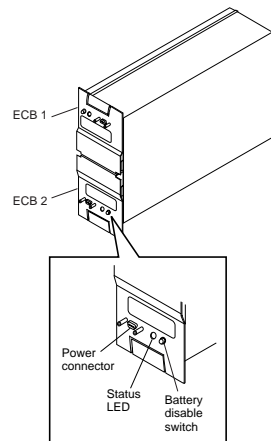
Figure 1. Location of Write-Back Cache Module Batteries

2. The battery is no longer powering the cache.

3. To return to normal operation, the cache battery is enabled when the battery cable is reconnected and the RAID subsystem is powered on.

Restarting the Controller

1. If you removed the PCMCIA card, hold down the reset button while inserting the PCMCIA card. When you release the reset button, the controller restarts.

2. If you did not remove the PCMCIA card, press the reset button and the controller restarts.

Fast Shadow Member Eviction

An MSCP flag is provided to enable rapid shadow member eviction when a device error is detected. The OpenVMS operating system can set this flag based on SYSGEN parameters in the field SHADOW_SYS_DISK. The MSCP flag is called MD.SER. When set, and an I/O encounters a device error, the I/O is returned as failed without further error recovery. The OpenVMS operating system can then evict a shadowset member, as appropriate.

Only One Switch per CLI Command Recommended

Certain CLI command switches are incompatible. To avoid problems in this area, only specify one switch per CLI command. For example, to set both WRITEBACK_CACHE and NORUN on unit D102, use the following two commands:

                    SET D102 WRITEBACK_CACHE

                    SET D102 NORUN

Logical Device Event Reports

Under certain circumstances the Port, Target, and LUN fields contained in event reports associated with storageset logical devices, Event Log displays as well as sense data responses, will be set to 255 (decimal) instead of the Port, Target, and LUN of the first physical device in the storageset. In addition, when the Port, Target, LUN are set to 255, the Device Type is set to 0 (magnetic disk device), and the Device Product ID and Device Firmware Revision Level fields will be ASCII space filled.

Saving the Subsystem Configuration

The SAVE_CONFIGURATION switch is intended to be used to provide a means to restore nonvolatile (NVRAM) contents when a controller in a single-controller module configuration is replaced. The SAVE_CONFIGURATION switch cannot cross hardware revisions or software versions. SAVE_CONFIGURATION is not available for upgrades of firmware or hardware, and does not perform inter-platform conversions. For example, do not use SAVE_CONFIGURATION to upgrade from HSOF Version 5.2, or from an HSJ30 to an HSJ50 array controller.

The controller stores the subsystem's configuration-the storagesets you configured, the switches set for each, the HSOF patches you've installed, and so on-in its nonvolatile memory. This means that, if the controller fails in a nonredundant configuration, you would have to reconfigure the subsystem from scratch. (In a dual-redundant configuration, this information is stored by both controllers, which effectively eliminates the risk of losing it.)

> **NOTE**: Compaq recommends that the SAVE_CONFIGURATION switch only be used for nonredundant controller configurations. To save the configuration information for dual-redundant configurations use the SET FAILOVER COPY= command.

If you are operating a nonredundant configuration subsystem, Compaq recommends saving the subsystem's configuration on at least one of the devices or storagesets with the following command:

                    INITIALIZE storageset_name SAVE_CONFIGURATION

When initializing a device or storageset with the SAVE_CONFIGURATION switch, the controller copies the subsystem's configuration to the disk drives. If you use the switch for a multi-device storageset, such as a stripeset, the complete information is stored on each device in the storageset. The capacity of a device that is initialized with the SAVE_CONFIGURATION switch is reduced by 256KB. This capacity reduction applies to each member of a storageset.

After initializing a storageset with this switch, the controller keeps the copy up-to-date. For example, every time a new patch or storageset is added to the HSOF software, the controller re-copies the new configuration to all storagesets that were initialized with the SAVE_CONFIGURATION switch.

