# *Compaq StorageWorks™*

# *Release Notes*

## RAID Array 7000/Enterprise Storage Array 10000
## HSZ70 HSOF Software Version 7.7
## for Compaq™ Tru64™ UNIX

*These Release Notes provide information for the RAID Array 7000 and Enterprise Storage Array 10000 (RA7000/ESA10000) Version 7.7 Solutions Software for* Compaq Tru64 *UNIX systems not covered elsewhere in the documentation.*

**NOTE**

The following is the recommended order for the installation of the upgrades to V7.7:

1. Upgrade your hardware (PCMCIA card). See Section 12 "*Software Installation"* of these Release Notes for details.
2. Install and configure the Command Console Agent. See the *Getting Started – HSZ70 Solutions Software V7.7 for Compaq Tru64 UNIX.*
3. If desired, install the Command Console Client on an available PC. See the *Command Console User's Guide V2.1* that was shipped with the HSOF V7.7 solution kit for details.

# Notice



Release Notes - HSZ70 HSOF Software Version 7.7 for *Compaq Tru64* UNIX
Sixth Edition (February 2000)
AA-R60LF-TE

## Release Notes Contents

These Release Notes include the following topics:



## Release Package Contents

The HSOF Version 7.7 Solutions Software kit consists of the following:

- A PCMCIA program card containing HSOF Version 7.7 software
- CD-ROM containing the following:
  - .txt file describing the contents of the CDROM
  - .pdf files of documentation
  - Adobe Acrobat Reader
  - *StorageWorks* Command Console Agent and Client software
- The RAID Array 7000/Enterprise Storage Array 10000 documentation set:
  - *Getting Started – Command Console Version 2.1 User's Guide*
  - *Getting Started – HSZ70 Solutions Software V7.7 for Compaq Tru64 UNIX Installation Guide*
  - *HSZ70 Array Controller HSOF Version 7.3 CLI Reference Manual*
  - *HSZ70 Array Controller HSOF Version 7.3 Service Manual*
  - *HSZ70 Array Controller HSOF Version 7.3 Configuration Manual*
  - *HSZ70 Solutions Software Version 7.7 Software Product Description*

– *Release Notes: RAID Array 7000/Enterprise Storage Array10000 V7.7 for Compaq Tru64 UNIX*

## Intended Audience

This document has been prepared for customers who have purchased the RAID Array 7000 (RA7000) or Enterprise Storage Array 10000 (ESA10000) and for Multivendor Customer Services personnel responsible for installing and maintaining systems that include the RAID Array 7000 or Enterprise Storage Array 10000 on *Compaq Tru64* UNIX systems. Please read this entire document before installing the software.

# 1.0 Identifying Your HSOF Software Revision Level

The Release Package you received includes a PCMCIA program card containing the new HSOF software (V7.7).

You can identify your software revision level by entering the **SHOW *this_controlle*r** command at the Command Line Interpreter (CLI) prompt. The resulting display lists the current software revision level. After installing this software release, the result should be V77Z-0.

If the HSOF Version is not V77Z-0, contact your support provider for instructions on how to obtain the updated version.

# 2.0 Hardware and Software Support

Paragraphs 2.1 through 2.5 list the hardware and software supported by this release of HSOF V7.7:

- Hardware Support
- Operating System Support
- Device Support
- *StorageWorks* Command Console Support
- Environmental Monitoring Unit Support

## 2.1 Hardware Support

HSOF Software Version 7.7 supports the following revisions for the RA7000/ESA10000 and associated hardware:

- DS-SW600-AA—600-mm wide cabinet 50/60 Hz, dual-redundant controllers, bolting kit for coupling (two SW600 cabinets)
- DS-SW370-AA—RAID pedestal, five 180-watt power supplies; eight universal 50/60 Hz 120/240V high-powered blowers; one AC input box; one enhanced EMU; one pedestal user's guide; six single-ended I/O modules
- DS-SW370-EA—RAID pedestal; five 180-watt power supplies; eight universal 50/60 Hz 120/240V high-powered blowers; one AC input box; one enhanced EMU; one pedestal user's guide; six expandable single-ended I/O modules; metric mounting hardware
- DS-BA370-AA—RAID rackmount enclosure; five 180-watt power supplies; eight universal 50/60 Hz 120/240V high-powered blowers; one AC input box, six single-ended I/O modules; one pedestal user's guide; one enhanced EMU; one PVA; metric mounting hardware
- DS-BA370-MA—Maintenance option for the SW370 and BA370 field service option, field-replaceable unit (FRU)
- DS-BA35X-HH—180-watt, 100 to 200-volt power supply, 240-volt, AC factor-corrected power supply, blue color carrier
- DS-BA35X-MK—High-powered blower for the SW370 and BA370
- DS-BA35X-MN—Single I/O termination module
- DS-BA35X-MP—Termination module
- DS-BA35X-BA—External cache battery shelf for SW370
- DS-BA35X-BC—Single battery in blue SBB
- DS-BA35X-BD—Double battery in blue SBB
- DS-BA35X-EB—Enhanced Environmental Monitor Unit of the SW370 and BA370
- DS-BA35X-MN—Single-ended, Ultra-SCSI I/O module
- DS-BA35X-EC—Power verification and addressing module
- DS-SW600-AA—600 mm wide cabinet, 50/60 Hz
- HS35X-BA—Single external cache battery in an SBB
- HS35X-BD—Dual external cache battery in an SBB
- DS-HSSIM-AB—64 MB SIMM cache upgrade (two 32 MB SIMMs)

## 2.2 Operating System Support

The following operating systems and versions support HSZ70 HSOF V7.7:

| Host Feature | Requirement |
|---|---|
| Platform | AlphaServers:<br>800, 2000, 2100, 2100A, 4000, 4100, 8200, 8400 |
| Operating System | *Compaq Tru64* UNIX Versions:<br>4.0d, 4.0e, 4.0f, and 5.0 |
| Free Disk Space | 500 KB for the program files |
| Adapter Compatibility | KZPSA–BB (Versions A11 and higher) and<br>KZPBA-CB (Versions 5.27 and higher) |

**NOTE**

Due to changes in certain operating system functions in *Compaq Tru64* UNIX V5.0 and higher, it is important to install HSOF software V7.7 on your controllers **before** installing these versions of the operating system.

## 2.3 Device Support

HSOF Software V7.7 supports the devices described in paragraphs 2.3.1 through 2.3.4:

- Supported Disk Devices
- Supported Optical Devices
- Supported Solid State Devices
- Supported Tape Devices

### *2.3.1 Supported Disk Devices*

Table 1 describes the supported disk devices that may be used with the HSOF V7.7 software. The "*Works With an HSZ70 in a"* column describes which type(s) of enclosures the HSZ70 may be mounted in to use the particular device. For example, the DS-RZ26L-VW disk is supported by the HSZ70 in a

DS-BA370 Series Ultra SCSI RAID Enclosure or an HSZ70 mounted in a DS-BA350/356 “M-series” shelf.

**NOTE**

With the release of HSOF Version 7.1, the maximum allowable storageset size was increased to 512 GB. This increase accommodates a 14-member RAIDset/Stripeset of 18 GB drives. New drives have also been added to Table 1 “HSZ70 HSOF V7.7 Supported Disk Devices” with the release of HSOF V7.7.

**Table 1 HSZ70 HSOF V7.7 Supported Disk Devices**

| Device | Works With an HSZ70 in a: | Capacity (GB) | Minimum Microcode Version | Minimum Hardware Version |
|---|---|---|---|---|
| RZ25-VA | BA350/356-M*x* | .426 | 900 | B01 |
| RZ26-VA | BA350/356-M*x* | 1.05 | T392 | D02 |
| RZ26L-VW | BA370<br>BA350/356-M*x* | 1.05 | 440C | A01 |
| RZ26L-VA | BA350/356-M*x* | 1.05 | 440C | A01 |
| RZ26N-VW | BA370<br>BA350/356-M*x* | 1.05 | 446 | A01 |
| RZ26N-VA | BA350/356-M*x* | 1.05 | 446 | A01 |
| DS-RZ26N-VZ | BA370<br>BA350/356-M*x* | 1.05 | 1003 | A01 |
| SWXD3-SF/WF | BA350/356-M*x* | 1.05 | 446 | A01 |
| SWXD3-SG/WG | BA370<br>BA350/356-M*x* | 2.1 | 0008 | A01 |
| RZ28-VW | BA370<br>BA350/356-M*x* | 2.1 | 435E | B01 |
| RZ28-VA | BA350/356-M*x* | 2.1 | 435E | B01 |
| RZ28B-VA | BA350/356-M*x* | 2.1 | 0003 | A01 |

**Table 1 HSZ70 HSOF V7.7 Supported Disk Devices**

| Device | Works With an HSZ70 in a: | Capacity (GB) | Minimum Microcode Version | Minimum Hardware Version |
|---|---|---|---|---|
| RZ28D-VW | BA370<br>BA350/356-M*x* | 2.1 | 0008 | A01 |
| RZ28D-VA | BA350/356-M*x* | 2.1 | 0008 | A01 |
| RZ28L-VW | BA370<br>BA350/356-M*x* | 2.1 | 0654<br>LYJO | A01 |
| RZ28L-VA | BA350/356-M*x* | 2.1 | 0654<br>LYJO | A01 |
| RZ28M-VA | BA350/356-M*x* | 2.1 | 466 | A01 |
| RZ28M-VW | BA370<br>BA350/356-M*x* | 2.1 | 466 | A01 |
| SWXD3-SH/WH | BA350/356-M*x* | 2.1 | 466 | A01 |
| DS-RZ28M-VZ | BA370<br>BA350/356-M*x* | 2.1 | 1003 | A01 |
| DS-RZ1BB-VW | BA370<br>BA350/356-M*x* | 2.1 | LYJ0<br>0656 | A01 |
| RZ29B-VW | BA370<br>BA350/356-M*x* | 4.3 | 0007 | B01 |
| RZ29B-VA | BA350/356-M*x* | 4.3 | 0007 | B01 |
| SWXD3-SE/WE | BA370<br>BA350/356-M*x* | 4.3 | 0007 | C02/A01 |
| DS-RZ29L-VA | BA350/356-M*x* | 4.3 | 0814<br>LYJO | A01 |
| DS-RZ1CB-VW | BA370<br>BA350/356-M*x* | 4.3 | LYJ0<br>0656 | A01 |
| DS-RZ1CD-VW | BA370<br>BA350/356-M*x* | 4.3 | A304 | A01 |
| DS-RZ1CF-VA | BA350/356-M*x* | 4.3 | 370<br>N1H1<br>1214 | A01 |
| DS-RZ1CF-VW | BA3700<br>BA350/356-M*x* | 4.3 | 370<br>N1H1<br>1214 | A01 |

**Table 1 HSZ70 HSOF V7.7 Supported Disk Devices**

| Device | Works With an HSZ70 in a: | Capacity (GB) | Minimum Microcode Version | Minimum Hardware Version |
|---|---|---|---|---|
| DS-RZ1DB-VA | BA350/356-M*x* | 9.1 | LYJ0<br>0307 | A01 |
| DS-RZ1DB-VW | BA370<br>BA350/356-M*x* | 9.1 | LYJ0<br>0307 | A01 |
| DS-RZ1DF-VW | BA370<br>BA350/356-M*x* | 9.1 | 0370<br>N1H1<br>1214 | A01 |
| DS-RZ1DF-VA | BA350/356-M*x* | 9.1 | 0370<br>N1H1<br>1214 | A01 |
| DS-RZ40-VA | BA350/356-M*x* | 9.1 | LYJO<br>0656 | A01 |
| DS-RZ1ED-VW | BA370<br>BA350/356-M*x* | 18 | 0306<br>0305<br>3B07 | A01 |
| DS-RZ1EF-VW | BA370<br>BA350/356-M*x* | 18 | 0370<br>N1H1 | A01 |
| DS-RZ1EF-VA | BA350/356-M*x* | 18 | 0370<br>N1H1 | A01 |
| DS-RZ1FB-VW | BA370<br>BA350/356-M*x* | 36 | 3B05 | A01 |
| DS-RZ1EA-VW | BA370<br>BA350/356-M*x* | 18 | 3B05<br>B016 | A01 |
| DS-RZ1DA-VW | BA370<br>BA350/356-M*x* | 9 | 3B06<br>B016 | AO1 |
| DS-RZ1DD-VW | BA370<br>BA350/356-M*x* | 9 | 0305<br>3B07 | A01 |
| DS-RZ1FC-VW | BA370<br>BA350/356-M*x* | 36 | 3B07 | A01 |

### *2.3.2 Supported Optical Devices*

Table 2 describes the supported optical disk devices that may be used with the HSOF V7.7 software (V7.1 and V7.2 did not support optical devices). The "*Works With an HSZ70 in a"* column describes which type(s) of enclosures the HSZ70 may be mounted in to use the particular device. For example, the RRD46 device is supported by an HSZ70 mounted in a DS-BA350/356 "M-series" shelf.

**Table 2 HSZ70 HSOF V7.7 Supported Optical Devices**

| Device | Works With an HSZ70 in a | Capacity (GB) | Minimum Microcode Version | Minimum Hardware Version |
|---|---|---|---|---|
| RRD46 [1] | BA350/356-M*x* | .6 | 1645 | A01 |
| RRD47 [1] | BA350/356-M*x* | .6 | 1645 | A01 |

Table 2 Notes:

[1] Code Load an d Device Formatting are not supported on this device.

