

# hp StorageWorks

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## **Release Notes – HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7 for Windows NT and Windows 2000**

Part Number: AA-RH0QK-TE

Tenth Edition (January 2003)

**Product Version:** 8.7

This document contains last-minute and supplemental information about your Solution Software. In the event of conflicting information between these Release Notes and other documents contained in this product release, the Release Notes content takes precedence.

For the latest version of these Release Notes and other product documentation, visit the *StorageWorks* website at:

<http://h18006.www1.hp.com/storage/index.html>



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HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version  
8.7 for Windows NT and Windows 2000  
Tenth Edition (January 2003)  
Part Number: AA-RHOQK-TE

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## Intended Audience

This document is intended for storage administrators and *StorageWorks* customer service personnel who install and maintain *StorageWorks* Enterprise/Modular Storage RAID Array products that include *StorageWorks* HSG80 RAID Array Controllers.

## Conventions

The following conventions are used throughout this document:

- Unless otherwise specified, all references to controllers or array controllers imply the *StorageWorks* HSG80 RAID Array Controller.
- Unless otherwise specified, all references to *StorageWorks* Array Controller Software Version 8.7 imply the released *StorageWorks* ACS Version 8.7 code or subsequently patched versions of ACS Version 8.7.
- For the purpose of this document, Enterprise/Modular Storage RAID Array refers to the following *StorageWorks* RAID Array products:
  - RA8000—Fibre Channel RAID Array 8000
  - ESA12000—Enterprise Storage Array 12000 Fibre Channel
  - MA8000—Modular Array 8000 Fibre Channel
  - EMA12000—Enterprise Modular Array 12000 Fibre Channel
  - EMA16000—Enterprise Modular Array 16000 Fibre Channel

## Abbreviations and Acronyms

The following abbreviations and acronyms are used throughout this document:

- **ACS**—Array Controller Software
- **CCL**—Command Console LUN
- **CLI**—Command Line Interpreter
- **EISA**—Extended Industry Standard Architecture
- **EMU**—Environmental Monitoring Unit
- **EVA**—Enterprise Virtual Array
- **FC**—Fibre Channel
- **FC-AL**—Fibre Channel - Arbitrated Loop
- **FC-SW**—Fibre Channel - Switched
- **FRU**—Field-Replaceable Unit
- **HBA**—Host Bus Adapter
- **LUN**—Logical Unit

- **LVD**—Low Voltage Differential
- **MSCS**—Microsoft Cluster Server
- **NVRAM**—Non-Volatile Memory
- **PCMCIA**—Personal Computer Memory Card Industry Association
- **PVA**—Power Verification and Addressing Assembly
- **RAID**—Redundant Array of Independent Disks
- **RETMA**—Radio Electronics Television and Manufacturing Association
- **SAN**—Storage Area Network
- **SBB**—Storage Building Block
- **SCSI**—Small Computer System Interface
- **SMART**—Self-Monitoring Analysis and Reporting Technology
- **SWCC**—*StorageWorks* Command Console
- **VCS**—Virtual Controller Software
- **WWID**—World Wide Identifier
- **WWN**—World Wide Name

## Release Package Contents

This HSG80 Fibre Channel Solution Software Kit consists of the following:

- The HSG80 Solution Software documentation set which includes:
  - *HSG80 ACS Solution Software Version 8.7 for Windows NT and Windows 2000 Installation and Configuration Guide*
  - *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide*
  - *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*
  - *HSG80 Array Controller ACS Version 8.7 Troubleshooting Reference Guide*
  - *Command Console Version 2.5 User Guide*
  - *Command Console Version 2.5 Release Notes*
  - *Registration and Warranty Package*

- *HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7 for Windows NT and Windows 2000 Release Notes (this document)*
- HSG80 Modular Storage RAID Arrays Solution Software V8.7 for Windows NT and Windows 2000 on Proliant & X86 Platforms CD-ROM
  - Installation and scripting utilities
  - SWCC Version 2.5 Agent and Client software
  - Device drivers

The following supporting documentation is available from the *StorageWorks* website:

<http://h18006.www1.hp.com/storage/index.html>

- *SAN Design Reference Guide*, Part Number: AA-RMPNE-TE
- *Enterprise/Modular Storage RAID Array Fibre Channel Arbitrated Loop Configurations Application Note*, Part Number: AA-RS1ZA-TE
- *Model 2100 and 2200 Ultra SCSI Controller Enclosures User Guide*, Part Number: EK-SE2C8-UA. C01
- *Model 4300 Family Ultra3 LVD Disk Enclosures User Guide*, Part Number: EK-LVDU3-UA. A01
- *Modular Array Cabinet Restrictions*, Part Number EK-MACON-CA. B01

## **Important Notice Regarding Cache Sizes**

For ACS Version 8.7, minimum cache size requirements are 128 MB in unmirrored configurations, and 256 MB in mirrored configurations, per cache module.