If a controller in a nonredundant-configuration fails, its replacement automatically searches the devices in the subsystem for a saved configuration. If it finds a saved configuration, it transparently loads it into nonvolatile memory and brings the subsystem online. It is unnecessary to issue an initialize command again after reconfiguring the devices with a new controller.

Commpaq does not recommend initializing all of your storagesets with the SAVE_CONFIGURATION switch. Every time you change the subsystem's configuration, the controller writes the new configuration to the storagesets that you initialized with this switch. Too many write operations can adversely affect performance.

If you are upgrading from HSOF Version 5.2 to Version 5.4 in a single-controller configuration, you can refresh the SAVE_CONFIGURATION data on your storagesets to include the new software revision by issuing the following command:

    SET UNIT xxx WRITE_PROTECT

[where xxx is any existing unit on the controller]

    SET UNIT xxx NOWRITE_PROTECT

These commands, which have no net effect, serve to change the contents on nonvolatile memory, causing the updated SAVE_CONFIGURATION information to be automatically written to the SAVE_CONFIG area of all units that have been initialized with this option.

Maintenance Terminal Port Speeds

HSOF Version 5.2 software supports terminal port connections at 4800, 9600, and 19200 BPS. Connections speeds at 300, 1200, and 2400 BPS are not supported.

CFMENU Constraints

CFMENU can only delete single sparesets. Delete sparesets one at a time. Delete spareset members one at a time by responding Y (yes) to one member, then responding N (no) to the rest of the spareset's members. CFMENU deletes the spareset member.

You can also delete spareset members using the CLI command DELETE SPARESET disk_name. While you still have to delete each member individually with separate CLI commands for each one, this is a faster method for deleting multiple spareset members.

CLONE Utility Constraints

The CLONE utility cannot be used with partitioned units.

Low/Failed Battery on Dual-Redundant Configurations with Preferred Paths

If an external cache battery goes low or fails for a controller in a dual-redundant configuration and preferred paths have been set, that controller's units may go AVAILABLE on the "OTHER" controller and INOPERATIVE on it. This causes a MOUNT VERIFY on the units from OpenVMS. You will need to issue the SET unit-name NOPREFERRED_PATH command which will allow the units to go out of MOUNT VERIFY. Later you can reissue the SET unit-name PREFERRED_PATH command to the affected units.

Use of the SET CACHE_UPS Feature

When the SET CACHE_UPS feature is enabled, the controller ignores the condition of the writeback cache batteries because an uninterruptible power supply (UPS) is assumed to be in use to maintain power to the writeback cache module in the event of a power failure. Note that HSOF software does not have the capability to monitor the remaining capacity of a UPS. There are many variables in a UPS configuration; some configurations may put data at risk if the UPS is exhausted. For example, if UPS power is lost to the entire host storage system without warning, writeback cache data is maintained by the cache batteries only.

> ⚠ **WARNING:** Use of this feature without a UPS could result in loss of data.

Device Adds, Moves, and Changes

The controller maintains configuration maps of device types and locations and uses those maps for communicating with devices. If you add, move, or change devices while the controller is powered off and without changing the controller configuration first, the controller is not able to work with the changed devices when it returns to service.

Tape Drive Firmware Revision

If you are not using HSUTIL to install your new tape firmware, do the following:

Before installing a new version of tape drive firmware, delete the tape drive completely from the controller configuration. You can re-add the tape drive after the firmware installation is complete. This prevents interrupts to the drive during the code loading operation.

Set Tape Density When Adding Drive and Changing Cartridge Types

The DEFAULT_FORMAT switch allows you to specify the tape format for use by the controller for write operations to a tape drive. Also use this switch to tell the controller to allow the host to set the tape format.

Not all tape devices support all formats. The easiest way to determine what formats are supported by a specific device is to enter the SET TAPE-UNIT-NUMBER DEFAULT_FORMAT=? command. The controller displays the valid options for the unit.