### *2.3.3 Supported Solid State Devices*

Table 3 describes the supported solid state disk devices that may be used with the HSOF V7.7 software. The "Works With an HSZ70 in a " column in Table 3 describes which type(s) of cabinets the HSZ70 may be mounted in to use the particular device. For example, the EZ31-VW device is supported by an HSZ70 in a DS-BA370 Series Ultra SCSI RAID Enclosure or an HSZ70 mounted in a DS-BA350/356 "M-series" shelf.

**Table 3 HSZ70 HSOF V7.7 Supported Solid State Disk Devices**

| Device | Works With an HSZ70 in a | Capacity (GB) | Min. Microcode Version | Min. Hardware Version |
|---|---|---|---|---|
| EZ31-VW [2] | BA370<br>BA350/356-M*x* | 0.134 | V064 | A01 |

**Table 3 HSZ70 HSOF V7.7 Supported Solid State Disk Devices**

| Device | Works With an HSZ70 in a | Capacity (GB) | Min. Microcode Version | Min. Hardware Version |
|---|---|---|---|---|
| EZ32-VW [2] | BA370<br>BA350/356-M*x* | 0.268 | V064 | A01 |
| DS-EZ41-VW [2] | BA370<br>BA350/356-M*x* | 0.134 | V012 | A01 |
| DS-EZ42-VW [2] | BA370<br>BA350/356-M*x* | 0.268 | V012 | A01 |
| EZ64-VA/ VW [1, 2] | BA350/356-M*x* | 0.475 | V064 | A01 |
| EZ69-VA/ VW [1, 2] | BA350/356-M*x* | 0.95 | V070 | A01 |
| DS-EZ705-VW [2] | BA350/356-M*x* | 0.536 | V012 | A01 |
| DS-EZ711-VW [2] | BA350/356-M*x* | 1.07 | V012 | A01 |
| DS-EZ716-VW [2] | BA350/356-M*x* | 1.6 | V012 | A01 |
| DS-EZ454-VW [3] | BA356-M*x* | 536MB | Y018 | A01 |
| DS-EZ832-VW [3] | BA356-M*x* | 32GB | Y018 | A01 |

Table 3 Notes**:**

[1] The software does not differentiate between “narrow” (VA) and “wide” (VW) devices by model number. Narrow drives (VA) are only allowed in BA350/356-series shelves. Wide drives (VW) are allowed in BA370 and BA350/356-series enclosures. If a “narrow” drive is placed in a BA370 enclosure, an error will occur.

[2] Code load is not supported on this device.

[3] Code Load and Format are not supported on this device.

### *2.3.4 Supported Tape Devices*

Table 4 describes the supported tape devices that may be used with the HSOF V7.7 software. The “Tape Device Enclosure” column describes the enclosure that the tape drive is shipped with (stand-alone cabinet, tabletop model, SBB, etc.). The “Works With an HSZ70 in a” column in describes which type(s) of cabinets the HSZ70 may be mounted in to use the particular device. For example, a TL812 device is supported by an HSZ70 in a DS-BA370 Series

Ultra SCSI RAID Enclosure or an HSZ70 mounted in a DS-BA350/356 “M series” shelf.

**Table 4 HSZ70 HSOF V7.7 Supported Tape Devices**

| Device | Device Enclosure | Works With an HSZ70 in a: | Capacity (GB) | Minimum Microcode Version | Minimum Hardware Version |
|---|---|---|---|---|---|
| TL812 | Tape Library | BA370 BA350/356-M*x* | 1040/2080 | 1.10ROBOT CC33 Drive | A01 |
| TL820 | Tape Library | BA370 BA350/356-M*x* | 5200 | 1d3M ROBOT V40 drive | L01 |
| TL822 | Tape Library | BA370 BA350/356-M*x* | 5080/10560 | 1g4F ROBOT CC33 drive | A01 |
| TL826 | Tape Library | BA370 BA350/356-M*x* | 3520/7040 | 1g4F ROBOT CC33 drive | A01 |
| DS-TZ89N-VW [1] | SBB | BA350/356-M*x* | 35/70 | V80 | A01 |
| DS-TZ89N-TA | Tabletop | BA370 BA350/356-M*x* | 35/70 | 141F | A01 |
| DS-TZS20-VW | Standalone | BA370 BA350/356-M*x* | 25/50 | 01aj | A01 |
| DS-TL893 | Tape Library | BA370 BA350/356-M*x* | 9.24/18.48TB | V2A/5A | A01 |
| DS-TL894 | Tape Library | BA370 BA350/356-M*x* | 1.69/3.36 TB | V1.24 | A01 |
| DS-TL895 | Tape Library | BA370 BA350/356-M*x* | | 230 | B01 |
| DS-TL896 | Tape Library | BA370 BA350/356-M*x* | 6.1/12.32 TB | V2A/5A | A01 |
| TZ875-NT | Standalone | BA370 BA350/356-M*x* | 50/100 | 930A | A01 |
| TZ875-TA | Tabletop | BA370 BA350/356-M*x* | 50/100 | 930A | A01 |

**Table 4 HSZ70 HSOF V7.7 Supported Tape Devices**

| Device | Device Enclosure | Works With an HSZ70 in a: | Capacity (GB) | Minimum Microcode Version | Minimum Hardware Version |
|---|---|---|---|---|---|
| TZ877-AE/AF | Standalone | BA370<br>BA350/356-M*x* | 70/140 | 930A | A01 |
| TZ87N-TA | Tabletop | BA370<br>BA350/356-M*x* | 10/20 | 930A | A01 |
| TZ87N-VA | SBB | BA370<br>BA350/356-M*x* | 10/20 | 930A | A01 |
| TZ87-TA | Tabletop | BA370<br>BA350/356-M*x* | 10/20 | 9514 | B02 |
| TZ87-VA | SBB | BA350/356-M*x* | 10/20 | 930A | A01 |
| TZ885-NE | SWxxx | BA350/356-M*x* | 100/200 | CC33 | A01 |
| TZ885-TA | Tabletop | BA370<br>BA350/356-M*x* | 100/200 | CC33 | A01 |
| TZ887-AE | SW500 | BA370<br>BA350/356-M*x* | 140/280 | CC33 | A01 |
| TZ887-AF | SW800 | BA370<br>BA350/356-M*x* | 140/280 | CC33 | A01 |
| TZ887-NE | SWxxx | BA350/356-M*x* | 140/280 | CC33 | A01 |
| TZ887-NT | Standalone | BA350/356-M*x* | 140/280 | CC33 | A01 |
| TZ88N-TA | Tabletop | BA370<br>BA350/356-M*x* | 20/40 | CC33 | A01 |
| TZ88N-VA | SBB | BA350/356-M*x* | 20/40 | CC33 | A01 |
| DS-AIT35-VW | SBB, Tabletop | BA370<br>356-M*x* | 35/70 | 4.03 | A01 |
| DS-TLZ10-VA [1] | SBB | BA370<br>BA356-M*x* | 12/24 | 4.05 | A01 |

Table 4 Notes:

[1] Code load is not supported on this device.

## 2.4 *StorageWorks* Command Console Support

Table 5 describes the *StorageWorks* Command Console components that support the HSOF V7.7 Software. The HSOF V7.7 Solutions Software Kit contains a Solution CD providing the necessary SWCC component versions and builds.

Please note that the *Getting Started – HSZ70 Solutions Software V7.7 for Compaq Tru64 UNIX Installation Guide Chapter 4 Installing and Configuring the Command Console Agent*, erroneously reports that the SWCC kit currently shipping with HSOF V7.7 Software supports *Compaq Tru64*UNIX V5.0.

It is our expectation that SWCC Agent for HS* controllers will support *Compaq Tru64* UNIX V5.0a and higher in the future.

The SWCC kit that contains the components listed below and that is currently shipping with HSOF V7.7 Software supports *Compaq Tru64*UNIX V4.0x only.

**Table 5 HSZ70 HSOF V7.7 *StorageWorks* Command Console Components**

| Applet Manager | | Agent | | Storage Window or Client | |
|---|---|---|---|---|---|
| Version | Build | Version | Build | Version | Build |
| 2.1 or higher | 155 or higher | 2.2 | 61 | 2.1 | 44 |

The SWCC subset shipping with HSOF V7.7 Software is SWCC220.

**NOTE**

The examples provided in the *Getting Started – HSZ70 Solutions Software V7.7 for Compaq Tru64 UNIX Installation Guide Chapter 4 Installing and Configuring the Command Console Agent*, use SWCC subset SWCC500.

Please enter SWCC220 as the SWCC subset with HSOF V7.7 Solutions Software.

**NOTE**

The V2.2 SWCC Agent provides the ability to use SWCC from multiple hosts in a cluster. SWCC Agent V2.2 and HSOF Software V7.7 are required for this feature.

## 2.5 Environmental Monitoring Unit Support

HSOF V7.7 supports the use of an Environmental Monitoring Unit (EMU) running firmware V1.3 and higher.

# 3.0 New Items

This section briefly describes the new items in HSOF Software V7.7.

## 3.1 *StorageWorks* Command Console Support in a Cluster Environment

*StorageWorks* Command Console V2.2 Agents are able to access the same controller from multiple hosts when used with HSOF Software V7.7. This allows the use of SWCC from multiple hosts in a cluster environment. The Agent contained on the Solution CD included in this kit has this feature.

## 3.2 New Devices Supported in HSOF V7.7 Software

### *3.2.1 Disk devices*

- DS-RZ1FB-VW with 36GB
- DS-RZ1EA-VW with 18GB
- DS-RZ1DA-VW with 9GB
- DS-RZ1DD-VW with 9GB
- DS-RZ1FC-VW with 36GB

### *3.2.2 Tape Devices*

- DS-AIT35-VW with 35/70GB
- DS-TLZ10-VA with 12/24GB

**NOTE**

Although some of the above listed Devices may have been supported in previous releases, all of these Devices have been classified as "new" for the HSOF V7.7 Software Release. Please see Section 2.3 for additional information on Device Support.

## 3.3 Issue Resolutions

This section addresses issues that occurred in a previous release of the HSOF software and have been resolved in the HSOF V7.7 release. The issues addressed by HSOF V7.7 Software are as follows:

- A rare occurrence of the controller experiencing a reset with the last failure code of 43130100 when using scripts that perform the configuration/de-configuration of storagesets
- A rare occurrence of a drive error causing an "online with lost data" message and a spareset lockup or I/O failure when a drive was being added to the storageset
- A rare occurrence in which a drive with medium errors was incorrectly placed in the spareset, activating an EMU alarm and a yellow fault light. This situation could occur when the Autospare feature was enabled and there was a drive error while one controller of a dual-redundant pair was shut down
- A rare occurrence of a disk device responding to TEST UNIT READY but not to any subsequent commands
- A rare occurrence in which an unusual drive error caused RAIDsets to suspend activity on the controller. This situation could occur when a drive became busy and as a result, would tie up the port
- A rare occurrence in which multiple Bad Block Replacements in the same data transfer from a mirrorset cause a Unit Attention message to be sent to the host. This may lead to *Compaq Tru64* UNIX V4.0x perception of an I/O failure, resulting in various host effects. The correction for this problem requires installation of both HSOF SoftwareV7.7 and a patch kit to *Compaq Tru64* UNIX V4.0x. See Section 9.2, *Compaq Tru64 UNIX Patch Kits for Issue Resolution,* to obtain information on *Compaq Tru64* V4.0 versions and their corresponding patch kits

- An occasional occurrence in which SWCC polling mechanisms may result in excessive Unit Attention messages being sent to the host. This may lead to host perception of an I/O failure, host rejection of spareset members, or other effects
- A rare occurrence in which the HSZStorageWindow.exe applet receives an "Error Scanning Subsystem" message. This could occur when using serial mode to connect an ESA 10000 with a full master cabinet of 24 disks and more than 6 disks in the second slave cabinet. This has been corrected in the version of the *StorageWorks* Command Console that is shipped with the HSOF V7.7 Software release

# 4.0 Features From Previous Releases

This section briefly describes changes that were introduced in the code version previous to HSOF V7.7 Software release that are not covered in other documentation.

## 4.1 Multiple-Bus Failover Support

Multiple-Bus (host-assisted) Failover is a dual-redundant controller configuration in which the host CPU has two paths (SCSI buses) to the Array Controller subsystem. The host on the subsystem has the capability to move storage devices from one path to the other. With this capability, if any component (Host Bus Adapter, SCSI Cable, or Controller) on one path fails, the host can move all storage to the surviving path. As of V7.7 both clusters and single hosts are supported. The following are documentation references to Multiple-Bus Failover Mode:

- Chapter 2 of the *HSZ70 Array Controller HSOF V7.3 Configuration Manual* describes the selection of the Failover mode
- Chapter 4 of the *HSZ70 Array Controller HSOF V7.3 Configuration Manual* describes the configuration of a controller pair into Multiple-Bus failover Mode
- The *HSZ70 Array Controller HSOF V7.3 CLI Reference Manual* describes the CLI command that place the controller pair into Multiple-Bus Failover mode
- Appendix “A” at the end of these release notes contains examples of the multiple-bus failover CLI command usage

**NOTE**

Multiple Bus Failover is selected on the HSZ70 Controller using the SET MULTIBUS_FAILOVER command.

### 4.1.1 Allocation_Class Switch Usage

*Compaq Tru64* UNIX Customers do not use the *ALLOCATION_CLASS* switch. Therefore, *Compaq Tru64* UNIX Customers should ensure that the switch value is set to the default (0). The result of a switch setting other than zero results in unpredictable controller behavior with that operating system.

