



## **HSD50 Array Controller Operating Software HSOF Version 5.4**

### **Release Notes**

This document summarizes features and characteristics of the HSD50 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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#### 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.

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#### 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.

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## Introduction

These release notes provide information for the HSD50 array controller running HSOF Version 5.4. This document should be used by individuals responsible for configuring, installing, and using the HSD50 controller.

Read this entire document before upgrading the controller's software. The information in these release notes takes precedence over the information in the HS Family of Array Controllers User's Guide.

## Topics Covered

These release notes cover the following topics:

- Hardware and software supported by HSOF Version 3.4
- Device Support—Lists of devices supported by HSOF Version 3.4
- New Items—Modifications that are new for HSOF Version 3.4
- Items from Previous Releases—Modifications to operating parameters or functions that were introduced in software versions prior to HSOF Version 3.4
- Documentation Amendments—Additions and corrections to the documentation
- 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 HSD50 documentation set:
  - *HSD50 Array Controller HSOF Version 5.1 Configuration Manual*
  - *HSD50 Array Controller HSOF Version 5.1 Service Manual*
  - *HSJ50 and HSD50 Array Controllers HSOF Version 5.1 CLI Reference Manual*
  - *HSD50 Array Controller Operating Software Version 5.4 Release Notes*
  - *HSD50 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 HSD50 array controller.

## Hardware Support

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

- HSD50 controller module, hardware revision A
- Cache module Version 3, hardware revision A or B
- BA350-MA controller shelf
- BA350-Sx device shelf
- BA350-Sx wide 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 HSD50 controllers is supported by the following operating system versions:

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

## Host Adapter Support

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

- SHAC-based embedded/native adapters (for various VAX and DEC systems)
- Embedded/native adapter for DEC 4000™ systems
- KFMSA (for XMI-based VAX systems)
- KFMSB (for XMI-based DEC systems)
- KFESA (for EISA-based AlphaServers)
- KFESB (for EISA-based AlphaServers)
- KFPSA PCI to DSSI adapter (for PCI-based AlphaServers)

## 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 <sup>1</sup>	1.05	440C	A01
RZ26N-VA/VW <sup>1</sup>	1.05	446	A01
SWXD3-SF/WF <sup>1</sup>	1.05	446	A01
DS-RZ26N-VZ <sup>1</sup>	1.05	1003	A01
DS-RZ1BB-VW	2.10	LYJO/0656	A01
RZ28-VA/VW <sup>1</sup>	2.10	435E	A01
RZ28B-VA	2.10	0003	A01
RZ28D-VA/VW <sup>1</sup>	2.10	0008	A01
SWXD3-SG/WG <sup>1</sup>	2.10	0008	A01
RZ28M-VA/VW <sup>1</sup>	2.10	0466	A01
DS-RZ28M-VZ <sup>1</sup>	2.10	1003	A01
SWXD3-SH/WH <sup>1</sup>	2.10	0466	A01
RZ74-VA	3.57	T427B	B07
DS-RZ1CB-VW	4.1	LYJO/0656	A01
RZ29B-VA/VW <sup>1</sup>	4.3	0007	B01
SWXD3-SE/WE <sup>1</sup>	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:

<sup>1</sup> 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**

<b>Device</b>	<b>Capacity</b> G= Gigabytes T=Terabytes	<b>Minimum Microcode Version</b>	<b>Minimum Hardware Version</b>	<b>Notes</b>
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
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	70/140	930A	A01	1,3,5



**Table 2 Supported Tape Drives**

<b>Device</b>	<b>Capacity</b> <b>G= Gigabytes</b> <b>T=Terabytes</b>	<b>Minimum</b> <b>Microcode</b> <b>Version</b>	<b>Minimum</b> <b>Hardware</b> <b>Version</b>	<b>Notes</b>
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**

<b>Device</b>	<b>Capacity in Gigabytes</b>	<b>Minimum Microcode Version</b>	<b>Minimum Hardware Version</b>	<b>Notes</b>
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**

<b>Device</b>	<b>Capacity in Gigabytes</b>	<b>Minimum Microcode Version</b>	<b>Minimum Hardware Version</b>
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 some problems 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 3.4.