> NOTE: Host system software must support the density selection for the affected device for this option to operate correctly. Using the HOST_SELECTED switch for other devices may yield unpredictable results.

Compaq recommends the use of the SET TAPE-UNIT-NUMBER DEFAULT_FORMAT=HOST_SELECTED command with only TSZ07 tape drives. Set the switch to HOST_SELECTED to allow the host to set the tape format.

When first adding a tape drive to the controller configuration, set the tape density with the SET TAPE-UNIT-NUMBER DEFAULT_FORMAT= command before using the OpenVMS INITIALIZE command. In dual-redundant controller configurations, set the tape density from both controllers in the pair before the tape drive is mounted. Not setting the tape density might cause the tape to be written at the wrong density, or the OpenVMS INITIALIZE command to fail with an invalid format error.

Running CONFIG or CFMENU Utilities During Backup or Copy Operations

Do not run the CONFIG or CFMENU utilities during a tape backup or copy operation.

Changing Host Adapter Types

If for some reason you change your host adapter and maintain the same node number, you MUST restart your controller or controllers.

DILX Enhancement

The HSJ50 controller with HSOF Version 5.1 software has a new version Disk In-Line Exerciser (DILX) that acts on disks configured as single-device, RAIDset, stripeset, mirroret, or striped-mirrorset units.

Ability to Install New Microcode on a Tape Drive and Solid State Disk Drives

HSOF Version 5.1 software allows you to use the controller's HSUTIL program to install new microcode to the TZ89 tape drive.

HSOF Version 5.1 software also allows you to use the controller's HSUTIL program to install new microcode to solid state disk devices.

Documentation Additions and Corrections

Please note the following corrections to the HSJ50 array controller documentation.

AUTOSPARE Not Valid Switch on SET FAILEDSET Command

The *HSJ50 Array Controller HSOF Version 5.1 CLI Reference Manual* incorrectly identifies AUTOSPARE as a valid switch on the SET FAILEDSET command. AUTOSPARE is not a supported switch for the HSJ50 controller.

SET THIS_CONTROLLER and SET OTHER_CONTROLLER COMMANDS

The SET THIS_CONTROLLER and SET OTHER_CONTROLLER commands in the *HSJ50 Array Controller HSOF Version 5.1 CLI Reference Manual* contain a description of the MIRROR_CACHE switch. MIRROR_CACHE is not a supported switch for the HSJ50 array controller.

Replacing a Controller with C_SWAP

In the *HSJ50 Array Controller Servicing Your StorageWorks Subsystem* guide the procedure for restarting the subsystem after replacing a controller with C_SWAP should contain the following note:

Note: The following error message is normal. Please continue with controller configuration.

Other controller not responding - RESET signal asserted.

Upgrading HSOF Software

You can upgrade the HSJ50 controller software using one of the following three procedures depending on whether you are upgrading a:

■ Dual-redundant controller installation configuration as a rolling upgrade (changing one program card at a time)

■ Dual-redundant controller installation configuration as a shutdown upgrade (changing both program cards simultaneously)

■ Single controller

During a rolling upgrade, devices on the redundant pair remain available to the host. The rolling upgrade procedure is recommended only when upgrading to an adjacent version (for example

from V5.3 to V5.4.) When performing rolling upgrades, it is required that the most recent software patches, if any, be installed on both the lower and higher code versions.

During a shutdown upgrade, you are required to shut down and then restart the controllers. This procedure typically takes less than 5 minutes to accomplish. All devices on the redundant pair are dismounted prior to the upgrade. Shutdown upgrades should be used when upgrading to a non-adjacent version (for example, from V5.1 to V5.4.)

> **CAUTION:** If JBOD disks that were initialized using the SAVE_CONFIGURATION option on an HSZ40 controller running HSOF Version 27Z have been moved onto your HSJ50 controller, contact your field service representative before upgrading your HSJ50 controller from HSOF Version 2.7 to HSOF Version 5.4 software.