### 4.1.2 Multiple-Bus Failover Support and Disk Partitioning

The multiple-bus failover feature in HSOF Software versions 7.3 through 7.7 do not support the partitioning of storagesets. You must delete any existing partition(s) before enabling multiple-bus failover, and you cannot create partitions once multiple-bus failover mode is in effect.

### 4.1.3 Multiple-Bus Failover Support and Pass-Through Devices

Pass-through devices (tape and CD-based storage devices) cannot be supported by the HSZ70 dual-redundant pair operating in multiple-bus failover mode. This restriction is inherent in the architecture of the pass-through concept and the mechanisms by which the host operating system is aware of device location.

Customers using pass-through devices should segment their storage configuration by:

- Placing the pass-through devices on controllers operating in transparent failover mode
- Placing the disk devices on controllers operating in multiple-bus failover mode

**NOTE**

Since pass-through devices are placed on controllers operating in transparent failover mode, they do not have the fault-tolerant advantages of devices placed on controllers operating in multiple-bus failover mode.

## 5.0 Storage Device Configuration Rules

The following list outlines the configuration rules for the controller.

- Maximum 64 assignable, host-visible LUNs. Maximum 63 assignable when using the *StorageWorks* Command Console

**NOTE**

The actual number of useable LUNs may be limited by the host operating system. See Section 9.0–*Host-Related Information* for more specific details.

- Maximum 512 GB LUN capacity
- Maximum 72 physical devices
- Maximum 20 RAIDset storagesets
- Maximum 20 RAIDset and mirrorset storagesets in a single controller configuration
- Maximum 30 RAIDset and mirrorset storagesets in a dual-redundant controller configuration
- Maximum 45 RAIDset, mirrorset, and stripeset storagesets
- Maximum 8 partitions per storageset or individual disk
- Maximum 6 members per mirrorset
- Maximum 14 members per RAIDset or stripeset
- Maximum 32 physical device members total for a unit

The *HSZ70 Array Controller HSOF V7.3 Configuration Manual* (Chapter 2) has detailed information regarding the configuration rules.

# 6.0 Clarifications

Paragraphs 6.1 through 6.5 contain clarification on the following subjects:

- Reinitializing After HSUTIL Operations
- Logical Device Event Reports
- Mirrored (Fault-Tolerant) Write-Back Cache
- Last Failure Code 010E0110 Normal Occurrence After Upgrade
- Running FRUTIL to Replace a Controller Module

## 6.1 Reinitializing After HSUTIL Operations

After you are finished using the HSUTIL program, you must initialize the controller from which you ran HSUTIL before resuming normal operations.

## 6.2 Logical Device Event Reports

Under certain situations where it is not possible to identify the first physical device in a storageset, the Port, Target, and LUN fields will be set to 255 (decimal). These fields are contained in event reports associated with storageset logical devices, Event Log displays, and sense data responses. This set number (255) occurs in place of the normal Port, Target, and LUN of the first physical device in the storageset.

In addition, whenever the Port, Target, and LUN fields are set to 255, the Device Type is also set to zero, and the Device Product ID and Device Firmware Revision Level fields are ASCII space filled.

All storageset-specific information is provided in the Device Product ID field to aid in identifying the logical device involved in the event.

## 6.3 Mirrored (Fault-Tolerant) Write-Back Cache

When operating in mirrored write-back cache mode, data written to storage devices is cached in two separate cache modules. This redundancy preserves any data not flushed from memory in the event of a cache failure. When a controller is used in a *mirrored cache configuration*, data is stored on separate cache modules. If one cache module fails, the data is recovered from the mirrored copy.

When a controller is used in a *non-mirrored cache configuration,* and one cache module fails, any write-back data not flushed from memory is lost. *Mirrored write-back cache is disabled by default.*

To enabled mirrored write-back cache mode, enter the CLI command: SET *controller MIRRORED_CACHE*. This command places both controllers in mirrored write-back cache mode, and therefore, only needs to be entered through one controller.

**NOTE**

Since the cache modules operate in parallel on the same bus, there is no significant impact to controller performance. The controller performs as if it were configured to operate in single write-back cache mode.

See the *HSZ70 Array Controller HSOF Version 7.3 Configuration Manual* for specific information regarding configuration rules and procedures.

## 6.4 Last Failure Code 010E0110 Normal Occurrence After Upgrade

When updating firmware on the controllers, the following message may appear suggesting that there is a problem with the controller or that there was an issue during the update process.

```
Last fail code: 010E0110


Press " ?" at any time for help.
```

```
%CER-HSZ_2> --13-JAN-1946 04:32:20 (time not set)--
System Information Page-and Last Failure entries reset
to default settings. Last Failure Entry: 1. Flags:
00000002 Template: 1.(01) Description: Last Failure
Event Power On Time: 1. Years, 127. Days, 3. Hours, 27.
Minutes, 5. Seconds Controller Model: HSZ70 Serial
Number: ZG05051997 Hardware Version: 0000(00) Firmware
Version: V54Z(00)

Instance Code: 0102030A Description:

An unrecoverable firmware inconsistency was detected or
an intentional restart or shutdown of controller
operation was requested.
```

This is a normal occurrence for the first boot following manufacture of the controller module and during the transition from one firmware version to another if and only if the format of the System Information Page (SIP) is different between the two versions.

If this event is reported at any other time, follow the recommended repair action associated with this Last Failure Code.

## 6.5 Running FRUTIL to Replace a Controller Module

A change has been made to the *HSZ70 Array Controller HSOF V7.3 Service Manual* describing the replacement of a controller module (Chapter 3). Near the end of the procedure, when the module has been inserted, FRUTIL may display the following message:

```
%CER—18-NOV-1998 10:39:01—Other controller not
responding -RESET- signal asserted
```

This message does not indicate that any sort of error has occurred. Please continue with the replacement procedure.

# 7.0 Operating Constraints

Paragraphs 7.1 through 7.5 describe the operating constraints for HSOF Software Version 7.7. An operating constraint is a limitation placed on the operation of the controller by the nature of its design. Other constraints of host

adapters or other system components may also be described in this section. Keep these constraints in mind to avoid problems and to help achieve the maximum performance from your controller:

- Cache Module Memory
- CLONE Utility Constraints
- DILX Operation
- Partitioned Sets Constraint
- Chunk Size and Writeback Cache

## 7.1 Cache Module Memory

The HSZ70 controller can operate with only 32 MB of memory on the cache module in non-mirrored mode. A minimum of 64 MB of memory is **required** on each cache module if the mirrored cache feature is to be used. The controller will **not** boot when the controller is set to operate in mirrored cache mode, and **any** cache module contains less than 64 MB of memory.

**NOTE**

Mirrored Write-Back Cache is disabled by default. Enable mirrored write-back cache with the CLI Command: SET *controller MIRRORED_CACHE*. Refer to the *HSZ70 Array Controller HSOF V7.3 CLI Reference Manual* (SET *controller* command description) and *HSZ70 Array Controller HSOF V7.3 Configuration Manual* (Chapter 2) for details.

## 7.2 CLONE Utility Constraints

The CLONE utility cannot be used with partitioned mirrorsets or partitioned striped mirrorsets.

## 7.3 DILX Operation

DILX is a controller/container diagnostic. DILX operates only on containers preferred to the controller with the serial line access to the CLI (this controller). For single controller configurations, preferred ID's must be set for DILX to report potential test containers. The setting of a preferred ID (or not)

is of no consequence to other operating functions of single controller configurations.

**CAUTION**

DILX has been changed to operate on all storage containers (not ONLY JBODs). Do not answer Y (YES) to Autoconfigure in DILX because DILX will immediately overwrite your storagesets. Also, write protecting the storageset in the CLI will not prevent DILX from writing on a storageset.

## 7.4 Partitioned Sets Constraint

Partitioned Disks that have been included in a logical volume group may retain system data even though the volume group has been removed and the partition destroyed. If the disks should become unusable in this manner, create a single disk (JBOD) for each of the problem disks. Using the CLI, run the disk utility DILX on the single disk targets for about 10 minutes. The system data will be destroyed and the disks ready for use.

## 7.5 Chunk Size and Writeback Cache

Using the minimum chunk size setting of 16 with the writeback cache disabled could result in serious performance degradation for that storageset. Selecting the optimum chunk size and enabling the writeback cache will result in the best performance for the storageset.

See Section 11.6 in these Release Notes for more information on specifying a chunk size.

# 8.0 Avoiding Problem Situations

In certain situations, you may experience unusual controller behavior. Paragraphs 8.1 through 8.10 present information to help you avoid such situations and to recover from them if they occur:

- Adding, Moving, and Changing Subsystem Components

- Running CONFIG During Backup Operations
- Installing New Tape Drive Firmware Without HSUTIL
- Saving Your Configuration
- Setting the Host SCSI Speed
- Setting the Device SCSI Speed
- Extended Device SCSI ID Support
- Restoring Power after Emergency Cab Shutdown
- Using the CLI and CF Menu Simultaneously in a Dual Configuration
- Changing Preferred Access Device

## 8.1 Adding, Moving, and Changing Subsystem Components

This section is divided into three areas:

- HSZ70 Controllers and Asynchronous Drive Hot Swap (ADHS)
- Storage Devices
- Controllers, Cache Module, or External Cache Batteries

### *8.1.1 HSZ70 Array Controllers and Asynchronous Drive Hot Swap*

Asynchronous Drive Hot Swap (ADHS) is defined as the removal or insertion of a drive without quiescing the bus. The rules surrounding ADHS may be found in Chapter 3 of the *HSZ70 Array Controller HSOF V7.3 Configuration Manual* as well as in the following paragraph:

Note that disk replacement within storagesets is performed by sparing, either by using the AUTOSPARE functionality, or by using manual intervention with CLI commands to delete and replace the device.

- ADHS is supported on the HSZ70 with the observance of the following restrictions:
    - Applies to disk drives only (wait 90 seconds after return of power before enabling the bus, issuing CLI commands to the HSZ70 controller, and all activity to it)
    - Disks may not be imported into slots configured as disks which are members of higher level containers such as RAIDsets, mirrorsets, sparesets, and so on. AUTOSPARING is used for these types of configurations
- ADHS is not supported under the following operating conditions:
    - During failover
    - During failback

- During controller initialization/reboot (until the CLI prompt appears)
- During the running of a local program (DILX, CLCP, and so on)
- To perform a physical move of a device from one location to another (new port or target)
- To perform more than one drive removal/insertion at a time (50 seconds of time is required for the controller to complete the process of recognizing/processing the drive removal/insertion)

**NOTE**

When power cycling entire shelves during servicing, ensure all controller-based Mirror/RAID drives have not been moved to the Failedset or are faulted.

### *8.1.2 Storage Devices*

The controller maintains a configuration map of the device type and location of all the devices in the subsystem. This device map allows communication between the controller and its devices.

**CAUTION**

Do not add, move, or change a device while the controller is powered off without **first** changing the controller configuration.

Unless the configuration is changed first, the controller will not be able to communicate with it when it returns to service:

- If a device is moved by mistake while the controller is off, delete all containers associated with the removed device after power has been restored to the controller
- If a device is added while the controller power is off, enter RUN CONFIG after power has been restored to the controller. Configure the new device as instructed in the *HSZ70 Array Controller HSOF V7.3 Configuration Manual*

- If a device is replaced while the controller is off, remove the device before restoring power to the controller. Correctly remove the current device and add the new device after restoring power to the controller

See the *HSZ70 Array Controller HSOF V7.3 Configuration Manual* for correct removal and addition procedure.

### *8.1.3 Controllers, Cache Modules, or External Cache Batteries*

It is permissible to replace the controller, cache module, or external cache battery while the subsystem is shut down. However, you must enter the SHUTDOWN *this_controller* command before shutting the subsystem down to make configuration changes. If two controllers are configured in a dual-redundant configuration, you must also enter the SHUTDOWN *other_controller* command. These commands instruct the controller to flush all unwritten data from the cache modules and discontinue all I/O activity.

See the *HSZ70 Array Controller HSOF V7.3 CLI Reference Manual* for more information regarding the SET *controller* command. Refer to the *HSZ70 Array Controller HSOF V7.3 Service Manual* for information regarding the maintenance and replacement of the controller, cache module, and cache battery.

**NOTE**

Please observe the two-year posted replacement period for the batteries as specified in the *HSZ70 Array Controller HSOF V7.3 Service Manual* under “Charging Diagnostics” and in the *Instructions for Write-Back Cache Battery Service Label* (FRU Insert EK-WBCIN-FI).

## 8.2 Running CONFIG During Backup Operations

Do not run the CONFIG utility during a tape backup operation.

## 8.3 Installing New Tape Drive Firmware Without HSUTIL

Be sure to observe the following tape firmware installation rule if you are not using HSUTIL to install the new firmware:

Delete the tape drive from the controller configuration **before** installing a new version of tape drive firmware. Add the tape drive back to the controller configuration after the firmware installation is complete.

## 8.4 Saving Your Configuration

The subsystem configuration should be saved to another location other than NVMEM. If the configuration is saved to another location, then the configuration will not have to be re-entered when the controller module is replaced. The method of ensuring the current subsystem configuration is saved differs depending upon whether your subsystem is a single controller (Section 8.4.1) or a dual-redundant controller configuration (Section 8.4.2).

### *8.4.1 Single Controller Configurations*

If the controller in a single controller subsystem requires replacement, the configuration and all pertinent code patches stored in nonvolatile memory (NVMEM) would be lost upon installing a replacement controller module. The CLI command:
INITIALIZE *container-name SAVE_CONFIGURATION* provides the means to save the NVRAM contents to another location so that it may be retrieved when needed.