### EMU Alarm Clarification

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

### 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.

### Upgraded Storageset Limits

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 for a unit.
- There can be a maximum of 4 partitions per disk or storageset.
- Each storageset can store a maximum of 256 GB.

### 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).

## Support for up to Fourteen 18 GB Drives

The maximum storageset size has been increased to 256 GB so that the 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®
E	Silicon Graphics IRIX®
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 HSOF features, refer to:

- *HSD50 Array Controller HSOF Version 5.1 Configuration Manual*
- *HSD50 Array Controller HSOF Version 5.1 Service Manual*
- *HSD50 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.

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When the *CACHE-UPS* feature 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.

### 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.

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:** HSOE 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 HSD50s (dual batteries on each cache module and 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 HSD50:

- no shutdown
- no RAIDset or mirrorset access permitted
- individual disk units accessed in write-through mode

## Extending the Life of Your Write-Back 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 HSD50 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.



**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.

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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 HSD50 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.



- 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 External Cache Batteries

Refer to Chapter 2 in the *HSD50 Array Controller HSOF Version 5.1 Service Manual*, for instructions on removing and replacing the controller module and write-back cache module.

- Stop all host activity and dismount all device units from the host system. Device service is interrupted for the duration of the service cycle. You can shut down the host operating system to accomplish this.
- Connect a maintenance terminal to the controller's maintenance terminal port on the front bezel.
- Take the controller out of service by issuing the following CLI command:

```
SHUTDOWN THIS_CONTROLLER
```

For a dual redundant configuration, shut down both controllers before proceeding by issuing these commands:

```
SHUTDOWN OTHER_CONTROLLER
```

```
SHUTDOWN THIS_CONTROLLER
```

When shut down completes, the controller's or controllers' green reset LED on the operator control panel (OCP) stops blinking.

- Power off the entire storage subsystem.

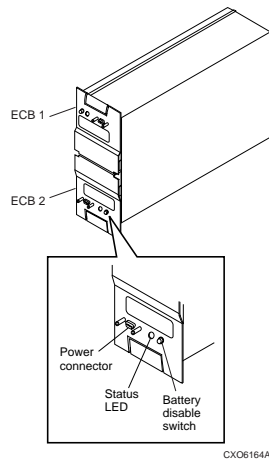


Figure -1. External Cache Battery Disable Switch

- The battery is no longer powering the cache.
- To return to normal operation, the cache battery is enabled when 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.

## 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.

## 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.

This is a permanent restriction.

## 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 HSOV Version 5.2, or from an or from an HSD30 to an HSD50 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:** 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 storage set 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 storage set, such as a stripeset, the complete information is stored on each device in the storage set. 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 storage set.

After initializing a storage set with this switch, the controller keeps the copy up-to-date. For example, every time a new patch or storage set is added to the HSOF software, the controller re-copies the new configuration to all storage sets 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.

Compaq does not recommend initializing all of your storage sets with the `Save_configuration` switch. Every time you change the subsystem's configuration, the controller writes the new configuration to the storage sets 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 storage sets 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 5.4 software supports terminal port connections at 4800, 9600, and 19200 bits per second (bps). Connection speeds at 300, 1200, and 2400 bps are not supported.

## Initialization Devices

Controller-attached devices can 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.

