digital™

DIGITAL StorageWorks HSJ50 Array Controller Operating Software

HSOF Version 5.2 Release Notes

Order Number: EK–HSJ50–RN. C01

This document summarizes features and characteristics of the HSJ50 array controller operating software Version 5.2 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 .

Software Version: HSOF V5.2

Digital Equipment Corporation
Maynard, Massachusetts

December 1997

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 instruction manual, 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.

Avertissement!
Cet appareil est un appareil de Classe A. Dans un environnement résidentiel cet appareil peut provoquer des brouillages radioélectriques. Dans ce cas, il peut être demandé à l' utilisateur de prendre les mesures appropriées.

Contents

Introduction

These release notes provide information for the HSJ50 array controller operating software Version 5.2[1] not covered elsewhere in the documentation. This document should be used by individuals responsible for configuring, installing, and using HSJ50 array controllers.

Read this entire document before installing the software.

Topics Covered

These release notes cover the following topics:

- Hardware and software supported by HSOF Version 5.2 software
- New features—Description of modifications to software
- Items from previous releases
- Clarifications—Explanations of controller behavior in certain situations
- Operating constraints—Limitations placed on the operation of the controller by the nature of its design
- Avoiding problem situations—Information to help you avoid and recover from unusual controller behavior in certain situations, under specific conditions
- Corrections and additions to the documentation
- HSOF software installation/upgrade instructions
- Identification of the software revision level
- Order numbers

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[1] The OpenVMS™ SHOW CLUSTER command and the HSOF software SHOW THIS_CONTROLLER command display the version as "V52J".

Release Package Contents

The Version 5.2 release package consists of the following:

- A cover letter
- The HSJ50 documentation set, which includes documents produced for HSOF Version 5.1, all still applicable to HSOF Version 5.2:
  - *DIGITAL Storageworks HSJ50 Array Controller*
    HSOF Version 5.1
    Configuration Manual
  - *DIGITAL Storageworks HSJ50 Array Controller*
    HSOF Version 5.1
    Service Manual
  - *DIGITAL Storageworks HSJ50 and HSD50 Array Controllers*
    HSOF Version 5.1
    CLI Reference Manual
  - *DIGITAL Storageworks HSJ50 Array Controller*
    Operating Software HSOF Version 5.2 Release Notes
  - *DIGITAL Storageworks Family Array Controller*
    Operating Software (HSOF), Version 5.2 Software Product Description
- A PCMCIA program card containing HSOF Version 5.2 software

Intended Audience

This document has been prepared for DIGITAL customers who have purchased HSJ50 array controllers and for DIGITAL Multivendor Customer Services personnel responsible for installing and maintaining systems that include HSJ50 array controllers.

Hardware and Software Support

This section lists the hardware and software compatible with HSOF Version 5.2 software.

Hardware Support

HSOF Version 5.2 software supports the following revisions for the HSJ50 controllers and associated hardware:

- HSJ50 controller module, hardware revision A
- Version 3 cache module, hardware revision A or B
- BA350–MA controller shelf
- BA350–S*x* device shelf
- BA356–S*x* wide device shelf with 8-bit or 16-bit personality module (controller operates in 8-bit mode only)
- BA35*x*–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 5.2 software on HSJ50 controllers is supported by the following operating system versions, within the limitations described in *DIGITAL Storageworks HSJ50 Array Controller HSOF Version 5.1 Configuration Manual*:

- OpenVMS Alpha™ Versions 6.1, 6.2, 7.0, or 7.1
- OpenVMS VAX™ Versions 5.5–2, 6.1, 6.2, 7.0, or 7.1

Host Adapter Support

The following adapters have been tested and are supported in this release.

- CIXCD–AB
  CIXCD–AC (both for XMI-based systems)
- CIBCA–B*x* (for BI-based systems)[2]
- CIPCA (for PCI-based systems)

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[2] Supersedes CIBCA-A, which is no longer supported

Device Support

HSOF Version 5.2 software supports the devices listed in Table 1 through Table 4 at the indicated hardware and microcode levels or higher.