The CLI command does this by saving a copy of the configuration file to all members of the container specified in the command. Refer to the *HSZ70 Array Controller HSOF V7.3 CLI Reference Manual* for details concerning the INITIALIZE command; see also the description in the *HSZ70 Array Controller HSOF V7.3 Configuration Manual, Chapter 2, "Planning Storagesets"*.

The use of the CLI command: INITIALIZE *container-name SAVE_CONFIGURATION* saves you from having to enter the subsystem configuration from scratch if the controller in a single-controller configuration requires replacement.

The *SAVE_CONFIGURATION* switch should **not** be used when upgrading the HSOF software on a single-controller configuration. The configuration data that is stored in NVMEM is not overwritten when the new software is loaded (see the *HSZ70 Array Controller HSOF V7.3 Configuration Manual*, Chapter 2, for additional information).

**NOTE**

The *SAVE_CONFIGURATION* switch should not be used when upgrading your hardware, and will not perform inter-platform conversions. For example, you cannot use the *SAVE_CONFIGURATION* switch to upgrade an HSZ50 to an HSZ70 Array Controller. Configuration information cannot be retrieved from storagesets on other HSx controllers (for example, HSD, HSJ, or prior HSOF software versions operating on HSZ controllers).

**NOTE**

Compaq recommends that the *SAVE_CONFIGURATION* switch only be used for non-redundant (single) controller configurations. To save the configuration information for dual-redundant configurations, use the CLI command: SET FAILOVER *COPY=controller* (see Paragraph 8.4.2).

#### *8.4.1.1 Initializing Using the SAVE_CONFIGURATION Switch*

When initializing a container using the *SAVE_CONFIGURATION* switch, the controller copies the subsystem configuration to all members of the specified container. If you use the switch for a multi-device container, (a stripeset for example), the complete information is stored on **each** device in the container. Be aware that a capacity reduction of 256 KB applies to each member of the container being initialized using the *SAVE_CONFIGURATION* switch.

After initializing a container using the *SAVE_CONFIGURATION* switch, the controller keeps the copy up-to-date. Each time you change the subsystem configuration or add a patch to the HSOF software, the controller copies the new configuration to all containers that were initialized with the *SAVE_CONFIGURATION* switch.

Compaq does not recommend initializing **all** of your containers using the *SAVE_CONFIGURATION* switch (initializing all of the containers causes too many configuration-write operations). Too many write operations are unnecessary and can adversely affect system performance.

#### *8.4.1.2 Replacing a Controller*

There are three possibilities that occur regarding the saving of a subsystem configuration when replacing a controller:

- Controller is “factory initialized” and no prior subsystem configuration data
- Controller is not “factory initialized’ and has no prior subsystem configuration data
- Controller has some prior subsystem configuration data in it

With any of these possibilities, a local connection should be made to the controller and a printed copy of the configuration as shown by the CLI command: SHOW *disk* should be available before replacing the controller.

8.4.1.2.1 Controller Factory Initialized (No Configuration Data) — With this situation, the new controller searches the devices in the subsystem for a saved configuration:

- Upon finding a saved configuration, it loads it into the new controller’s NVMEM and brings the subsystem on-line (it is not necessary to issue an INITIALIZE command after installing a new controller)

If a local connection was made to the maintenance port of the controller, then the CLI will display the events going on: “Looking for Configuration,” “Restarting Configuration,” etc.

- If a saved configuration is not found, no configuration data is loaded into NVMEM and the subsystem is not brought on-line. Subsystem configuration data will have to be entered into the controller. The methods of entering this data is by way of the *StorageWorks* Command Console (SWCC) or by way of the CLI command: RUN config through a maintenance terminal (RUN config brings up the configuration utility) Refer to the *HSZ70 Array Controller HSOF V7.3 Configuration Manual*, Chapter 4 for additional details

If a local connection was made to the maintenance port of the controller, then the CLI will display the events going on: "Looking for Configuration," "No Configuration Found" etc.

8.4.1.2.2 Controller Not Factory Initialized (No Configuration Data) — With this situation, the new controller does not search the devices in the subsystem for a saved configuration and the controller is not brought on-line. The CLI command: SET *this_controller INITIAL_CONFIGURATION* must be entered to allow the configuration saved on a storageset to be brought in.

8.4.1.2.3 Controller Has Prior Configuration Data — With this situation, the controller software displays many errors in finding the disks it assumes is part of the configuration. The CLI command: SET *this_controller INITIAL_CONFIGURATION* must be entered to clear the incorrect configuration from NVMEM and bring in the proper configuration from the container that has it stored. See the *HSZ70 Array Controller HSOF V7.3 CLI Reference Manual* for additional details.

**CAUTION**

Do **not** enter any other SET *this_controller* command other than a SET *this_controller INITIAL_CONFIGURATION*. Entering another type of SET *this_controller* command may change the configuration data stored in the controller NVMEM. When this happens, the software initiates an update of the saved configuration to the container(s) in which the configuration was saved, thereby destroying the proper saved configuration.

#### *8.4.1.3 Upgrading HSOF Software*

When upgrading HSOF software, you can refresh the configuration data on your storagesets to include the new software revision by issuing the following command:

```
SET UNIT xxx WRITE_PROTECT
SET UNIT xxx NOWRITE_PROTECT
```

[where xxx is any existing unit on the controller]

These commands change the contents of MVMEM, causing the updated configuration information to be automatically written to the save configuration area of all containers initialized with this option.

### *8.4.2 Dual-Redundant Controller Configurations*

Subsystem configuration and code patch information is stored in the NVMEM of both controllers of a dual-redundant configuration. If one of the two controller modules in a dual-redundant configuration needs replacing, no configuration information is lost because the other controller has it. There is no need to use the CLI command: INITIALIZE *container-name SAVE_CONFIGURATION*, in fact, its use is discouraged.

The method of saving the configuration in dual-redundant controller configurations is by using the CLI command: SET FAILOVER COPY=*controller* (refer to *HSZ70 Array Controller HSOF V7.3 CLI Reference Manual* for additional information). The act of placing the two controllers into failover mode with this command ensures that the configuration in the primary controller (the one that had the configuration placed in it) is copied to the companion controller in the dual-redundant pair.

**NOTE**

Ensure you know which controller has the good configuration information before entering this command. The device configuration from the controller specified in the CLI command: SET FAILOVER COPY=*controller* overwrites the information on the companion controller.

## 8.5 Setting the Host SCSI Speed

In host configurations that use long SCSI cables between the host system and the HSZ70 controller, it is possible for the initiator and target to negotiate a faster data rate than is supported by the cable length. Use the CLI command: SET *controller TRANSFER_RATE_REQUESTED* to request this negotiation (see the *HSZ70 Array Controller HSOF V7.3 CLI Reference Manual* for detailed information about this command). All HSZ70 controllers operating on the same host SCSI bus must operate at the same SET *controller TRANSFER_RATE_REQUESTED* setting (20 MHz, 10 MHz, or 5 MHz). See the *HSZ70 Array Controller HSOF V7.3 Configuration Manual* for information in setting the data transfer rate.

## 8.6 Setting the Device SCSI Speed

In configurations that use long SCSI cables between the HSZ70 controller and the storage devices, it is possible for the initiator and the target to negotiate a data rate faster than is supported by the cable length. Use the CLI command: SET *device-name TRANSFER_RATE_REQUESTED=* to set the maximum data transfer rate between the controller and the storage devices (see the *HSZ70 Array Controller HSOF V7.3 CLI Reference Manual* for detailed information about the setting of the data transfer rate).

## 8.7 Extended Device SCSI ID Support

For devices installed in the RAID cabinet(s) the controller supports SCSI device ID numbers 0 through 15 excluding SCSI ID numbers 4 through 7:

- SCSI ID number 7 is reserved for the controller in a single-controller configuration
- SCSI ID numbers 6 and 7 are reserved for the controllers in a dual-redundant configuration

Depending on your configuration, SCSI ID number 6 may be used if the controller is not part of a dual-redundant configuration. SCSI ID numbers 4 and 5 are not currently supported.

See the *HSZ70 Array Controller HSOF Version 7.3 Configuration Manual* for specific information regarding configuration rules and procedures.

## 8.8 Restoring Power After Emergency Cab Shutdown

This section provides the procedures to restore power to each of the extended cabs after the master cab has been powered off by an “emergency cab shutdown”. Examples causing this type of shutdown would be fan loss or power-supply loss, etc.

It is recommended that the extended cabs be powered off and powered back on prior to the reboot of the master cab. The steps to follow are:

1. Power off remaining (extended) cabs.
2. Power up extended cabs.
3. Power up Master Cab.

There are two procedures that may be used to accomplish the above three steps. Compaq recommends the first procedure.

### *8.8.1 Using AC switch*

1. Turn off AC switch after EMU alarm sounds on extended cabs.
2. Turn on AC switch on extended cabs.
3. Turn on AC switch on Master Cab.

### *8.8.2 Using EMU/PVA*

1. On extended cabs, wait for EMU alarm to sound, turn off EMU alarm, then press and hold PVA switch until the cab shuts down.
2. Press EMU button on extended cabs.
3. Press EMU button on Master Cab.

## 8.9 Using the CLI and CF Menu Simultaneously in a Dual Configuration

When in a dual configuration do not issue a simultaneous CLI command on one controller and a CFMENU command on the other controller. This may result in a deadlock situation between the two controllers causing either of the controllers to experience a timer expiration and possible shutdown while each waits for the CLI lock.

## 8.10 Changing the Preferred Access Device

To change the preferred access device for the SWCC UNIX Agent, perform one of the following procedures:

- Directly edit the storage.ini file which is kept in the /usr/opt/SWCC220/etc directory. It is an ASCII file, and any ASCII editor may be used

Or

- Delete/rename the existing storage.ini file. When the Agent is restarted, a new storage.ini file is created with default names and monitor intervals

Or

- Delete the existing storage.ini file and run the swcc_config utility. Select option 2 (Modify Storage Subsystem Information) and select the add option. This will rescan the device and will use the current access device

Once the storage.ini file has been changed, the user must stop and restart the Agent in order for the changes to take effect.

# 9.0 Host-Related Information

Paragraphs 9.1 through 9.5 provide host-related information as follows:

- Dependency Between HSOF V7.7 and *Compaq Tru64* V5.0 and Higher
- *Compaq Tru64* UNIX Patch Kits for Issue Resolution
- SCSI Target ID Restriction for *Compaq Tru64* UNIX Versions Prior to V5.0
- New HSZ70 Logical Units
- Device LUN Settings

## 9.1 Dependency Between HSOF V7.7 and *Compaq Tru64* V5.0 and Higher

Due to changes in certain operating system functions in *Compaq Tru64* UNIX V5.0 and higher, it is important to install HSOF Software V7.7 on your controllers **before** installing these versions of the operating system.

## 9.2 *Compaq Tru64* UNIX Patch Kits for Issue Resolution

As noted in Section 3.3, a rare issue related to Bad Block Replacements in data transfers on mirrorsets is corrected by the application of **both** HSOF Software V7.7 and a patch kit to *Compaq Tru64* UNIX V4.0x operating systems. The appropriate patch kit is identified in Table 6 below:

**Table 6 Patch Kits for *Compaq Tru64* UNIX V4.0x**

| *Compaq Tru64* UNIX Version | Patch Kit |
|---|---|
| V4.0d | 6 |
| V4.0e | 4 |
| V4.0f | 3 |

Please use your usual method or procedure for obtaining updates in order to obtain the above listed patch kits.

**NOTE**

The correction in these patch kits is already present in *Compaq Tru64* UNIX V5.0 and higher.

## 9.3 SCSI Target ID Restriction for *Compaq Tru64* UNIX Versions Prior to V5.0

The HSZ70 controllers can support host SCSI Target IDs between 0 and 15. However, *Compaq Tru64* UNIX versions prior to V5.0 recognize SCSI Target IDs in the range 0 to 7 only.

Therefore, in *Compaq Tru64* UNIX versions prior to V5.0 the useable host SCSI IDs for the RA7000/ESA10000 subsystems must be assigned within the range of 0 to 7. Please note that SCSI ID 7 is typically assigned to the host SCSI adapter.

**NOTE**

This restriction does not exist for *Compaq Tru64* UNIX V5.0 and higher.

## 9.4 New HSZ70 Logical Units

Each time a new storageset and logical unit is created on the RAID Array, that device must be configured and recognized by *Compaq Tru64* UNIX. Rebooting the host will configure the device into the operating system. The devices can be labeled and used for data storage once *Compaq Tru64* UNIX recognizes them.

## 9.5 Device LUN Settings

*Compaq Tru64* UNIX V4.0x requires all pass-through storage devices (except tape loaders) to be at a device LUN of 0. This is not a requirement of *Compaq Tru64* UNIX V5.0x.

# 10.0 Order Numbers

Table 7 lists the part numbers needed to upgrade a singles controller to a dual controller operation.

**Table 7 Order Numbers**

| PART NUMBER | OPTION DESCRIPTION |
|---|---|
| DS-HSZ70-AH | One *StorageWorks* UltraSCSI HSZ70 RAID Array Controller. Includes 64 MB Cache Module, 6 Ultra Wide device channels, Tri-link connector with terminator, and a serial line cable assembly with adapters (9 pin and 25 pin). Requires cache battery DS-HS35X-BA. |
| DS-HSSIM-AB | One 64 MB SIMM Pack for cache memory. |
| DS-HS35X-BA | Replacement External Cache Battery in an SBB. |

# 11.0 Documentation Additions or Corrections

Paragraphs 11.1 through 11.6 describe updates to the existing documentation.