The cache size requirements for running ACS Version 8.7P or Version 8.7S remain at 512 MB.

## **Identifying ACS Revision Level**

The ACS release package you received should include a PCMCIA program card containing the new ACS software. Included in this section are instructions for determining the ACS version running on your RAID Array.

Once ACS is installed, you can identify the specific version of ACS by typing the following command at the CLI prompt:

```
HSG80> SHOW THIS_CONTROLLER
```

The resulting display lists the software revision level as one of the following:

```
V87G
```

```
V87F
```

```
V87P
```

```
V87S
```

If the ACS version is not Version 8.7 or a subsequently patched version of ACS Version 8.7, contact your support provider for instructions on how to obtain the updated version.

If the ACS version is Version 8.7P or Version 8.7S, you need additional layered application software beyond this Solution Software Kit to take advantage of the added functionality of these versions. See "Layered Software Applications", page 25, for additional information on compatible layered application software.

ACS Version 8.7 is fully compatible with Version 8.7 Solution Software. In addition, Version 8.7 Solution Software is backward compatible with ACS Version 8.6, which benefits the upgrade process across your SAN.

## Patching ACS

Each ACS patch builds on the current version of ACS and all previously installed patches. ACS patches must be installed in order, from lowest to highest, when multiple patches are installed. ACS patches are available for download from the following *StorageWorks* website:

<http://h18000.www1.hp.com/products/storageworks/softwaredrivers/acs/index.html>

ACS patch downloads come packaged with the instructions and scripts needed to apply the patch. See the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide* for further information on patching ACS.

For multi-bus configurations, use the following procedure in addition to those provided with the ACS patch download:

1. Apply ACS patches to both controllers.

2. Move all units to `OTHER_CONTROLLER`, one unit at a time, using Secure Path software. Moving the units in this manner is not a requirement, but it lets the controller do less work than when moving all the units at once.
3. Reboot `THIS_CONTROLLER` during a slow time (when controllers are running at more than 50% idle). The patch takes effect once the controller is rebooted.
4. Repeat these steps for `OTHER_CONTROLLER` by moving all units to `THIS_CONTROLLER` and rebooting `OTHER_CONTROLLER` during a slow time.

## ACS Patch Memory

Any installed ACS Version 8.6 (or lower) patches should be removed after an ACS Version 8.7 installation since they are no longer applicable. This frees up HSG80 patch memory for future ACS patches.

To check or remove ACS patches, run the Code Load and Code Patch utility by typing the following command:

```
HSG80> RUN CLCP
```

## Multiple Storage System Types

The extended interoperability of the heterogeneous SAN allows you to mix several types of *StorageWorks* storage systems. *StorageWorks* recommends the following configuration rules when different storage products are shared in the same SAN:

- HSG80 ACS Version 8.7 and EVA VCS Version 2.0—Use ACS Solution Software Version 8.7 (includes SWCC Version 2.5) and VCS Version 2.0 compatible multi-bus software/drivers.
- HSG80 ACS Version 8.6 and EVA VCS Version 2.0—Use ACS Solution Software Version 8.6 (if SWCC Version 2.4 components are desired) and VCS Version 2.0 compatible multi-bus software/drivers.
- HSG80 ACS Version 8.6 and HSG80 ACS Version 8.7—Use ACS Solution Software Version 8.7 (includes SWCC Version 2.5).

**NOTE:** Any multiple storage system configuration that includes EVA VCS Version 2.0 requires multi-bus support. See "Secure Path Software", page 24, for compatible Secure Path versions. ACS Version 8.7 compatible Secure Path versions and HBA drivers are compatible with VCS Version 2.0.

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## New Features

This section briefly describes new features and changes that are supported by the Version 8.7 release of the Solution Software together with the array controller running ACS Version 8.7.