## Only One Switch per CLI Command Recommended

Certain switches to CLI commands 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
```

## 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 member 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.

## 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.

Refer to HSD50 Array Controller HSOF Version 5.1 Configuration Manual, HSD50 Array Controller HSOF Version 5.1 Service Manual, and HSD50 Array Controller HSOF Version 5.1 CLI Reference Manual for details about adding the tape drive back to the configuration.

## 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.

## DILX Enhancement

The HSD50 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, sripeset, mirrorset, striped-mirrorset, or partitioned units.

## Ability to Install New Microcode

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

HSOF Version 5.1 software also allows you to use the controller's HSUTIL program to install new microcode to solid state disk drives: EZ51, EZ54, EZ64, or EZ69

## Documentation Additions and Corrections

This section describes additions and corrections to:

- *HSD50 Array Controller HSOF Version 5.1 Configuration Manual*
- *HSD50 Array Controller HSOF Version 5.1 Service Manual*
- *HSD50 Array Controller HSOF Version 5.1 CLI Reference Manual*

## AUTOSPARE Not Valid Switch on SET FAILEDSET Command

The *HS Family of Array Controllers CLI Reference Manual* incorrectly identifies *AUTOSPARE* as a valid switch on the SET FAILEDSET command. *AUTOSPARE* is not a supported switch for the HSD50 controller.

## MIRROR\_CACHE Not Valid switch on SET THIS\_CONTROLLER and SET OTHER\_CONTROLLER COMMANDS

The SET *this\_controller* and SET *other\_controller* commands in the *HSD50 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 HSD50 array controller.

## Replacing a Controller with C\_SWAP

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.

Please note the following additional correction:

In the *HSD50 Array Controller HSOF Version 5.1 CLI Reference Manual* on page 2-81, the second example was included in error. Please strike through that example.

## Upgrading HSOF Software

You can upgrade the HSD50 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 both program cards simultaneously)
- 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. Note that rolling upgrades from V5.2 to V5.4 are permitted.

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 HSD40 controller running HSOF Version 2.7 have been moved onto your HSD50 controller, please contact your service representative before upgrading your HSD50 controller from HSOF Version 2.7 to HSOF Version 5.2 software.

---

## 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. Note that rolling upgrades from V5.2 to V5.4 are permitted.

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 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

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 5-8 of the single controller configuration procedure for both controllers simultaneously.

The two controllers will reinitialize concurrently and will 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.

## Single Controller Software 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 lighted, and port lights 1, 2, and 3 are lighted 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 orderable part numbers for controller options.

Device	Description
HSD50-AF	StorageWorks HSD50 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
HSD50-AH	StorageWorks HSD50 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
HSD50-AJ	StorageWorks HSD50 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
HSD52-AF	Two StorageWorks HSD50 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
HSD52-AH	Two StorageWorks HSD50 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
HSD52-AJ	Two StorageWorks HSD50 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
HSSIM-AA	32 MB SIMM pack for cache modules 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-5C5AA-SA software kit must be ordered for each controller ordered (two kits for HSD52 configurations).

## Appendix A

### The HSUTIL Utility

This section describes the features and user interface of the HSUTIL utility. HSUTIL provides two functions:

- Device format-Enables you to perform a basic SCSI format operation on a disk device.
- Device code load-Enables you to download device firmware into supported disk devices.

### The Device Format Function

The device format function enables you to perform a SCSI format operation on a disk. Once started, the HSUTIL utility performs the operation without intervention.

### Device Format Special Considerations

Be aware of the following special considerations when using the HSUTIL utility to format disks:

- HSUTIL formats a single target device per session.
- HSUTIL does not format devices configured as units, stripesets, mirrorsets, RAIDsets, sparesets, or failedsets. The destination device must be an unattached device.
- If a power failure or SCSI bus reset occurs during a format operation, the device could become unusable until a successful format operation is completed. To minimize the possibility of this problem, Compaq recommends that you prevent activity to all devices on the same port as the device being formatted.
- You can use the Ctrl/C or Ctrl/Y keys to exit HSUTIL before the program begins issuing SCSI commands to perform a format. Once the program begins issuing SCSI commands, however, the exit key combinations are disabled.
- Medium formatting is accomplished with no initiator control over defect management. The destination device determines the degree of defect management to be performed.
- Special considerations for dual-redundant configurations:
  - While HSUTIL is active, do not invoke any CLI command or run any local program that might reference the target device from the other controller. Results are unpredictable.
  - Do not reinitialize either controller during a format operation. The resulting SCSI bus reset may render the target device unusable until after a successful format operation is completed.

### Formatting a Disk Using HSUTIL

This section demonstrates the use of the HSUTIL utility to format a disk. In this example, you are formatting target disk DISK150.

1. Make a backup of any user data on the disk to be formatted.

2. If possible, prevent I/O operations to all other devices on the same device SCSI bus to reduce the possibility of a SCSI bus reset.
3. Invoke the HSUTIL utility and select the format operation by entering "1" at the prompt:

```

                RUN HSUTIL
*** Available functions are:
0. EXIT
1. FORMAT
2. CODE_LOAD
Enter the number of the function you wish to perform (0:2) [2] ?1

```

The program reports the unattached units available for formatting:

```

Unattached devices on this controller include:
Device  SCSI Product ID  Current Device Rev
DISK150 RZ26L (C) DEC  T392
DISK250 RZ28 (C) DEC  441C

```

4. Select DISK150 as the device to be formatted:  
Enter the device to format ? DISK150

The program displays a number of informational messages and offers you the option of exiting before the format operation begins:  
Do you want to continue(y/n)[n] ? Y

```

The format operation begins, finishing a number of minutes later:
HSUTIL Started at: 13-JAN-1996 04:49:48
Format of DISK150 has successfully finished.
HSUTIL - Normal Termination at: 13-JAN-1996 05:22:33

```

DISK150 is now formatted and usable.

## The Device Code Load Function

The device code load function allows you to load new firmware into supported devices. The new firmware image must be at a specific LBN on a source disk on the same controller. The source and target disks must be in the configuration on the controller from which HSUTIL is invoked. The source disk can be a raw disk device configured as a unit with no file system or label on it, or it could be a normal file system disk. The device code load process takes place in two steps.

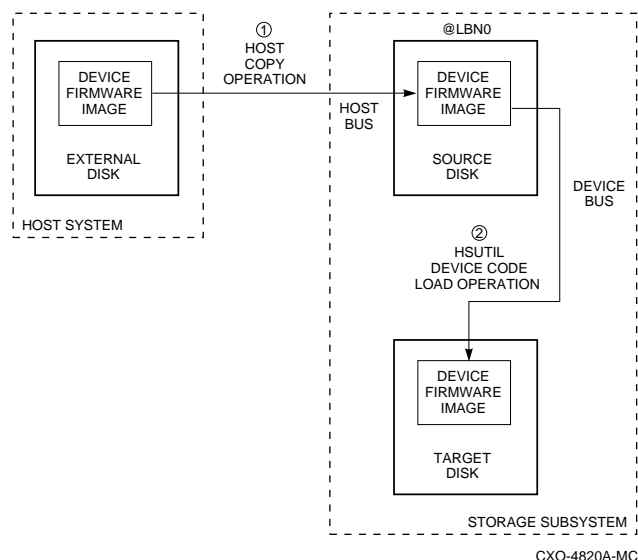


Figure -2. The Device Code Load Process

## Preparing the Source Disk

Copy the new device firmware image to a source disk in the storage subsystem. You cannot load the firmware image from a location external to the controller.

The device firmware image must be located in contiguous blocks at a known logical block number (LBN) on the source disk. Prepare for the code load operation by copying the device firmware image to the source disk at a known LBN location.

One way to prepare the firmware image for downloading is to copy it to a raw source disk containing no data. A raw source disk has no label and no formatted file structure on it. Using a raw disk as the source disk puts the firmware image in contiguous blocks at a specific LBN (usually LBN 0) on the source disk.

The details of copying the firmware image to the source disk from the host disk are specific to the host operating system. Refer to the sample Host Copy Scripts below for examples of copying a firmware image in OpenVMS.

## Code Loading the Target Disk

Once the firmware image is located in contiguous blocks at a known LBN on the source disk, use HSUTIL to download it into the target disk.

## Sample OpenVMS Host Copy Script

If you are installing new firmware on only one device type, such as RZ29B, and be sure to select the correct code for the code load, then load the code first onto a spare drive at LBN: 0. These commands show how to copy firmware for a single device type.

From an OpenVMS account you would type these commands:

```

$ MOUNT/FOREIGN $2$DUA300:
$ COPY/CONTIGUOUS NODE::LCA:[FIRMWARE.RZ2X]RZ29B_DEC_0014.LOD -
TO $2$DUA300:
$ DISMOUNT/NOUNLOAD $2$DUA300:

```

Drive \$2\$DUA300: must be installed but not mounted on a shelf visible to the controller you are going to connect to. You are now ready to update code in an RZ29B using the code starting at LBN: 0 on DUA300:.

These commands show how to copy firmware for multiple device types.

If you are updating more than one type of supported device, you can copy the code for each device to a spare disk drive or any drive that can be moved to other controllers with little interference. In this example you can use any single mounted disk drive and would continue until you have all the software you need.