- Software Installation
- Replacing a PVA
- CLI Console Messages
- Removing /Replacing Controller Module and/or Program Card
- FRUTIL Main Menu Selections
- Chunk Size

## 11.1 Software Installation

The information in the *HSZ70 Array Controller HSOF V7.3 Service Manual, Chapter 3 "Replacement Procedures ", pages 3-24 through 3-27,* has been updated in Section 12 *"Software Installation"* of these Release Notes. Use the information provided in the *HSZ70 Array Controller HSOF V7.3 Service Manual, Chapter 3 "Replacement Procedures "*, only in conjunction with Section 12 *"Software Installation"* of these Release Notes.

Section 12 *"Software Installation"* provides the specific step by step procedures needed for updating your HSOF Software.

## 11.2 Replacing a PVA

Replace the procedure found in the *RA7000 and ESA10000 Storage Subsystems User's Guide*
(EK–SMCPP–UG) Section 5.10 "Replacing a PVA" with the following:

1. Halt all I/O activity to the controller using the appropriate procedures for your operating system.
2. Invoke the shutdown command from the maintenance terminal:
   – *For dual-redundant configurations, shutdown each controller one at a time. From the maintenance terminal connected to the maintenance port of one controller, use both of the following commands:*

     ```
     HSZ70> SHUTDOWN OTHER_CONTROLLER

     HSZ70> SHUTDOWN THIS_CONTROLLER
     ```

   – *In a single controller configuration, you need only use the command:*

```
HSZ70> SHUTDOWN THIS_CONTROLLER
```

3. To ensure the controller has shutdown cleanly, verify that the Reset (//) light on the controller's OCP is lit continuously.
4. Rotate the left-hand and right-hand levers outward from the unit.
5. Pull the PVA straight out to disconnect it from the backplane and clear of the subsystem.

Perform the following procedure to install a PVA module.

1. Insert the replacement PVA into the guide slots and push it in against the backplane connector. Be sure the two levers are straight out from the unit to allow engagement with the brackets.
2. Rotate the levers in toward the unit to fully seat the PVA.
3. Properly set the SCSI bus address using the SCSI bus address switch on the front panel of the PVA. The addresses must match the addresses that were set on the original PVA module.

**NOTE**

Compaq supports enclosure addresses 0, 2, and 3. Address 0 is for the master unit and only addresses 2 and 3 are allowed for the expansion units. The use of these addresses in combination depends on the number of enclosures.

4. Restart the controller(s) by pressing and releasing the RESET button on the controller(s) OCP.
5. To verify if the controller(s) have initialized correctly, observe the RESET light on the controller's OCP. It should be flashing, not ON continuously.

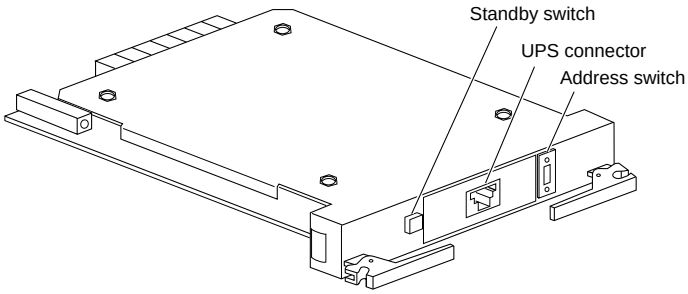
The next documentation update of the *RA7000 and ESA10000 Storage Subsystems User's Guide*
(EK–SMCPP–UG) will incorporate the following change to the PVA (Power Verification and Addressing module) replacement procedure.

## 11.3 CLI Console Messages

CLI console messages are subject to change without prior notification.

## 11.4 Removing/Replacing Controller Module or PCMCIA Card

In the *HSZ70 Array Controller HSOF V7.3 Service Manual*, a CAUTION statement should be added to the removal/replacement sections of the controller module and the PCMCIA program cards regarding the PVA SCSI ID switch (associated with the illustration that follows).




**CAUTION**

The SCSI ID switch on the PVA module is extremely close to the PCMCIA card ESD cover. When removing the cover (or the controller module), take precautions not to accidentally bump the switch thereby changing the switch value. Note the switch value before removing the PCMCIA Program Card or the controller module so that it can be returned to its configured position if moved.

## 11.5 FRUTIL Main Menu Selections

The *HSZ70 Array Controller HSOF V7.3 Service Manual* (EK-HSZ70-SV.B01), in the section *"Replacing an I/O Module"* on page 3-37, currently displays the following example as a FRUTIL Main Menu:

> FRUTIL displays the FRUTIL Main menu:
>
> ```
> FRUTIL Main Menu:
> 1.  Replace or remove a controller or cache module
> 2.  Install a controller or cache module
> 3.  Replace a PVA module
> 4.  Replace an I/O module
> 5.  Exit
> Enter choice: 1, 2, 3, 4, or 5 ->
> ```

HSOF Software V7.x does not support line items 3 or 4 from the list above. The correct display should read:

> FRUTIL displays the FRUTIL Main menu:
>
> ```
> FRUTIL Main Menu:
> 1.  Replace or remove a controller or cache module
> 2.  Install a controller or cache module
> 3.  Replace Other Battery
> 4.  Exit
> Enter choice: 1, 2, 3, or 4 ->
> ```

## 11.6 Chunk Size

Cautionary information on using the default chunk size as well as information on calculating chunk size, increasing the request rate, increasing the data transfer rate and increasing sequential write performance are described in paragraphs 11.6.1 through 11.6.4 and are to be added to the documents referenced.

The sections in the *HSZ70 Array Controller HSOF Version 7.3 CLI Reference Manual*, page 2-38 and in *the HSZ70 Array Controller HSOF Version 7.3*

*Configuration Manual*, pages 3-18 through 3-20 regarding chunk size should be replaced with the following:

## 11.6.1 Specifying Chunk Size

Specify the Chunksize of the data to be stored to control the stripesize used in RAIDsets and stripesets:

### 11.6.1.1 Chunksize = Default

This lets the controller set the Chunksize based on the number of disk drives (d) in a stripeset or RAIDset.
If d ≤ 9 then Chunksize = 256. Or 128 kilobytes (K)
If d > 9 then Chunksize = 128. Or 64 kilobytes (K)

**CAUTION**

The default chunk size should be used with caution. It is imperative that you analyze the i/o transfers being used with your application to determine the proper chunk size. An improper value used as a chunk size may cause serious performance problems with the subsystem.

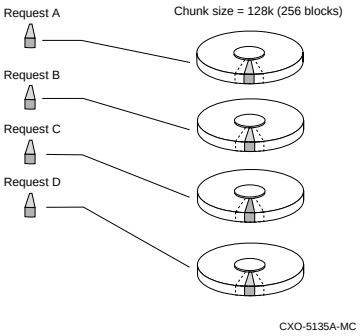
### 11.6.1.2 Chunksize = n

This lets you specify a chunksize in blocks. The relationship between chunksize and request size determines whether striping increases the request rate or the data-transfer rate.

## 11.6.2 Increasing the Request Rate

A large chunk size (relative to the average request size) increases the request rate by allowing multiple disk drives to respond to multiple requests. If one disk drive contains all of the data for one request, then the other disk drives in the storageset are available to handle other requests. Thus, in principle, separate I/O requests can be handled in parallel, thereby increasing the request rate. This concept is shown in Figure 11-1.

**Figure 11-1 Chunk Size Larger than the Request Size**




Applications such as interactive transaction processing, office automation, and file services for general timesharing tend to require high I/O request rates.

Large chunk sizes also tend to increase the performance of random reads and writes. It is recommended that you use a chunk size of 10 to 20 times the average request size, rounded to the closest prime number. In general, a chunk size of 239 works well for UNIX systems with a transfer size of 16 sectors; and a chunk size of 113 works well for *OpenVMS*™ systems with a transfer size of 8 sectors.

To calculate the chunk size that should be used for your subsystem, you first must analyze the types of requests that are being made to the subsystem:

- Lots of parallel I/O that use a small area of disk should use a chunk size at 10 times the average transfer request rate
- Random I/Os that are scattered over all the areas of the disks should use a chunk size of 20 times the average transfer request rate
- If you don’t know, then you should use a chunk size of 15 times the average transfer request rate
- If you have mostly sequential reads or writes (like those needed to work with large graphic files), then make the chunk size a small number (i.e. 17 sectors in Table 8 shows a few examples of chunk size selection

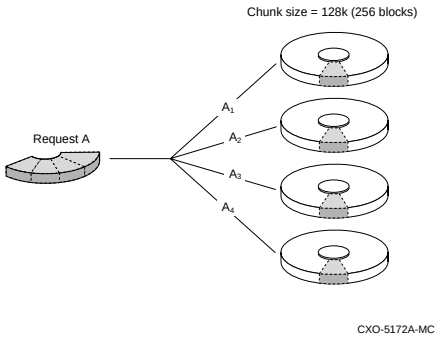
**Table 8 Example Chunk Sizes**

| Transfer Size (KB) | High-Locality | Unknown Locality | Low Locality |
|---|---|---|---|
| 2 | 41 | 59 | 79 |
| 4 | 79 | 113 | 163 |
| 8 | 157 | 239 | 317 |

### *11.6.3 Increasing the Data Transfer Rate*

A small chunk size relative to the average request size increases the data transfer rate by allowing multiple disk drives to participate in one I/O request. This concept is shown in Figure 11-2

**Figure 11-2 Chunk Size Smaller than the Request Size**




Applications such as CAD, image processing, data collection and reduction, and sequential file processing tend to require high data-transfer rates.

### *11.6.4 Increasing Sequential Write Performance*

Sequential write and read requests on stripesets (or striped mirrorsets) should use a small chunk size relative to the I/O size to increase the performance. A chunk size of 17 generally works well.

# 12.0 Software Installation

> **CAUTION**
>
> Due to changes in certain operating system functions in *Compaq Tru64* UNIX V5.0 and higher, it is important to install HSOF Software V7.7 on your controllers **before** installing these versions of the operating system.

This section provides the specific procedures needed to install your HSOF V7.7 software. The information in this section can be used in conjunction with the *HSZ70 Array Controller HSOF V7.3 Service Manual, Chapter 3 "Replacement Procedures ", pages 3-24 through 3-27.*

The Controller upgrades described in this section are as follows:

- Single Controller Upgrade
- Dual-Redundant Controller Upgrade

## 12.1 Single Controller Upgrade

A Single Controller Upgrade is synonymous with a Shutdown Upgrade. A Shutdown Upgrade is one in which the storage device is taken off-line for the period of time that the software is being installed. Use the following procedure to upgrade the HSOF software in a non-redundant (single) controller:

1. Halt all host I/O activity to the controller and prepare the host system for a controller shutdown using the appropriate procedures for your operating system.
2. Establish a local connection to the controller through the maintenance port of the controller.
3. Shutdown the controller with the following command:
   **`SHUTDOWN THIS_CONTROLLER`**

**CAUTION**

Before continuing, wait until the Reset button on the controller stops flashing (lit continuously). This indicates that unwritten data is flushed from the cache module.

4. Remove the PCMCIA program card ESD cover from the controller.
5. While pressing and holding the controller Reset button, press the program card eject button to eject the program card from the controller. Release the button after the card is ejected.

**NOTE**

The controller will initialize and the Reset button will flash at an approximate once per second rate when ready for operation.

6. Press and hold the Reset button while inserting the new program card. Release the button after the new card is inserted.

**NOTE**

The controller will initialize and the Reset button will flash at an approximate once per second rate when ready for operation.

7. Replace the ESD cover on the controller, pushing the locking pins to secure them in place.
8. Mount the storage units on the host.

**NOTE**

You can identify the version of the HSOF software that is currently loaded in the controller by entering a **`SHOW THIS_CONTROLLER`** command at the CLI prompt.

## 12.2 Dual-Redundant Upgrade

Before you can begin the Dual-Redundant upgrade you will first need to determine which one of the following two upgrade procedures you will perform:

- Dual-Redundant Controller Rolling Upgrade
  Or
- Dual-Redundant Controller Shutdown Upgrade

Below is a description of each of the two procedures and Table 9 shows which procedure is necessary for the HSZ70 HSOF Software versions.

**Dual-Redundant Controller Rolling Upgrade:**

The Dual-Redundant Controller 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. 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.

**Dual-Redundant Controller Shutdown Upgrade:**

The Dual-Redundant Controller Shutdown Upgrade procedure requires that you change your dual-redundant configuration into two single controller configurations for the HSOF Version 7.7 Software upgrade. You must shut down and restart both controllers during this upgrade. Units will be unavailable to the host system during this time. Before upgrading the controller software, prepare the host system for this situation by dismounting units or shutting down the system.

**Table 9 HSOF Software Versions and Supported Upgrade Procedures**

| Rolling Upgrade to V7.7 From: | Shutdown Upgrade to V7.7 From: |
|---|---|
| Versions 7.3, 7.4, and 7.5 | Versions 7.0, 7.1, and 7.2 |

As shown in the above table, Rolling Upgrades to Version 7.7 are supported from Version 7.3, 7.4, and 7.5.

Releases prior to HSOF Software Version 7.3 must upgrade to HSOF Software Version 7.7 by performing the shutdown upgrade procedure.