> **NOTE**: HSOF Version 5.4 software waits up to one minute after the controller restarts before presenting a CLI prompt or accepting any commands. This delay does not affect unavailability to the host. The delay provides time for the controller's internal configuration operations to process completely before commands you enter can change the configuration. After you insert the HSOF Version 5.4 program cards and press the reset button, allow 60 seconds for the CLI prompt to appear.

Dual-Redundant Controller Rolling Upgrade

A rolling upgrade procedure is one in which the disk subsystem does not have to be shut down to upgrade the software. Using the failover capabilities of the controllers, only one controller at a time needs to be shut down, allowing the host system to have disk drive activity from the disk subsystem being upgraded. The rolling upgrade procedure is recommended only when upgrading to an adjacent version (for example from V5.3 to V5.4.) When performing rolling upgrades, it is required that the most recent software patches, if any, be installed on both the lower and higher code versions.

Use the following procedure to install the new HSOF software while maintaining connectivity to the storage devices:

1. Establish a local connection to the controller through the maintenance port of one of the controllers ("this controller").

2. Wait for the CLI prompt, and then shut down "other controller" using the following command:

       SHUTDOWN OTHER_CONTROLLER OVER

> **CAUTION:** Before continuing, wait until the Reset button stops flashing and stays lit continuously. This indicates that unwritten data is flushed from the cache module.

3. Remove the PCMCIA program card ESD cover from "other controller".

4. Press and hold the controller Reset button while ejecting the old program card (release the button after the card is ejected.)

5. Press and hold the Reset button while inserting the new program card in "other controller". Release the button after the new card is inserted.

NOTE: Wait for the following to happen before continuing:

■   The Reset button flashes approximately once per second.

■   The maintenance terminal displays a message that finishes with:
    other controller restarted

6. Read the status of "other controller" by issuing the following command:

    SHOW OTHER_CONTROLLER

NOTE: When the SHOW OTHER_CONTROLLER command verifies that the other controller restarted, it is safe to continue.

7. Replace the ESD cover on "other controller" and push the locking pins to secure it.

8. Is this your first pass through this procedure:

■   Yes - move the maintenance port cable from "this controller" to "other controller" maintenance port and repeat the procedure from step 2 to replace the other program card.

NOTE: "other controller" switches with "this controller," meaning that the controller the maintenance port cable was plugged into originally ("this controller") becomes "other controller" for the second pass through this procedure.

■   No - You have completed the procedure.

Dual-Redundant Controller Shutdown Upgrade

This procedure requires that you change your dual-redundant configuration into two single controller configurations for the HSOF Version 5.4 software upgrade. You must shut down and restart both controllers during this upgrade. Units will be unavailable to the host system during this time. Before upgrading the controller software, prepare the host system for this situation by dismounting units or shutting down the system.

NOTE: Compaq does not recommend the use of the SAVE_CONFIGURATION option for dual-redundant configurations.

Use the following procedure to upgrade the HSOF software in a dual-redundant configuration:

1. Stop all I/O to the units in your subsystem.

2. Establish a local terminal connection to one of the controllers

3. Enter the SET NOFAILOVER command to take the controllers out of dual-redundant (failover) mode.

    $ SET NOFAILOVER

4. Enter the SHUTDOWN command for each controller.

    $ SHUTDOW OTHER_CONTROLLER

    $ SHUTDOWN THIS_CONTROLLER

Wait for the command to complete. When the controller shuts down, the green RESET (//) LED stops flashing and stays lit.

> ⚠ **CAUTION:** Failure to shut down the controllers in this step might result in problems with RAIDsets and cache when the controller is reset.

5. Remove the electrostatic-discharge (ESD) shields covering the PCMCIA program cards.

6. Press and hold down the reset buttons while ejecting the program cards.

7. Release the reset buttons.

8. Remove the program cards.

9. While holding in the controller reset buttons, insert the V5.4 program cards, pressing the cards in until the eject buttons extend outward.