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	1.05	440C	A01
RZ26N-VA/VW	1.05	446	A01
SWXD3-SF/WF	1.05	446	A01
DS-RZ1BB-VW	2.1	LYJO/0656	A01
DS-RZ1CB-VW	4.3	LYJO/0656	A01
DS-RZ1DB-VW	9.1	LYJO/0307	A01
DS-RZ26N-VZ	1.05	1003	A01
RZ28-VA/VW	2.10	435E	B01
RZ28B-VA	2.10	0003	A01
RZ28D-VA/VW	2.10	0008	A01
SWXD3-SG/WG	2.10	0008	A01
RZ28M-VA/VW	2.10	0466	A01
DS-RZ28M-VZ	2.10	1003	A01
SWXD3-SH/WH	2.10	0466	A01
RZ29B-VA/VW	4.3	0007	B01
SWXD3-SE/WE	4.3	0007	C02/A01
DS-RZ40-VA	9.1	LYGO	A01
RZ74-VA	3.57	T427B	B07

Table 2: Supported Tape Drives

Device	Capacity in Gigabytes	Minimum Microcode Version	Minimum Hardware Version	Notes
TKZ60-EC	.440	111	B01	6,1
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	1.10 robot /v40 drive	A01	1,2,3
TL812	960/1920	1.2 robot /CC33 drive	A01	1,2,3,4
TL820, Rev A01	2640/5280	1d3M robot /v40	L1	1,2,3
TL822	5280/10560	1g4F robot /CC33 drive	A01	1,2,3,4
TL826	3520/7040	1g4F robot /CC33 drive	A01	1,2,3,4
DS-TL893	9.24/18.48T	V2A/5A	A01	1,2,3,4
DS-TL894	1.69/3.36T	V1.24	A01	1,2,3,4
DS-TL896	6.16/12.32T	V2A/5A	A01	1,2,3,4
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	10/20	930A	A01	3,5
TZ87N-VA	10/20	930A	A01	3,4,5
TZ87-TA	10/20	9514	B02	1,3,5
TZ87N-TA	10/20	930A	A01	1,3,5
TZ867-AE/AF	42	430B	A01	1,3,5
TZ875-NE	50/100	930A	A01	1,3,5
TZ875-NT	50/100	930A	A01	1,3,5

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

Notes:

In the Capacity column, T = Terabytes

1. Requires 0.2 meter SCSI-1 to SCSI-2 transition cable, DIGITAL internal part number 17-03831-01 for DWZZA-AA and DIGITAL part number 17-04367-01 for SSB DWZZA-VA and DWZZB-VW.
2. Requires DWZZA/DWZZB 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. Tape device code load is supported through using HSUTIL.
6. Loaders operate in sequential mode only.

Table 3: Supported Solid State Disk Drives

Device	Capacity in Gigabytes	Minimum Microcode Version	Minimum Hardware Version	Code Load Supported?
EZ31-VW	0.134	V064	A01	Yes, See Note 2
EZ32-VW	0.268	V064	A01	Yes, See Note 2
EZ51R-VA	0.10	V096	D01	Yes
EZ54R-VA	0.42	V096	A01	Yes
EZ58R-VA	0.85	V109	C01	No
EZ64-VA	0.475	V064	A01	Yes
EZ64-VW	0.475	V070	A01	Yes
EZ69-VA	0.950	V064	A01	Yes
EZ69-VW	0.950	V070	A01	Yes

Notes:

1. Do not warm-swap solid-state disk drives. Make sure power to the device shelf is turned off before removing or inserting this device. This note applies to all solid-state disk drives.
2. The EJ31 and EJ32 are supported as devices in HSOF Version 5.1, but device code load to this drive with HSUTIL is not supported with an entry in the internal HSUTIL table. Code load to the EZ31 and EZ32 may be performed using the "unsupported device" feature of HSUTIL. The steps are as follows:

    a. answer the "unsupported device" question: yes

    b. total size: 1024

    c. single write buffer: no

    d. buffer size: 8

    e. download microcode and SAVE as input: yes

    f. bytes reversed: no

Table 4: Supported CD-ROM Drives

Device	Capacity in Gigabytes	Minimum Microcode Version	Minimum Hardware Version	Notes
RRD42-VB/VU	0.6	1.1a	A01	1
RRD43-VA	0.6	0064	A02	1
RRD44-VA	0.6	3493	A02	1
RRD45-VA/VU	0.6	1645	A01	1
RWZ52-VA	0.6 per side	3403	A01	1
RWZ53-VA	2.3/2.6	1.35	AX02	1
RW524	19	1.37 juke box /3404 drive	A01	2
RW525	19	2.17 juke box /3404 drive	A01	2
RW530	38	6.15 juke box /3404 drive	A01	2
RW531	38	0.35 juke box /3404 drive	A01	2
RW532	76	0.35 juke box /3404 drive	A01	2
RW534	104	5.20 juke box /3404 drive	A01	2
RW536	170	5.20 juke box 3404 drive	A01	2,3
RW546	36.8	1.36 juke box /1.35 drive	A01	2,3
RW551	64	1.36 juke box /1.35 drive	A01	2,3
RW552	147	1.36 juke box /1.35 drive	A01	2,3
RW555	294	1.36 juke box /1.35 drive	A01	2,3
RW557	547	1.36 juke box /1.35 drive	A01	2,3

Notes:

1. Do not warm-swap this device. Ensure that the device shelf power is off when inserting or removing this device.
2. Requires 0.2 meter SCSI-1 to SCSI-2 transition cable, DIGITAL internal part number 17-03831-01.
3. To add this device to your configuration do the following: SET *optical container-name* PTL TRANSFER_RATE_REQUESTED=ASYNC

New Features of Version 5.2

Summary

HSOF Version 5.2 provides the following:

- Corrects problems that were identified after the release of HSOF Version 5.1.
- Incorporates all patches issued to HSOF Version 5.1.
- Improves internal battery test algorithms to resolve some anomalies in Version 5.1 battery testing.
- Provides support for the following new devices:
  - DS-RZ1BB-VW
  - DS-RZ1CB-VW
  - DS-RZ1DD-VW
  - DS-TL890
  - DS-TL891
  - DS-TL892

Items from Previous Release

The following list briefly describes features introduced in HSOF Version 5.1 that are not described in the HSOF 5.1 documentation set.

DILX Enhancement

The Disk In-Line Exerciser (DILX) acts on disks configured as single-device, RAIDset, stripeset, mirrorset, stripe-mirrorset or partitioned units.

Ability to Install New Device Microcode

The HSUTIL program can be used to install new microcode to tape drive TZ89 and solid state disk drives EZ51, EZ54, EZ64, or EZ69.

Clarifications

This section presents clarifications of controller behavior in certain situations.

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 CACHE_UPS

If the CACHE_UPS qualifier 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

When the CACHE_UPS option is enabled, the controller ignores the condition of the write-back cache batteries because an uninterruptible power supply (UPS) is assumed to be in use to maintain power to the write-back 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, 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.

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.

Battery Handling and Cache Policy

The setting chosen 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 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:

1. the battery becomes fully charged or
2. 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).

Once a battery has become fully charged, Cache Policy A and 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.

	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 RAID/mirrorsets sets 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 which does not pass the battery test.

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 (partner is running and has good batteries):

- RAIDsets and mirrorsets migrate to partner under OpenVMS 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

SHOW on Both Controllers

Some devices, such as tape devices, may not show correctly on one controller if they are preferred to the other controller. If the expected information is not displayed from one controller, use the SHOW command again to view the information on the other controller.

Logical Block Address Does Not Match for MEDIUM ERROR

The Logical Block Address (LBA) is a number used to identify a block on a mass storage device. The LBA that appears in the Information field of an Event Log (%EVL) display when the Sense Key field is MEDIUM ERROR does not agree with the LBA number contained in the Information field of the extended sense data that is sent to the host system. It is one less than the number in the extended sense data.

Adding RAIDsets When Battery Condition is Low

You can use the ADD RAIDSET and ADD MIRRORSET commands, regardless of the write-back cache battery condition. However, if the CACHE_POLICY is set to A and the batteries are low, the controller does not allow access to any RAIDsets or mirrorsets. CACHE_POLICY A requires that the cache batteries be fully charged before you can use RAIDsets or mirrorsets.

Drive-Level Event Reports

Under certain circumstances the "devtype" (device type) field contained in drive-level event reports %EVL displays as well as error logs, will contain the value 1F(hexadecimal). When "devtype" is 1F the content of the "device identification" and "device serial number" fields are undefined and should be ignored

Only One Qualifier per CLI Command Recommended

Certain qualifiers to CLI commands are incompatible. To avoid problems in this area, only specify one qualifier 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.