### *12.2.1 Dual-Redundant Controller Rolling Upgrade*

If your HSOF Software version supports a Dual-Redundant Controller Rolling Upgrade, follow the below procedures.

**CAUTION**

Prior to installing HSOF V7.7 software, it is important to first determine whether the two controllers in your dual-redundant configurations have the same or different product ID's, this will determine the upgrade procedure you will use to continue.

To view the product ID's on your dual-redundant controllers, establish a local connection to the controller through the maintenance port of one of the controllers, (which becomes "this controller"). Enter the following commands and observe the resulting displays:

```
SHOW THIS_CONTROLLER and SHOW OTHER_CONTROLLER
```

The product ID is shown in the first characters of the display, prior to the hardware serial number. Most controllers have the product ID of "HSZ70" but a very few controllers may have the product ID of "HSZ70  (C) DEC."

- IF the Product ID's of the two HSZ70 controllers in a dual-redundant pair are the same, use the procedure for ***Same Product ID's for Dual-Redundant Rolling Upgrade*** (Section 12.2.1.1).

- IF the Product ID's of the two HSZ70 controllers in a dual-redundant pair are different, and IF your current *Compaq Tru64* UNIX operating system version is V4.0x or lower, use the procedure for ***Different Product ID's and* Compaq Tru64 *UNIX V4.0x for Dual-Redundant Rolling Upgrade*** (Section 12.2.1.2).

- IF the Product ID's of the two HSZ70 controllers in a dual-redundant pair are **different**, **and** IF your current *Compaq Tru64* UNIX operating system version is **V5.0**, use the procedure below for ***Different Product ID's and* Compaq Tru64 *UNIX V5.0 for Dual-Redundant Rolling Upgrade*** (Section 12.2.1.3).

#### *12.2.1.1 Procedure for Same Product ID's for Dual-Redundant Rolling Upgrade*

1. Establish a local connection to the controller through the maintenance port of one of the controllers ("this controller").
2. Remove the preferred target IDs from the "other controller" by using the following command:

   **`SET OTHER_CONTROLLER NOPREFERRED`**

> **NOTE**
>
> Ensure you have the preferred target IDs written down before clearing them out with the **`SET OTHER_CONTROLLER NOPREFERRED`** command. This will speed up the process at the end of the installation procedure.

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

   **`SHUTDOWN OTHER_CONTROLLER`**

**NOTE**

If the EMU alarm is turned on, then the alarm will "sound" when the controller is shut down. The alarm may be turned off by pressing the lit EMU "fault" button.

**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.

4. Remove the program card ESD cover from "other controller".
5. Press and hold the controller Reset button while ejecting the old program card. Release the button after the card is ejected.
6. 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 at an approximate once per second rate and
The maintenance terminal displays a message that finishes with `other controller restarted`.

7. 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.

8. Replace the ESD cover on “other controller” and push the locking pins to secure it.
9. First pass through this procedure?

   YES—Move the maintenance port cable from “this controller” to “other controller” maintenance port and repeat procedure from step 3 to step 8 to replace the other program card.

> **NOTE**
>
> “Other controller” switches with “this controller”—the controller that the maintenance port cable was plugged into originally—(“this controller”) becomes “other controller” for the second pass through steps 2–8.

   NO—Go to step 10.

10. Re-establish the preferred target ID list in the two controllers by issuing the following commands:

    **SET OTHER_CONTROLLER PREFERRED_ID=*n,n,...***

    **SET THIS_CONTROLLER PREFERRED_ID=*n,n,...***

#### *12.2.1.2 Procedure for Different Product ID’s and* Compaq Tru64 *UNIX V4.0x for Dual-Redundant Rolling Upgrade*

1. Establish a local connection to the controller through the maintenance port of one of the controllers (“this controller”).
2. Remove the preferred target IDs from the “other controller” by using the following command:

   **SET OTHER_CONTROLLER *NOPREFERRED***

> **NOTE**
>
> Ensure you have the preferred target IDs written down before clearing them out with the **SET OTHER_CONTROLLER *NOPREFERRED*** command. This will speed up the process at the end of the installation procedure.

3. Wait for the CLI prompt, and then shut down "other controller" by using the following command:
   **SHUTDOWN OTHER_CONTROLLER**

**NOTE**

If the EMU alarm is turned on, then the alarm will "sound" when the controller is shut down. The alarm may be turned off by pressing the lit EMU "fault" button.

**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.

4. Remove the program card ESD cover from "other controller".
5. Press and hold the controller Reset button while ejecting the old program card. Release the button after the card is ejected.
6. 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 at an approximate once per second rate and
The maintenance terminal displays a message that finishes with `other controller restarted`.

7. 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.

8. Replace the ESD cover on "other controller" and push the locking pins to secure it.
9. When "other controller" has completely rebooted, move the local connection to the maintenance port of **other** (newly upgraded) controller, which will cause the newly upgraded controller to become "this controller."

   Issue the **SHOW THIS_CONTROLLER** command.

   The resulting display will show that the controllers are misconfigured due to the differing product ID's.
10. Issue the **SET NOFAILOVER** command to shutdown the "other controller" still containing old software. This will cause the "other controller" to shut down and devices to fail over to "this controller".
11. Observing all notes and caution statements in steps 3 through 8 remove the old program card, insert the new one, and reset "other controller" to start it.
12. When the second controller has restarted as described in Step 7, issue the **SET FAILOVER COPY=*controller*** command.

    Either **THIS** or **OTHER** may be used as the source in the **COPY=** parameter since both controllers have already been updated.
13. Re-establish the preferred target ID list in the two controllers by issuing the following commands:

    **SET OTHER_CONTROLLER PREFERRED_ID=*n,n,...***

    **SET THIS_CONTROLLER PREFERRED_ID=*n,n,...***

#### *12.2.1.3 Different Product ID's and* Compaq Tru64 *UNIX V5.0 for Dual-Redundant Rolling Upgrade*

When your HSZ70 controllers with different product ID's are configured in a system using *Compaq Tru64* UNIX V5.0, it is necessary to perform some steps involving the operating system before and after controller upgrade to HSOF V7.7.

1. Determine the **master** controller by following the sub-steps below:

a. Use the following command to view details of the devices attached to the host.

```
# hwmgr -view dev -cat disk
HWID: Device Name    Mfg  Model         Location
-----------------------------------------------------------
27: /dev/disk/floppy0c    3.5in floppy  fdi0-unit-0
34: /dev/disk/dsk0c  DEC  RZ28  (C) DEC bus-0-targ-1-lun-0
35: /dev/disk/dsk1c  DEC  RZ26L (C) DEC bus-0-targ-2-lun-0
36:/dev/disk/cdrom0c DEC  RRD44 (C) DEC bus-0-targ-5-lun-0
37: /dev/disk/dsk2c  DEC  HSZ70         bus-1-targ-3-lun-0
38: /dev/disk/dsk3c  DEC  HSZ70         bus-1-targ-3-lun-1
39: /dev/disk/dsk4c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-0
40: /dev/disk/dsk5c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-1
```

In the above example dsk2 (D300 on the controller) and dsk3 (D301 on the controller) are reporting the Product ID of "HSZ70" while dsk4 (D600 on the controller) and dsk5 (D601 on the controller) are reporting the Product ID of "HSZ70  (C) DEC" in the Model column.

**NOTE**

If all the units configured on the dual controller pair are "ONLINE" to only one of the controllers (i.e. the other controller is in stand by mode), then all the devices will show only one Product ID. The controller which has the units "ONLINE" is the **master** controller. Go to Step 2 and perform Steps 2 through 15. It is not necessary in this case to perform Step 16.

b. Use the command below to determine which device the root file system is mounted on.

```
# df
Filesystem    512-blocks    Used   Avail Capacity Mounted on
/dev/disk/dsk4a   338542  276436   28250    91%   /
/dev/disk/dsk4g  3389096  520056 2530130    18%   /usr
/proc                  0       0       0   100%   /proc
```

In the example above the root file system is mounted on dsk4.

c. Shut the system down to single-user mode. This will prevent background processes from touching the disks while this procedure is in progress.

```
# shutdown now
```

d. If the root file system is not mounted on a unit configured on the controller pair, choose **either** of the controllers to be the "**master**" controller in the upgrade operation below. Go to step 2.

If the root file system is mounted on a unit configured on the controller pair, then do the following in order to determine which is the **master** controller.

e. Connect the CLI interface to one of the controllers and perform the **`SHOW <UNIT>`** command for the unit with the root device (D600 in case of the example).

```
HSZ> show d600
    LUN                                             Uses
------------------------------------------------------------
  D600                                              DISK600
  ...
        State:
          ONLINE to this controller
          Not reserved
          PREFERRED_PATH = THIS_CONTROLLER
  ...
```

If the output shows that the unit is "ONLINE" to **this** controller (as is the case in this example), then **THIS_CONTROLLER** is the **master** controller.

If the output shows that the unit is "ONLINE" to the **other** controller, then **OTHER_CONTROLLER** is the **master** controller.

2. Establish a local connection to the **master** controller (determined in Step 1) through the maintenance port of that controller, which now becomes "this controller".
3. Remove the preferred target IDs from the "other controller" by using the following command:

   **SET OTHER_CONTROLLER *NOPREFERRED***

> **NOTE**
>
> Ensure you have the preferred target IDs written down before clearing them out with the **SET OTHER_CONTROLLER *NOPREFERRED*** command. This will speed up the process at the end of the installation procedure.

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

   **SHUTDOWN OTHER_CONTROLLER**

**NOTE**

If the EMU alarm is turned on, then the alarm will "sound" when the controller is shut down. The alarm may be turned off by pressing the lit EMU "fault" button.

**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.

5. Remove the program card ESD cover from "other controller".
6. Press and hold the controller Reset button while ejecting the old program card. Release the button after the card is ejected.
7. 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 at an approximate once per second rate and
The maintenance terminal displays a message that finishes with `other controller restarted`.

8. 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.

9. Replace the ESD cover on “other controller” and push the locking pins to secure it.
10. When "other controller" has completely rebooted, issue the **`SET NOFAILOVER`** command.
    This will cause the "other controller" to shut down.
11. Press the Reset button on “other” (slave) controller and wait until it restarts.
12. Move the local connection to the maintenance port of the slave controller.
13. Issue the **`SET FAILOVER COPY=OTHER`** command to copy the **master** controller’s product ID to the slave controller. This will cause the slave controller to shutdown and reboot automatically.

> **CAUTION**
>
> Be sure to use **OTHER** as the qualifier in the **COPY=** command to properly match the Product ID’s.

14. Observing all notes and caution statements in steps 4 through 9, remove the old program card, insert the new one, and reset the master controller to start it.
15. Re-establish the preferred target ID list in the two controllers by issuing the following commands:

    **`SET OTHER_CONTROLLER PREFERRED_ID=`*`n,n,...`***

    **`SET THIS_CONTROLLER PREFERRED_ID=`*`n,n,...`***

16. Follow the commands in the example below to correct the device files:

a. Scan the SCSI interfaces to update the operating system’s view of device changes and create new devices as necessary.

> **NOTE**
>
> Depending on the size of your configuration, the scan may take several minutes to complete. The presence of tape devices will further increase the delay to complete the scan. For this reason, you may wish to use the -bus qualifier to specify the bus you want to scan. The correct bus number can be determined by examining the “location” field of the “hwmgr -view devices” output.

```
# hwmgr -view devices
HWID: Device Name   Mfg  Model          Location
------------------------------------------------------------
39: /dev/disk/dsk4c DEC  HSZ70  (C) DEC bus-1-targ-6-lun-0
```

Issue the command for the appropriate bus (1 in this example).

```
# hwmgr -scan scsi -bus 1
```

b. In order to understand which devices need to be redirected to the newly created devices, examine the current list of devices prior to rebooting the system:

```
# hwmgr -view devices
HWID: Device Name   Mfg  Model          Location
------------------------------------------------------------
4: /dev/kevm
27: /dev/disk/floppy0c    3.5in floppy  fdi0-unit-0
34: /dev/disk/dsk0c  DEC  RZ28 (C) DEC  bus-0-targ-1-lun-0
35: /dev/disk/dsk1c  DEC  RZ26L (C) DEC bus-0-targ-2-lun-0
36:/dev/disk/cdrom0c DEC  RRD44 (C) DEC bus-0-targ-5-lun-0
37: /dev/disk/dsk2c  DEC  HSZ70         bus-1-targ-3-lun-0
38: /dev/disk/dsk3c  DEC  HSZ70         bus-1-targ-3-lun-1
39: /dev/disk/dsk4c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-0
40: /dev/disk/dsk5c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-1
41: /dev/cport/scp0       HSZ70         bus-1-targ-3-lun-0
42: /dev/cport/scp1       HSZ70 (C) DEC bus-1-targ-6-lun-0
44: /dev/disk/dsk6c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-0
45: /dev/disk/dsk7c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-1
```

Note that you can ignore the control port "scp0" device.