### ACS Feature Enhancements

The following major enhancements are included in the ACS Version 8.7 release:

- **Host Connection Table Locking**—Host table lock and unlock commands were added to control the connection table in NVRAM. When the table is locked, the host login request is rejected (unless the connection is already in the table), and the request is stored internally on a rejected hosts table.
- **Selective Management Presentation**—Selective Management Presentation extends the use of Selective Storage Presentation by providing control over which SAN Management Agent systems (if any) can perform management operations.
- **VENDOR\_ID Field**—ACS now provides a `VENDOR_ID` field at the bottom of the **Extended information** area, returned by the `SHOW THIS FULL` or `SHOW OTHER FULL` commands.
- **Linked WWIDs for Snap and Clone Units**—To better manage snap and clone unit creation, a linked WWID scheme was implemented. It keeps the WWIDs of these units constant each time they are created. The linked WWID scheme reduces the number of system data records needed to track unit WWIDs, and enhances the stability of administrative scripts used in unit creation.
- **SMART Error Drive Eject**—In prior versions of ACS, SMART error notifications received from a device were treated as soft (recovered) errors. The notification was passed to the host and operations continued. ACS now provides a CLI switch (SMART error eject state) that offers an alternative to this behavior.

With the new switch enabled, drives in a normalized and redundant set that report a SMART error are removed from that set. SMART errors reported by drives in a non-redundant or non-normal set continue to be treated as recovered errors. If the switch is disabled, all SMART errors are treated as recovered errors.

- **Error Threshold for Drives**—ACS now provides the ability to set limits for drive errors. Once the limit is reached, the questionable drive is removed from any redundant set it is a member of and put into the failed set. Errors counted are medium and recovered errors. Hardware errors are not included in this count since the drive fails immediately when a hardware error is encountered.

## CLI Command Updates

The following CLI commands and switches were added or enhanced in ACS Version 8.7:

### Host Connection Table Locking

```
SET controller CONNECTIONS_LOCKED
SET controller CONNECTIONS_UNLOCKED
ADD CONNECTIONS REJECTED_HOST
```

### Selective Management Presentation

```
SET DISABLE_MANAGERS
SET ENABLE_MANAGERS
```

### Linked WWIDs for Snap and Clone Units

```
ADD SNAPSHOT_UNITS USE_PARENT_WWID
```

### SMART Error Drive Eject

```
SET controller SMART_ERROR_EJECT
```

### Error Threshold for Drives

```
CLEAR_ERRORS DRIVE_ERRORS
SET DRIVE_ERROR_THRESHOLD
SHOW DRIVE_ERROR_THRESHOLD
```

See the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide* for complete syntax details.

## FC Switch Support Updates

The following updates and changes to supported FC Switch products are included in this Solution Software Version 8.7 release:

- Support for the 8/16 Port Fibre Channel Storage Switches (DS-DSGGA-AA [380591-B21] and DS-DSGGA-AB [380578-B21]) was discontinued because these switches are limited to four switch, two-hop maximum configurations.
- Firmware for all 1 Gbps SAN Switch products was upgraded to v2.6.0c.
- Added support for the following FC switches, many of which provide 2 Gbps switch support:

- SAN Switch 2/16 (16 Ports FC, 2 Gbps)
- SAN Switch 2/8-EL (8 Ports FC Entry Level, 2 Gbps)
- SAN Switch 2/16-EL (16 Ports FC Entry Level, 2 Gbps)
- SAN Switch 2/32 (32 Ports FC, 2 Gbps)
- SAN Core Switch 2/64 (32-64 Ports FC, 2 Gbps)
- SAN Director 64 (32-64 Ports FC, 1 Gbps)
- SAN Edge Switch 32 (32 Ports FC, 1 Gbps)
- SAN Edge Switch 16 (16 Ports FC, 1 Gbps)
- SAN Director 2/64 (32-64 Ports FC, 2 Gbps)
- SAN Edge Switch 2/32 (32 Ports FC, 2 Gbps)
- SAN Edge Switch 2/16 (16 Ports FC, 2 Gbps)

See the "Switch Support", page 20, for part numbers, firmware versions, and additional information.

**IMPORTANT:** *StorageWorks* recommends that you do not mix switch firmware versions in your SAN. The best practice is to uniformly upgrade all switches in the SAN.