Using SAVE_CONFIGURATION to Save the Subsystem's Configuration

The SAVE_CONFIGURATION qualifier is intended to be used to provide a means to restore nonvolatile memory (NVRAM) contents when a controller in a single-controller module configuration is replaced. The SAVE_CONFIGURATION qualifier 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, you cannot use SAVE_CONFIGURATION to upgrade from HSOF Version 5.1 to Version 5.2, or from an HSJ40 to an HSJ50 array controller.

The controller stores the subsystem's configuration—the storagesets you configured, the qualifiers 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

DIGITAL recommends that the SAVE_CONFIGURATION qualifier 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, DIGITAL recommends that you save the subsystem's configuration on at least one of the devices or storagesets with the following command:

`INITIALIZE` *`storageset_name`* `SAVE_CONFIGURATION`

When you initialize a device or storageset with the SAVE_CONFIGURATION qualifier , the controller copies the subsystem's configuration to the disk drives. If you use the qualifier 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 qualifier is reduced by 256KB. This capacity reduction applies to each member of a storageset. This means that use of the SAVE_CONFIGURATION qualifier on disks that contain user data could result in data being overwritten.

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

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

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 your devices with a new controller.

If you are upgrading from HSOF Version 5.1 to Version 5.2 in a single-controller configuration, you can refresh the SAVE_CONFIG 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 of nonvolatile memory, causing the updated SAVE_CONFIG information to be automatically written to the SAVE_CONFIG area of all units which have been initialized with this option.

Operating Constraints

This section describes the operating constraints for HSOF Version 5.2 software. An operating constraint is a limitation placed on the operation of the controller by the nature of its design. Keep these constraints in mind to avoid problems and to help you to get the maximum performance from your controller.

Maintenance Terminal Port Speeds

HSOF Version 5.2 software supports terminal port connections at 4800, 9600, and 19200 bits per second (bps). Connections speeds at 300, 1200, and 2400 bps are not supported.

Limits on the Total Number of Storagesets

The following limits apply to storagesets configured on a 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 total for a unit.
- There can be a maximum of 4 partitions per disk or storageset.
- Each storageset can store a maximum of 120 GB.

Initialization Devices

Controller-attached devices may serve as initialization devices for VAX 7000 and VAX 10000 systems, provided the VAX 7000/10000 console code is at Version 4.0 or higher.

CFMENU Constraints

CFMENU can delete only one spareset member at a time. Delete sparesets one at a time by responding “Y” (yes) to one member, and “N” (no) to the remaining 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.

UNMIRROR and Device Capacity

The UNMIRROR command is valid only for devices that have a capacity equal to the capacity of the mirrorset. If a mirrorset is comprised of devices of different capacities, the mirrorset capacity is limited to the size of the smallest member; larger members will have unused capacity. If a member with unused capacity is the last remaining member of a mirrorset, you cannot use the UNMIRROR command to change the device back to a single-disk unit, because that change would cause a change in reported disk capacity, possibly confusing the operating system.

Unit Problems after Battery Low

An unusual combination of circumstances could cause a unit to unexpectedly become inoperative or report lost data after a write-back cache battery changes state from “low” to “good.” No data has been lost. Reset the controller to correct the unit state.

CLEAR_ERRORS LOST_DATA Command

When entering the CLEAR_ERRORS LOST_DATA command for a RAIDset-based unit, always enter the command through the preferred path on the controller that owns the unit. Entering the command from the companion controller in a dual-redundant configuration does not clear the lost data.

SET NOPATH Requires Controller Reset

Shut down the controller using the CLI SHUTDOWN THIS_CONTROLLER command to restart an HSJ controller after disabling the host paths with the SET THIS_CONTROLLER NOPATH command. Failure to do so could result in subsequent unexpected conditions requiring controller reinitialization. The shut down allows devices preferred to this controller to become visible on the other controller.

You do not need to reset an HSJ controller after enabling paths.

RRD42 CD–ROM Reader

Mounting an RRD42 might put a message in the OpenVMS error log. In earlier versions of OpenVMS, the first four digits in Longword 19 of the controller dependent information is 02D1. New versions of OpenVMS report ASC: 209.(D1) ASCQ: 2.(02). The message indicates “Unexpected bus phase,” and can be ignored safely.