We will need to redirect the following device names (with invalid PID's):

```
37: /dev/disk/dsk2c  DEC  HSZ70         bus-1-targ-3-lun-0
38: /dev/disk/dsk3c  DEC  HSZ70         bus-1-targ-3-lun-1
```

```
To the following new device names (containing valid
PID's):
```

```
44: /dev/disk/dsk6c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-0
45: /dev/disk/dsk7c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-1
```

Remember the following:

- HWID 37 will be redirected to 44
- HWID 38 will be redirected to 45

c. At this point, you should reboot the system (ONLY TO SINGLE-USER MODE).
Then mount the root file system to enable writing to the disk:

```
# shutdown -h now
.
 .
  .
P00>>> boot -flag s dkb600
.
 .
  .
Starting secondary cpu 1
INIT: SINGLE-USER MODE
# mountroot
.
 .
  .
```

d. Examine the output of "hwmgr -view devices" and "hwmgr -show scsi" (The scsi DID output will be necessary to execute the hwmgr –redirect commands).

```
# hwmgr -view dev -cat disk
HWID: Device Name    Mfg  Model         Location
------------------------------------------------------------
27: /dev/disk/floppy0c    3.5in floppy  fdi0-unit-0
34: /dev/disk/dsk0c  DEC  RZ28  (C) DEC bus-0-targ-1-lun-0
35: /dev/disk/dsk1c  DEC  RZ26L (C) DEC bus-0-targ-2-lun-0
36:/dev/disk/cdrom0c DEC  RRD44 (C) DEC bus-0-targ-5-lun-0
39: /dev/disk/dsk4c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-0
40: /dev/disk/dsk5c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-1
44: /dev/disk/dsk6c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-0
45: /dev/disk/dsk7c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-1


# hwmgr -show scsi
     SCSI           DEVICE DEVICE  DRIVER NUM DEVICE FIRST
HWID:DEVICE HOSTNAM TYPE   SUBTYPE OWNER PATH FILE   VALID
------------------------------------------------------------
34:  0      ajkitt  disk   none     0     1   dsk0 [0/1/0]
35:  1      ajkitt  disk   none     0     1   dsk1 [0/2/0]
36:  2      ajkitt cdrom   none     0     1 cdrom0 [0/5/0]
37:  3      ajkitt  disk   none     0     1  (null)
38:  4      ajkitt  disk   none     0     1  (null)
39:  5      ajkitt  disk   none     2     1   dsk4 [1/6/0]
40:  6      ajkitt  disk   none     0     1   dsk5 [1/6/1]
44:  7      ajkitt  disk   none     0     1   dsk6 [1/3/0]
45:  8      ajkitt  disk   none     0     1   dsk7 [1/3/1]
```

Note the following correspondence, and recall our intentions:

```
HWID = SCSI DID
----   --------
37   = 3
38   = 4
44   = 7
45   = 8

REDIRECT
HWID        SCSI DID
--------    --------
37 to 44    3 to 7
38 to 45    4 to 8
```

e. The redirection is accomplished by the following hwmgr commands:

```
# hwmgr -redirect scsi -src 3 -dest 7
hwmgr: Redirect operation was successful

# hwmgr -redirect scsi -src 4 -dest 8
hwmgr: Redirect operation was successful
```

Final result, and proof that all devices are reachable:

```
# hwmgr -view devices
HWID: Device Name    Mfg  Model         Location
-------------------------------------------------------------
 4: /dev/kevm
27: /dev/disk/floppy0c    3.5in floppy  fdi0-unit-0
34: /dev/disk/dsk0c  DEC  RZ28  (C) DEC bus-0-targ-1-lun-0
35: /dev/disk/dsk1c  DEC  RZ26L (C) DEC bus-0-targ-2-lun-0
36:/dev/disk/cdrom0c DEC  RRD44 (C) DEC bus-0-targ-5-lun-0
37: /dev/disk/dsk2c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-0
38: /dev/disk/dsk3c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-1
39: /dev/disk/dsk4c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-0
40: /dev/disk/dsk5c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-1
42: /dev/cport/scp1       HSZ70 (C) DEC bus-1-targ-3-lun-0

# hwmgr -show scsi

      SCSI           DEVICE DEVICE DRIVER NUM DEVICE FIRST
HWID: DEVICE HOSTNAM TYPE   SUBTYPE OWNER PATH FILE  VALID
-------------------------------------------------------------
34:   0      ajkitt  disk   none     0    1   dsk0 [0/1/0]
35:   1      ajkitt  disk   none     0    1   dsk1 [0/2/0]
36:   2      ajkitt  cdrom  none     0    1 cdrom0 [0/5/0]
37:   3      ajkitt  disk   none     0    1   dsk2 [1/3/0]
38:   4      ajkitt  disk   none     0    1   dsk3 [1/3/1]
39:   5      ajkitt  disk   none     2    1   dsk4 [1/6/0]
40:   6      ajkitt  disk   none     0    1   dsk5 [1/6/1]
```

```
# mount /usr

# file /dev/rdisk/dsk*c

/dev/rdisk/dsk0c:       character special (19/22) SCSI #0
"RZ28" disk #0

(SCSI ID #1) (SCSI LUN #0)

/dev/rdisk/dsk1c:       character special (19/38) SCSI #0
"RZ26L" disk #1

(SCSI ID #2) (SCSI LUN #0)

/dev/rdisk/dsk2c:       character special (19/70) SCSI #1
"HSZ70" disk #3

(SCSI ID #3) (SCSI LUN #0)

/dev/rdisk/dsk3c:       character special (19/86) SCSI #1
"HSZ70" disk #4

(SCSI ID #3) (SCSI LUN #1)

/dev/rdisk/dsk4c:       character special (19/102) SCSI #1
"HSZ70" disk #5

(SCSI ID #6) (SCSI LUN #0)

/dev/rdisk/dsk5c:       character special (19/118) SCSI #1
"HSZ70" disk #6

(SCSI ID #6) (SCSI LUN #1)
```

f. The system is now ready for multi-user mode:

```
# ^D

INIT: New run level: 3

.

 .

  .
```

<<end of example>>

17. The controller software upgrade to HSOF V7.7 is now complete.

### *12.2.2 Dual-Redundant Controller Shutdown Upgrade*

If your HSOF Software version requires a Dual-Redundant Controller Shutdown Upgrade, follow the below procedures.

> **CAUTION**
>
> Prior to installing HSOF V7.7 software, it is important to first determine whether the two controllers in your dual-redundant configurations have the same or different Product ID's, this will determine the upgrade procedure you will use to continue.

To view the Product ID's on your dual-redundant controllers, establish a local connection to the controller through the maintenance port of one of the controllers, (which becomes "this controller"). Enter the following commands and observe the resulting displays:

```
SHOW THIS_CONTROLLER and SHOW OTHER_CONTROLLER
```

The Product ID is shown in the first characters of the display, prior to the hardware serial number. Most controllers have the Product ID of "HSZ70" but a very few controllers may have the Product ID of "HSZ70  (c) DEC."

- IF the Product ID's of the two HSZ70 controllers in a dual-redundant pair are the **same**, use the procedure for ***Same Product ID's for Dual-Redundant Shutdown Upgrade*** (Section 12.2.2.1).

- IF the Product ID's of the two HSZ70 controllers in a dual-redundant pair are **different**, **and** IF your current *Compaq Tru64* UNIX operating system version is **V4.0x or lower**, use the procedure for ***Different Product ID's and* Compaq Tru64 *UNIX V4.0x for Dual-Redundant Shutdown Upgrade*** (Section 12.2.2.2).

- IF the Product ID's of the two HSZ70 controllers in a dual-redundant pair are **different**, **and** IF your current *Compaq Tru64* UNIX operating system version is **V5.0**, use the procedure below for ***Different Product ID's and* Compaq Tru64 *UNIX V5.0 for Dual-Redundant Shutdown Upgrade*** (Section 12.2.2.3).

#### *12.2.2.1 Same Product ID's for Dual-Redundant Shutdown Upgrade*

1. Halt all host I/O activity to the controller and prepare the host system for a controller shutdown using the appropriate procedures for your operating system.
2. Establish a local connection to the controller through the maintenance port of the controller.
3. Shutdown both controllers with the following commands:

   ```
   SHUTDOWN OTHER_CONTROLLER
   SHUTDOWN THIS_CONTROLLER
   ```

> **CAUTION**
>
> Before continuing, wait until the Reset buttons on both controllers stop flashing (lit continuously). This indicates that unwritten data is flushed from the cache module.

4. Remove the PCMCIA program card ESD covers from both controllers.
5. While pressing and holding the controller Reset button, press the program card eject button to eject the program card from the controller. Release the button after the card is ejected. Repeat for other controller.

> **NOTE**
>
> The controller will initialize and the Reset button will flash at an approximate once per second rate when ready for operation.

6. Press and hold the Reset button while inserting the new program card. Release the button after the new card is inserted. Repeat for other controller.

> **NOTE**
>
> The controllers initialize and their Reset buttons will flash at an approximate once per second rate when ready for operation.

7. Replace the ESD covers on both controllers, pushing their locking pins to secure them in place.
8. Mount the storage units on the host.

> **NOTE**
>
> You can identify the version of the HSOF software that is currently loaded in the controller by entering a **SHOW THIS_CONTROLLER** command at the CLI prompt.

#### *12.2.2.2 Different Product ID's and* Compaq Tru64 *UNIX V4.0x for Dual-Redundant Shutdown Upgrade*

1. Halt all host I/O activity to the controller and prepare the host system for a controller shutdown using the appropriate procedures for your operating system.
2. Establish a local connection to the controller through the maintenance port of the controller.
3. Shutdown the controllers with the following commands:

   ```
   SHUTDOWN OTHER_CONTROLLER

   SHUTDOWN THIS_CONTROLLER
   ```

> **CAUTION**
>
> Before continuing, wait until the Reset buttons on both controllers stop flashing (lit continuously). This indicates that unwritten data is flushed from the cache module.

4. Remove the PCMCIA program card ESD covers from both controllers.
5. While pressing and holding the controller Reset button, press the program card eject button to eject the program card from the controller. Release the button after the card is ejected. Repeat for other controller.

> **NOTE**
>
> The controller will initialize and the Reset button will flash at an approximate once per second rate when ready for operation.

6. Press and hold the Reset button while inserting the new program card. Release the button after the new card is inserted. Repeat for other controller.

> **NOTE**
>
> The controllers initialize and their Reset buttons will flash at an approximate once per second rate when ready for operation.

7. The controllers will detect that they are misconfigured due to the differing product ID's.
   To resolve the misconfiguration, issue the **SET FAILOVER COPY=*controller*** command.
   Either **THIS** or **OTHER** may be used as the source in the **COPY=** parameter since both controllers have already been updated.
8. Replace the ESD covers on both controllers, pushing their locking pins to secure them in place.
9. Mount the storage units on the host.

> **NOTE**
>
> You can identify the version of the HSOF software that is currently loaded in the controller by entering a **SHOW THIS_CONTROLLER** command at the CLI prompt.

#### *12.2.2.3 Different Product ID's and* Compaq Tru64 *UNIX V5.0x for Dual-Redundant Shutdown Upgrade*

When your HSZ70 controllers with different Product ID's are configured in a system using *Compaq Tru64* UNIX V5.0, it is necessary to perform some steps involving the operating system before and after controller upgrade to HSOF V7.7.

1. Determine the **master** controller by following the sub-steps below:

a. Use the following command to view details of the devices attached to the host.

```
# hwmgr -view dev -cat disk
HWID: Device Name    Mfg  Model         Location
------------------------------------------------------------
27: /dev/disk/floppy0c    3.5in floppy  fdi0-unit-0
34: /dev/disk/dsk0c  DEC  RZ28  (C) DEC bus-0-targ-1-lun-0
35: /dev/disk/dsk1c  DEC  RZ26L (C) DEC bus-0-targ-2-lun-0
36:/dev/disk/cdrom0c DEC  RRD44 (C) DEC bus-0-targ-5-lun-0
37: /dev/disk/dsk2c  DEC  HSZ70         bus-1-targ-3-lun-0
38: /dev/disk/dsk3c  DEC  HSZ70         bus-1-targ-3-lun-1
39: /dev/disk/dsk4c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-0
40: /dev/disk/dsk5c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-1
```

In the above example dsk2 (D300 on the controller) and dsk3 (D301 on the controller) are reporting the Product ID of "HSZ70" while dsk4 (D600 on the controller) and dsk5 (D601 on the controller) are reporting the Product ID of "HSZ70  (C) DEC" in the Model column.

**NOTE**

If all the units configured on the dual controller pair are "ONLINE" to only one of the controllers (i.e. the other controller is in stand by mode), then all the devices will show only one Product ID. The controller which has the units "ONLINE" is the **master** controller. Go to Step 2 and perform Steps 2 through 11. It is not necessary in this case to perform Step 12.

b. Use the command below to determine which device the root file system is mounted on.

```
# df
Filesystem    512-blocks    Used   Avail Capacity Mounted on
/dev/disk/dsk4a   338542  276436   28250    91%   /
/dev/disk/dsk4g  3389096  520056 2530130    18%   /usr
/proc                  0       0       0   100%   /proc
```

In the example above the root file system is mounted on dsk4.

c. Shut the system down to single-user mode. This will prevent background processes from touching the disks while this procedure is in progress.

```
# shutdown now
```

d. If the root file system is not mounted on a unit configured on the controller pair, choose **either** of the controllers to be the "**master**" controller in the upgrade operation below. Go to step 2.

If the root file system is mounted on a unit configured on the controller pair, then do the following in order to determine which is the **master** controller.

e. Connect the CLI interface to one of the controllers and perform **`SHOW <UNIT>`** command for the unit with the root device (D600 in case of the example).

```
HSZ> show d600
    LUN                                             Uses
------------------------------------------------------------
  D600                                              DISK600
  ...
        State:
          ONLINE to this controller
          Not reserved
          PREFERRED_PATH = THIS_CONTROLLER
  ...
```

If the output shows that the unit is "ONLINE" to **this** controller (as is the case in this example), then **THIS_CONTROLLER** is the **master** controller.