```

$ COPY/CONT NODE::LCA:[FIRMWARE.RZ2X]RZ29B_DEC_0014.LOD -
TO $2$DUA300:[000000]
$ COPY/CONT NODE::LCA:[FIRMWARE.RZ2X]RZ28P4_442C_DEC.FUP -
TO $2$DUA300:[000000]
$

```

Use the dump command to find the starting LBN of each firmware image:

```

$ DUMP/HEAD/BLOCK=COUNT=0 $2$DUA300:[000000]*.FUP
$ DUMP/HEAD/BLOCK=COUNT=0 $2$DUA300:[000000]*.LOD

```

The information below was edited to reduce the printout but each line is from the above dump command.

```

$2$DUA300:[000000]RZ26L_442D_DEC.FUP LBN: 8
$2$DUA300:[000000]RZ26_T392A_DEC.FUP LBN: 520
$2$DUA300:[000000]RZ28P4_442C_DEC.FUP LBN: 1036
$2$DUA300:[000000]RZ28_442D_DEC2104.FUP LBN: 1548
$2$DUA300:[000000]RZ29B_DEC_0014.LOD LBN: 2060
$ DISMOUNT/NOUNLOAD $2$DUA300:

```

Drive \$2\$DUA300: must be installed but not mounted on a shelf visible to the controller you are going to connect to. You are now ready to update code in different drives of choice with their code starting at LBN: \* on DUA300: as printed out above.

## Device Code Load Special Considerations

Be aware of the following special considerations when using the HSUTIL utility to download firmware to a disk device:



**CAUTION:** HSUTIL has been tested to perform the code load operation properly only with supported devices. Use HSUTIL to code load unsupported devices at your own risk.

---

- Device compatibility with firmware code loading using the SCSI Write Buffer command varies greatly from vendor to vendor. While HSUTIL does check to see if a target disk is an unsupported device, it does not prevent you from continuing the code load operation on the device. Any unsupported device could be rendered unusable until it is factory-initialized, if the code load is unsuccessful.



**CAUTION:** Delete all non-disk devices from the controller configuration that are on the same shelf as the target disk, and prevent bus activity to all other disks on the same shelf before downloading firmware to the target disk.

---

- If a power failure or SCSI bus reset occurs during a code load operation, permanent damage to the device can result. To minimize the possibility of rendering a device unusable, Compaq recommends halting activity on other devices on the same port during the code load process.
- HSUTIL processes a single target device per session.
- HSUTIL does not load code to devices configured as units, stripesets, mirrorsets, RAIDsets, sparesets, or failedsets. The destination device must be an unattached device.
- The source device must be configured as a single-device unit.
- The device firmware image must be located on the source disk in contiguous blocks at a known LBN location.
- Once HSUTIL has allocated the source disk for the code load operation, the source disk is unavailable to other subsystem operations.
- Some device firmware releases require a format operation after a code load operation to make the device usable. In this case, you must rerun HSUTIL to perform the format operation. See the release notes for your device firmware version to determine if you must format the device after code loading. If you do not have release notes, contact the device vendor to verify whether a format is required after a firmware update.
- Use the Ctrl/C or Ctrl/Y keys to exit HSUTIL before the program begins issuing SCSI commands to perform a code load. Once the program begins issuing SCSI commands, however, the exit key combinations are disabled.
- In dual-redundant configurations, shut down the controller that you are not be using for the code load operation and eject the program card. Reinstall the program card to restart the controller after you have finished the code load.

## Code Loading a Device Using HSUTIL

The example in this section demonstrates the use of the `hsutil` utility to download device firmware. In this case, your device's firmware release documentation specifies that it does not require a subsequent format. In the example, you are changing the firmware in device DISK150 from revision 0007 to 0014. The source disk is DISK250.

The details of copying the device firmware image from a location external to the controller to the source disk are specific to the host operating system. In this example, the firmware image is already at LBN 0 of DISK250.

1. Back up all data on the target device using your operating system's backup procedures.
2. Use the show disk command to report the available devices and the firmware level of each. In the example below, DISK150 is the target device and DISK250 (Unit D200) is the source device. Note that the firmware level of DISK150 is reported as "0007" and that it is an unattached device:

```

                SHOW DISK FULL
Name      Type  Port Targ Lun      Used by
DISK150   disk   1  5   0
          RZ29B (C) DEC   0007
DISK250   disk   2  5   0          D200
          RZ28  (C) DEC   442D
Switches:
NOTTRANSPORTABLE
Size: 8356756 blocks

```

If the target device is configured as part of a higher-level container, such as a unit, you must delete that part of the configuration. The target device must be an unattached disk drive.

3. Invoke the HSUTIL utility and select the code load function by entering option "2" at the prompt:

```

                RUN HSUTIL
*** Available functions are:
0. EXIT
1. FORMAT
2. CODE_LOAD
Enter the number of the function you wish to perform (0:2) [2] ?2

```

4. The program displays the single-device units available as source disks for code loading:
 

Single device units on this controller include:

```

Unit  Associated Device  SCSI Product ID
200  DISK250              RZ28

```

5. Select Unit 200 (DISK250) as the source disk:

Which unit is the code to be loaded FROM ? 200

Because you have previously copied the firmware image to LBN 0 on the source disk, you can accept the default starting LBN of the device firmware image by pressing Return at the prompt:

What is the starting LBN of the code on the unit where the code is to be loaded FROM [0] ? Return

6. Enter the disk model that is the target of the code load. Enter this information exactly as it was reported in the show command, including any spaces or special characters: (You may, however, use only as many characters as are necessary to uniquely identify the device, as shown in the following example.)

What is the SCSI PRODUCT ID of the disk that you want code load TO ? RZ29B

7. The program lists all unattached disk drives of the model specified. In this example, DISK150 as the only unattached device with the desired product ID:



Unattached devices on this controller include:

```
Device  SCSI Product ID  Current Device Rev
DISK150  RZ29B  (C) DEC  0007
```

8. Select the target device from the list:

Which device is the code to be loaded TO ? DISK150

9. The program displays a number of informational messages and offers you the option of exiting before the format operation begins:

Do you want to continue(y/n)[n] ? Y

10. The program begins the device code load operation, finishing within two minutes:

Device code has been successfully downloaded to DISK150

HSUTIL - Normal Termination at: 13-JAN-1996 05:53:03

11. Enter the show disk command for disk150 to verify that the device code load operation was successful. Note that the program reports a new firmware revision level, such as "0014." The device is now available for use with its new firmware.

```
                SHOW DISK150
Name      Type  Port Targ Lun      Used by
-----
DISK150   disk   1  5  0
          RZ29B (C) DEC   0014
```

## Code Loading a Device Using HSUTIL (Format Required)

Some devices and some revisions of device firmware require that you format the device after installing new firmware. The Code Load portion of HSUTIL detects when a device format is required, and displays a message on the console indicating this. Follow the instructions for "Formatting a Disk" in this document. You cannot use the device until it's formatted.

**NOTE:** Ensure data is backed up from the device before starting the code load.

## Abort Codes

In the event that HSUTIL terminates before it successfully completes a format or code load operation, it reports one of the abort codes. shown in the following table:

---

**Table 8 Abort Codes**

---

<b>Abort Code</b>	<b>Description</b>
1	FAO returned either FAO_BAD_FORMAT or FAO_OVERFLOW
2	Bad return from TS\$READ_TERMINAL_DATA
3	TS\$READ_TERMINAL_DATA returned either an ABORTED or INVALID_BYTE_COUNT
4	User requested an abort via ^Y or ^C
5	An error occurred on a SCSI command
6	Can't find the pub, device is probably missing

---