OVERRIDE_ONLINE qualifier

Attempting to delete tape-based units using the OVERRIDE_ONLINE qualifier results in conditions requiring controller reinitialization. Do not enter the OVERRIDE_ONLINE qualifier when deleting tape-based units.

Unable to Access Tape Drives after Power Cycle

You might not be able to access a tape drive after the power for the drive is turned off and back on. Use the CLEAR_ERRORS UNKNOWN *device-name* command to place the device in a known state.

Avoiding Problem Situations

In certain situations, you might experience unusual controller behavior. This section presents information to help you to avoid such situations and to recover from them if they occur.

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 cannot work with the changed devices when it returns to service.

Tape Drive Firmware Revision Upgrade

If you do not use HSUTIL to install new tape firmware, you must do the following: Before installing a new version of tape drive firmware, delete the tape drive completely from the controller configuration. This prevents interrupts to the drive during the code loading operation. You can re-add the tape drive after the firmware installation is complete.

Set Tape Density When Adding Drive and Changing Cartridge Types

The DEFAULT_FORMAT qualifier allows you to specify the tape format for use by the controller for write operations to a tape drive. Also use this qualifier 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.

Notes

- Host system software must support the density selection for the affected device for this option to operate correctly. Using the host_selected qualifier for other devices may yield unpredictable results.

- DIGITAL recommends the use of the SET *tape-unit-number* DEFAULT_FORMAT=HOST_SELECTED command with only TSZ07 tape drives. Set the qualifier 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 Operations

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

Changing Host Adapter Types

If you change the host adapter and maintain the same node number, restart the controller(s).

Extending the Life of Your Write-Back Cache Batteries

Occasionally, circumstances require shutting down the controller and restarting it. If the correct steps for turning off the power to an HSJ50 array controller configuration with write-back cache are not followed, there is a potential for loss of data that might exist on any devices connected to them. In addition, turning off the power to the controller subsystem for any reason for longer than one day (such as a long holiday, system move, replacing a bad SCSI host cable, and so forth), turn off the external cache batteries (ECB's) to prevent them from discharging. To avoid problems when the controller restarts, always use the following process to shut it down:

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 the Controller

1. Use the proper procedures for shutting down your operating system if the host system is also going to be turned off.
2. If the host is not going to be turned off, shutting down the host system is not necessary, 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.

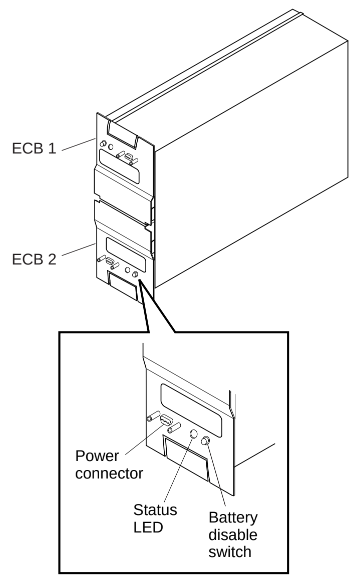
   The green reset LED light stops blinking when the SHUTDOWN command is completed.

6. Only when the controller SHUTDOWN command has successfully completed, should you 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 two seconds. The cache LED flashes once, then shuts off.

Figure 1 External Cache Battery Disable Switch



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.

Moving Write-Back Cache Modules

When moving a write-back cache module to a new environment (that is, different controller, different devices), it is very important that you perform a clean shut down of the controller and clear any data from the cache. Follow these steps to move a write-back cache module:

1. Shut down the controller and flush unwritten data from the cache module using the appropriate CLI command:

   ```
   SHUTDOWN THIS_CONTROLLER
   ```

   or

   ```
   SHUTDOWN OTHER_CONTROLLER
   ```

2. Wait for the SHUTDOWN command to complete and verify that the controller does not report any errors.
3. Remove the controller and cache module following the instructions in the *DIGITAL StorageWorks HSJ50 Array Controller HSOF Version 5.1 Service Manual.*

The SHUTDOWN command flushes cache data to the devices, and you can install the module in another location without problems caused by uncleared cache data.