If the output shows that the unit is "ONLINE" to the **other** controller, then **OTHER_CONTROLLER** is the **master** controller.

2. Halt all host I/O activity to the controller and prepare the host system for a controller shutdown using the appropriate procedures for your configuration.
3. Establish a local connection to the **master** controller through the maintenance port of that controller.
4. Shutdown the controllers with the following commands:

   **SHUTDOWN OTHER_CONTROLLER**

   **SHUTDOWN THIS_CONTROLLER**

> **CAUTION**
>
> Before continuing, wait until the Reset buttons on both controllers stop flashing (lit continuously). This indicates that unwritten data is flushed from the cache module.

5. Remove the PCMCIA program card ESD covers from both controllers.
6. While pressing and holding the controller Reset button, press the program card eject button to eject the program card from the controller. Release the button after the card is ejected. Repeat for other controller.

**NOTE**

The controller will initialize and the Reset button will flash at an approximate once per second rate when ready for operation.

7. Press and hold the Reset button while inserting the new program card. Release the button after the new card is inserted. Repeat for other controller.

**NOTE**

The controllers initialize and their Reset buttons will flash at an approximate once per second rate when ready for operation.

8. The controllers will detect that they are misconfigured due to the differing Product ID's. To resolve the misconfiguration, first issue the **`SET NOFAILOVER`** command to begin the resolution process.
9. Issue the **`SET FAILOVER COPY=`*`THIS_CONTROLLER`*** command to copy the Product ID on the **master** controller to the slave controller.

**CAUTION**

Be sure to use **THIS** as the qualifier in the **COPY=** command to properly match the Product ID's.

10. Replace the ESD covers on both controllers, pushing their locking pins to secure them in place.

**NOTE**

You can identify the version of the HSOF software that is currently loaded in the controller by entering a **`SHOW THIS_CONTROLLER`** command at the CLI prompt.

11. Ensure that the host is running in single-user mode.
12. Follow the commands in the example below to correct the device files:

a. Scan the SCSI interfaces to update the operating system's view of device changes and then create new devices as necessary.

> **NOTE**
>
> Depending on the size of your configuration, the scan may take several minutes to complete. The presence of tape devices will further increase the delay to complete the scan. For this reason, you may wish to use the -bus qualifier to specify the bus you want to scan. The correct bus number can be determined by examining the "location" field of the "hwmgr -view devices" output.

```
# hwmgr -view devices
HWID: Device Name   Mfg  Model          Location
------------------------------------------------------------
39: /dev/disk/dsk4c DEC  HSZ70  (C) DEC bus-1-targ-6-lun-0
```

Issue the command for the appropriate bus (1 in this example).

```
# hwmgr -scan scsi -bus 1
```

b. In order to understand which devices need to be redirected to the newly created devices, examine the current list of devices prior to rebooting the system:

```
# hwmgr -view devices
HWID: Device Name   Mfg  Model          Location
-------------------------------------------------------
4: /dev/kevm
27: /dev/disk/floppy0c    3.5in floppy  fdi0-unit-0
34: /dev/disk/dsk0c  DEC  RZ28 (C) DEC  bus-0-targ-1-lun-0
35: /dev/disk/dsk1c  DEC  RZ26L (C) DEC bus-0-targ-2-lun-0
36:/dev/disk/cdrom0c DEC  RRD44 (C) DEC bus-0-targ-5-lun-0
37: /dev/disk/dsk2c  DEC  HSZ70         bus-1-targ-3-lun-0
38: /dev/disk/dsk3c  DEC  HSZ70         bus-1-targ-3-lun-1
39: /dev/disk/dsk4c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-0
40: /dev/disk/dsk5c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-1
41: /dev/cport/scp0       HSZ70         bus-1-targ-3-lun-0
42: /dev/cport/scp1       HSZ70 (C) DEC bus-1-targ-6-lun-0
44: /dev/disk/dsk6c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-0
45: /dev/disk/dsk7c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-1
```

Note that you can ignore the control port "scp0" device.

We will need to redirect the following device names (with invalid PID's):

```
37: /dev/disk/dsk2c  DEC  HSZ70         bus-1-targ-3-lun-0
38: /dev/disk/dsk3c  DEC  HSZ70         bus-1-targ-3-lun-1
```

```
To the following new device names (containing valid
PID's):
```

```
44: /dev/disk/dsk6c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-0
45: /dev/disk/dsk7c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-1
```

Remember the following:

- HWID 37 will be redirected to 44
- HWID 38 will be redirected to 45

c. At this point, you should reboot the system (ONLY TO SINGLE-USER MODE).
Then mount the root file system to enable writing to the disk:

```
# shutdown -h now
.
 .
  .
P00>>> boot -flag s dkb600
.
 .
  .
Starting secondary cpu 1
INIT: SINGLE-USER MODE
# mountroot
.
 .
  .
```

d. Examine the output of "hwmgr -view devices" and "hwmgr -show scsi" (The scsi DID output will be necessary to execute the hwmgr –redirect commands).

```
# hwmgr -view dev -cat disk
HWID: Device Name    Mfg  Model         Location
------------------------------------------------------------
27: /dev/disk/floppy0c    3.5in floppy  fdi0-unit-0
34: /dev/disk/dsk0c  DEC  RZ28  (C) DEC bus-0-targ-1-lun-0
35: /dev/disk/dsk1c  DEC  RZ26L (C) DEC bus-0-targ-2-lun-0
36:/dev/disk/cdrom0c DEC  RRD44 (C) DEC bus-0-targ-5-lun-0
39: /dev/disk/dsk4c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-0
40: /dev/disk/dsk5c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-1
44: /dev/disk/dsk6c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-0
45: /dev/disk/dsk7c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-1


# hwmgr -show scsi
     SCSI           DEVICE DEVICE  DRIVER NUM DEVICE FIRST
HWID:DEVICE HOSTNAM TYPE   SUBTYPE OWNER PATH FILE   VALID
------------------------------------------------------------
34:  0      ajkitt  disk   none     0     1   dsk0 [0/1/0]
35:  1      ajkitt  disk   none     0     1   dsk1 [0/2/0]
36:  2      ajkitt cdrom   none     0     1 cdrom0 [0/5/0]
37:  3      ajkitt  disk   none     0     1  (null)
38:  4      ajkitt  disk   none     0     1  (null)
39:  5      ajkitt  disk   none     2     1   dsk4 [1/6/0]
40:  6      ajkitt  disk   none     0     1   dsk5 [1/6/1]
44:  7      ajkitt  disk   none     0     1   dsk6 [1/3/0]
45:  8      ajkitt  disk   none     0     1   dsk7 [1/3/1]
```

Note the following correspondence, and recall our intentions:

```
HWID = SCSI DID
----   --------
37   = 3
38   = 4
44   = 7
45   = 8

REDIRECT
HWID        SCSI DID
--------    --------
37 to 44    3 to 7
38 to 45    4 to 8
```

e. The redirection is accomplished by the following hwmgr commands:

```
# hwmgr -redirect scsi -src 3 -dest 7
hwmgr: Redirect operation was successful

# hwmgr -redirect scsi -src 4 -dest 8
hwmgr: Redirect operation was successful
```

Final result, and proof that all devices are reachable:

```
# hwmgr -view devices
HWID: Device Name    Mfg  Model         Location
------------------------------------------------------------
 4: /dev/kevm
27: /dev/disk/floppy0c    3.5in floppy  fdi0-unit-0
34: /dev/disk/dsk0c  DEC  RZ28  (C) DEC bus-0-targ-1-lun-0
35: /dev/disk/dsk1c  DEC  RZ26L (C) DEC bus-0-targ-2-lun-0
36:/dev/disk/cdrom0c DEC  RRD44 (C) DEC bus-0-targ-5-lun-0
37: /dev/disk/dsk2c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-0
38: /dev/disk/dsk3c  DEC  HSZ70 (C) DEC bus-1-targ-3-lun-1
39: /dev/disk/dsk4c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-0
40: /dev/disk/dsk5c  DEC  HSZ70 (C) DEC bus-1-targ-6-lun-1
42: /dev/cport/scp1       HSZ70 (C) DEC bus-1-targ-3-lun-0

# hwmgr -show scsi

      SCSI           DEVICE DEVICE DRIVER NUM DEVICE FIRST
HWID: DEVICE HOSTNAM TYPE   SUBTYPE OWNER PATH FILE  VALID
------------------------------------------------------------
34:   0      ajkitt  disk   none     0    1   dsk0 [0/1/0]
35:   1      ajkitt  disk   none     0    1   dsk1 [0/2/0]
36:   2      ajkitt  cdrom  none     0    1 cdrom0 [0/5/0]
37:   3      ajkitt  disk   none     0    1   dsk2 [1/3/0]
38:   4      ajkitt  disk   none     0    1   dsk3 [1/3/1]
39:   5      ajkitt  disk   none     2    1   dsk4 [1/6/0]
40:   6      ajkitt  disk   none     0    1   dsk5 [1/6/1]
```

```
# mount /usr

# file /dev/rdisk/dsk*c

/dev/rdisk/dsk0c:       character special (19/22) SCSI #0
"RZ28" disk #0

(SCSI ID #1) (SCSI LUN #0)

/dev/rdisk/dsk1c:       character special (19/38) SCSI #0
"RZ26L" disk #1

(SCSI ID #2) (SCSI LUN #0)

/dev/rdisk/dsk2c:       character special (19/70) SCSI #1
"HSZ70" disk #3

(SCSI ID #3) (SCSI LUN #0)

/dev/rdisk/dsk3c:       character special (19/86) SCSI #1
"HSZ70" disk #4

(SCSI ID #3) (SCSI LUN #1)

/dev/rdisk/dsk4c:       character special (19/102) SCSI #1
"HSZ70" disk #5

(SCSI ID #6) (SCSI LUN #0)

/dev/rdisk/dsk5c:       character special (19/118) SCSI #1
"HSZ70" disk #6

(SCSI ID #6) (SCSI LUN #1)
```

f. The system is now ready for multi-user mode:

```
# ^D

INIT: New run level: 3

.

 .

  .
```

<<end of example>>

13. The controller software upgrade is now complete. Mount the storage units on the host.

# Appendix A

## Example of Multiple-Bus Failover Mode Procedures

The following three procedures outline the processes to:

- Placing a pair of controllers in a multiple-bus failover mode
- Verifying setup in a multiple-bus failover mode
- Exiting multiple bus failover mode

To place the HSZ70 controllers in a multiple bus failover mode, refer to the procedures for "Establishing a Local Connection to the Controller". These procedures are outlined in the Section 2 of the *HSZ70 Array Controller HSOF Version 7*.3 *Configuration Manual*. Once the maintenance terminal is connected and the HSZ> prompt is displayed, then the procedures outlined below are ready for input.

### *Placing the Controllers in Multiple-Bus Failover Mode*

Prior to placing the controller pair into multiple-bus failover mode, the following command should be issued:

```
HSZ>SET NOFAILOVER
```

This command:

- Takes the controller pair out of any current failover mode
- Shuts down "other controller"

Re-boot "other controller" before issuing the **SET MULTIBUS_FAILOVER** command placing the pair of controllers into multiple bus failover modes.

The following **SHOW *controller*** command display shows you the status of "this controller" before issuing the SET MULTIBUS_FAILOVER command.

```
HSZ>SHOW THIS_CONTROLLER
Controller:
    HSZ70 ©DEC ZG65200286 Firmware V7.7-0, Hardware F01
    Not configured for dual-redundancy
```

```
    Controller misconfigured -- other controller present
    Device Port SCSI address 7
    Time: NOT SET
Host port:
    SCSI target(s) (3,5)
    No preferred targets
    TRANSFER_RATE_REQUESTED=20MHz
    Host Functionality Mode = A
    Allocation class 0
    Command Console LUN is disabled
Cache:
    128 megabyte write cache, version 4
    Cache is GOOD
    Battery is GOOD
    No unfinished data in cache
    CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
    NOCACHE_UPS
Mirrored Cache:
    Not enabled
```

The next command places the controller in the multiple-bus dual-redundant failover mode.

```
HSZ>SET MULTIBUS_FAILOVER COPY=THIS_CONTROLLER
```

Both controllers reboot and form a dual-redundant pair with both members in multiple-bus failover mode.

## *Verifying Setup in Multiple Bus Failover Mode*

The following `SHOW controller` command results show you the status of "this controller" after issuing the **`SET MULTIBUS_FAILOVER`** command.

**HSZ>SHOW THIS_CONTROLLER**.

```
Controller:
   HSZ70 ©DEC ZG65200286 Firmware V7.7-0, Hardware F01
   Configured for MULTIBUS_FAILOVER with ZG71700534
   In dual-redundant configuration
   Device Port SCSI address 7
   Time: NOT SET
Host port:
   SCSI target(s) (3,5)
   TRANSFER_RATE_REQUESTED=20MHz
   Host Functionality Mode = A
   Allocation class 0
   Command Console LUN is disabled
Cache:
   128 megabyte write cache, version 4
   Cache is GOOD
   Battery is GOOD
   No unfinished data in cache
   CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
   NOCACHE_UPS
Mirrored Cache:
   Not enabled
HSZ>
```

### *Exiting Multiple Bus Failover Mode*

This next command removes the dual-redundant pair from multiple-bus failover mode.

**HSZ>SET NOMULTIBUS_FAILOVER**

Shuts down the “other controller” and reboots “this controller”. “Other controller” remains shut down until manually rebooted.