10. Release the reset buttons.

11. Reinstall the ESD shields.

    The controllers restarts. Communication with the host system begins as described in the HSJ50 Array Controller HSOF Version 5.1 Configuration Manual.

12. Repeat all of the previous steps for the second controller.

13. After you complete all of the above steps on both controllers, put the controllers back into dual-redundant (failover) mode by entering the following command:

    ```
    $ SET FAILOVER COPY=CONFIGURATION_SOURCE
    ```

Single Controller Upgrade

Use the following procedure to upgrade the HSOF software in a nonredundant (single) controller:

1. Halt all I/O activity to the controller using the appropriate procedures for your operating system.

2. Connect a maintenance terminal to the controller.

3. Enter the shutdown command to take the controller out of service:

    ```
    SHUTDOWN THIS_CONTROLLER
    ```

> ⚠ **CAUTION:** Failure to shut down the controller in this step could result in problems with RAIDsets and cache when the controller is reset.

Wait for the command to complete. When the controller halts, the green Reset (//) LED stops flashing and stays lit, and port lights 1, 2, and 3 are lit continuously.

4. Remove the ESD shield covering the PCMCIA program card.

5. While pressing and holding the reset button, press the program card eject button to eject the program card from the controller.

6. Release the reset button.

7. Remove the program card.

8. While holding in the controller reset button, insert the V5.4 program card, pressing the card in until the eject button extends outward, then release the reset button.

   After the controller begins restart, it will not allow you to enter any CLI commands for approximately 60 seconds. This delay does not affect unit availability to the host. When the controller is correctly initialized, the green reset indicator flashes once every second.

9. Reinstall the ESD shield.

Identifying Your HSOF Revision Level

You can identify HSOF Software Version 5.4 by entering the SHOW THIS_CONTROLLER command at the CLI prompt. The resulting display lists the software revision level as version "V54Z-x."

Order Numbers

The following table contains order numbers for controller options and preconfigured options.

Table 7 Order Numbers

Device	Description
HSJ50-AF	StorageWorks HSJ50 Array Controller with a 32 MB cache module, 36/42 SCSI-2 device connections, 1 external cache battery in a SBB, one 2-meter ECB cable
HSJ50-AH	StorageWorks HSJ50 Array Controller with a 64 MB cache module, 36/42 SCSI-2 device connections, 1 external cache battery in a SBB, one 2-meter ECB cable
HSJ50-AJ	StorageWorks HSJ50 Array Controller with a 128 MB cache module, 36/42 SCSI-2 device connections, 1 external cache battery in a SBB, one 2-meter ECB cable
HSJ52-AF	Two StorageWorks HSJ50 Array Controllers with 32 MB cache modules, 72/84 SCSI-2 device connections, 2 external cache batteries in a SBB, two 2-meter ECB cables
HSJ52-AH	Two StorageWorks HSJ50 Array Controllers with 64 MB cache modules, 72/84 SCSI-2 device connections, 2 external cache batteries in a SBB, two 2-meter ECB cables
HSJ52-AJ	Two StorageWorks HSJ50 Array Controller with 128 MB cache modules, 72/84 SCSI-2 device connections, 2 external cache batteries in a SBB, two 2-meter ECB cables
HSJ54-AJ	Two StorageWorks HSJ50 Array Controllers with 64 MB cache modules, 144/168 SCSI-2 device connections, 4 external cache batteries in two SBBs, four 2-meter ECB cables
HSSIM-AA	32 MB SIMM pack for cache memory upgrades
HS35X-BA	One replacement external cache battery in a SBB
HS35X-BB	Two replacement external cache batteries in a SBB

NOTE: One prerequisite QB-5C4AA-SA software kit is required for each controller ordered (two kits for HSJ52 configurations, four kits for HSJ54 configurations.)