Documentation Additions and Corrections

Following are additions and corrections to:

- *DIGITAL Storageworks HSJ50 Array Controller HSOF Version 5.1 Configuration Manual*
- *DIGITAL Storageworks HSJ50 Array Controller HSOF Version 5.1 Service Manual*
- *DIGITAL Storageworks HSJ50 and HSD50 Array Controller HSOF Version 5.1 CLI Reference Manual*

Fault Management Utility (FMU) Codes

Add the following codes:

Executive Services Last Failure

01192390—A processor interrupt was generated by the CACHEA Dynamic Ram controller and ArBitration engine (DRAB) with an indication that the CACHE backup battery has failed or is low (needs charging).

011A2390—A processor interrupt was generated by the CACHEB Dynamic Ram controller and ArBitration engine (DRAB) with an indication that the CACHE backup battery has failed or is low (needs charging).

Host Interconnect Port Service Last Failure

42332080—Receive_main found destination address in the rcv packet does not match node address.

Last Failure Codes No Longer Used

010B2380—A processor interrupt was generated by the CACHEA Dynamic Ram controller and ArBitration engine (DRAB) with an indication that the CACHE backup battery has failed or is low (needs charging).

010C2380—A processor interrupt was generated by the CACHEB Dynamic Ram controller and ArBitration engine (DRAB) with an indication that the CACHE backup battery has failed or is low (needs charging).

Upgrading Array Controller Software

This section describes how to upgrade controller software using the program card in both the single and dual-redundant controller configurations. An HSJ operating software upgrade causes a brief interruption in service to attached devices.

Caution

If JBOD disks that were initialized using the SAVE_CONFIG option on an HSZ40 controller running HSOF Version 27Z have been moved onto your HSJ50 controller subsystem, read Appendix A in these release notes before upgrading your HSJ50 controller to HSOF Version 5.1.

Program Card Upgrade (Single Controller Configuration)

Use the following procedure to upgrade controller software in a single controller configuration.

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. Take the controller out of service:

   ```
   HSJ50> SHUTDOWN THIS_CONTROLLER
   ```

   To ensure the controller has shutdown cleanly, check for the following indications on the controller's OCP:

   – The Reset (//) light is lit continuously.

   – Port lights 1, 2, and 3 are also lit continuously.

Caution

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

4. Unsnap and remove the program card ESD cover.
5. While pushing and holding down the operator control panel (OCP) Reset (//) button on the controller, eject and remove the program card.
6. While pushing and holding down the OCP Reset (//) button on the controller, insert the new program card.
7. Release the Reset (//) button to initialize the controller.

   After restart, the controller will not allow you to enter any CLI commands for approximately 60 seconds. This delay does not affect unit availability to the host. The delay provides time for the controller internal operations to complete before user commands can change configuration.

   When the controller initializes correctly, the green reset indicator flashes once every second.
8. Replace the ESD cover over the program card by pushing the two plastic push pins on each side of the shield.
9. Resume I/O activity to the controller.

Program Card Upgrade (Dual-Redundant Configuration)

In a dual-redundant configuration, the software in both controllers must be upgraded simultaneously. Use the following procedure to upgrade controller software in a dual-redundant configuration:

1. Follow steps 1-4 of the single controller configuration procedure for each controller.
2. Follow steps 5-7 of the single controller configuration procedure for both controllers simultaneously.

   The two controllers reinitialize concurrently and synchronize with each other. The timing of this procedure is not critical, however the program cards should be removed and inserted at approximately the same time (within a few seconds).
3. Replace the ESD covers over both program cards.
4. Resume I/O activity to the controllers.

Identifying Your HSOF Software Revision Level

You can identify HSOF Version 5.2 software by entering the SHOW THIS_CONTROLLER command at the CLI prompt. The resulting display lists the software revision level as version "Version 52J."

Order Numbers

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

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 device connections, 1 external cache battery in a SBB, one 2-meter ECB cable
HSJ52-AF	Two StorageWorks HSJ50Array 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 Controllers 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	Four StorageWorks HSJ50 Array Controllers with 128 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).

Appendix A

Possible Problem with Disks Initialized with SAVE_CONFIG Under HSOF V2.7 on HSZ40/20/SWXRC

If you initialized a JBOD disk using the SAVE_CONFIGURATION switch on an HSZ40 controller which was running HSOF V2.7, and then moved the disk to your HSJ50 controller, read this appendix.

There is a remote possibility that some disks attached to HSZ40/20/SWXRC and the solution products containing them (RA410, SC4200/4600, etc.) could have a problem in the structure of the on-disk file system. Systems that might be affected are those which:

1. Use disks in JBOD configuration (that is, disks which are not members of controller-based storagesets such as RAIDsets and mirrorsets)
2. Initialized disks under HSOF V27Z using the SAVE_CONFIG command **and** rebooted the controller **before** initializing the disk under the operating system.

Note that the problem does not occur if the file system was built on the disk before the controller was rebooted. Also, the problem does not occur when disks are initialized using SAVE_CONFIG and the platform operating system under HSOF Versions 3.0Z, 3.1Z, 32Z, 50Z, 51Z or 52Z.

If a disk built as described above is moved to an HSJ50 controller running HSOF Versions 5.0, 5.1 or 5.2, problems could occur.

When a disk being used in a JBOD configuration is initialized with SAVE_CONFIG, the last 500 blocks on the disk are allocated by the controller to store the configuration data. If the controller running HSOF V27Z is rebooted before the disk is initialized by the platform operating system, the controller fails to remember the reduction in disk size and reports the unreduced disk capacity to the operating system. When the operating system subsequently builds the file system, the blocks which SAVE_CONFIG uses to update the configuration data are also included in the file system disk space, creating a potential for both the operating system and the controller to write to the last 500 blocks on disk.

If the file system subsequently overwrites configuration data, the controller recognizes that the data is invalid configuration data and ignores it. In this case, controller parameters must be manually re-entered when SAVE_CONFIG tries to restore the configuration (unless another drive contains valid config data.)

Various configuration events cause the controller to write the configuration data to the SAVE_CONFIG area. If the controller overwrites file system data, the results vary depending on the platform operating system and the application.

If a disk which has this problem is moved to a controller running HSOF Version 5.1or Version 5.2 before the differing file system and controller view of the disk capacity is resolved and the file system tries to access the SAVE_CONFIG area, the controller returns an error to the operating system. The action that the operating system takes upon receiving this error varies depending on the platform, but might include rendering the entire file system or database inaccessible.

How to Detect if You Have This Problem

OpenVMS platforms

The problem described in this appendix affects single-disks units in JBOD configuration with SAVE_CONFIG data stored on them. If you have not moved JBOD disk units with SAVE_CONFIG data saved on them to the HSJ50 controller being upgraded to Version 5.1 or Version 5.2, do not proceed any further. Your system is **not** at risk.

If disks in your system are at risk of this problem, use the following procedure to check a disk in JBOD configuration to determine whether it is exposed:

a. At the controller prompt, type SHOW DISK *nnn* (where *nnn* is the JBOD disk in question).

b. Look for "Configuration being backed up on this container" message.

c. Record the block size capacity displayed by the controller.

d. From the OpenVMS prompt on one of the hosts, mount the disk in question and type the command:

```
$ show device/full dka200:
```

e. Compare the total block size obtained from the "show device" command with the block size capacity obtained in step 'c.'

f. If the reported sizes are different, this disk is at risk for the problem. See the "Solution" section in this appendix for the recovery procedure.

Solution

1. If you are using SAVE_CONFIG to initialize JBOD disks under HSOF Version 27Z, initialize the disk with the platform file system **before** rebooting the controller.
2. If you have the risk factors for the problem as described in the "Symptom" and "Detection" sections in this appendix, use the steps below to resolve the discrepancy in controller/operating system views of the disk at the earliest opportunity.

DIGITAL recommends that the recovery process described below be performed **before** moving the disk to a controller running Version 5.1 or Version 5.2. Any files that might have been written in the SAVE_CONFIG area are accessible to the operating system after the restore process; however, these files are suspect and should be carefully examined to ensure that the data they contain is correct, or restored from a previous backup.

a. Back up the unit that contains SAVE_CONFIG information.

b. Unmount the file system(s) contained on that unit.

c. Delete the unit from the configuration in the controller.

d. Initialize the container from the controller without SAVE_CONFIG.

e. Add the unit back into the configuration.

f. Initialize and restore unit from backup.