## Solution Software Updates

The following improvements were made to your Solution Software:

- Solution Software Version 8.7 was qualified with ACS Version 8.7 and the components defined in these Release Notes.
- Upgraded HBA drivers for Windows NT and Windows 2000 to Version 4-4.81a9 and Version 5-4.81a9.
- Upgraded *StorageWorks* DS-KGPSA-CB HBA firmware to Version 3.82a1, BIOS Version 1.60a5.
- Added support for the *StorageWorks* 64-bit, 2 Gbps PCI FC HBA 3R-A3515-AA (245299-B21).
- Discontinued support for *StorageWorks* DS-KGPSA-BC PCI FC HBA.
- Added support for Windows 2000 Service Pack 2 and Service Pack 3.
- Added support for Secure Path Version 4.0 software.
- Windows 2000 Datacenter support is not included in this release because of lengthier certification requirements for Datacenter solutions.

Upon certification, Solution Software Version 8.7 for Windows 2000 Datacenter and its associated documentation is made available.

- The Solution Software installation program can now perform silent installations, which automates the installation process. See the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide* for more information.
- The Fibre Channel Software Setup included with this Solution Software Kit automatically corrects the ResetTPRLO parameter by setting it to a value of 1. See "ResetTPRLO Parameter in Windows Environments", page 50, for detailed information.
- The Solution Software now provides a Component Identifier program that gives the user a quick method for identifying storage components. See the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide* for more information.

## Documentation Updates

The following documentation changes were made in order to consolidate and reduce the number of documents associated with Version 8.7 Solution Software:

- New document *Enterprise/Modular Storage RAID Array Fibre Channel Arbitrated Loop Configurations Application Note* consolidates prior release, host-specific FC-AL application notes into a single, multivendor document for FC-AL configurations. This document supersedes the following application notes:
  - *Enterprise/Modular Storage RAID Array FC-AL HA Configurations for Windows NT/Windows 2000 - Intel Application Note*, Part Number: AA-RHOSE-TE
  - *Enterprise/Modular Storage RAID Array FC-AL Configurations for Windows NT/Windows 2000 Application Note*, Part Number: AA-RHORC-TE
- The following documents were incorporated into the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*:
  - *Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000 Installation Guide*
  - *Installing the Integration Patch for Compaq Insight Manager and ACS Version 8.6 or Later*
- The following Datacenter documents are not included because of lengthier certification requirements for Datacenter solutions.

— *HSG80 ACS Solution Software Version 8.7 for Windows 2000 Datacenter Installation and Configuration Guide*

— *HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7 for Windows 2000 Datacenter Release Notes*

Upon certification, Solution Software Version 8.7 for Windows 2000 Datacenter and its associated documentation will be made available.

— The section "Rolling Upgrades", page 26 was replaced. This section supersedes both the rolling upgrade and ACS upgrade procedures found in the *HSG80 ACS Solution Software Version 8.7 for Windows 2000 Datacenter Installation and Configuration Guide*.

The following changes were made to the general content of these Release Notes since they were last published:

- A new section "Abbreviations and Acronyms", page 4 was added to define abbreviations and acronyms used in these Release Notes.
- A new section "Patching ACS", page 7 was added to clarify the process used to patch ACS.
- A new section "Multiple Storage System Types", page 8 was added to address basic configuration rules used in mixing different *StorageWorks* products in the same SAN.
- New "SCSI-2 to SCSI-3 Migration", page 42 information was added to assist customers who wish to extend the interoperability of their SAN.
- The section "Layered Software Applications", page 25, was updated.
- The section "Disk Device Support", page 17, was updated.
- The "Document Catalog" section and procedures were removed because electronic copy for Solution Software documentation is available exclusively from the *StorageWorks* website.
- The "HSG80 Device Removal and Replacement" section and procedures were moved from these Release Notes to the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*.
- The "Solution Software Upgrade Procedures" section was moved from these Release Notes to the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*.
- The "Upgrading DS-KGPSA-BC Firmware" section and procedures were removed since this particular HBA is no longer supported in this release.

## Modular Array Solutions

The modular solution consists of the array controller (single or dual configurations) installed in a Model 2200 Ultra SCSI controller enclosure, and the drives installed in either a Model 4314 disk enclosure or a Model 4354 disk enclosure. The modular solutions must be mounted in RETMA cabinets. The *StorageWorks* RETMA cabinets are available in heights of 42U, 41U, 36U, and 22U. The Model 2200 Ultra SCSI controller enclosure is 4U. The Model 4314 disk enclosure and the Model 4354 disk enclosure are both 3U. This combination allows for several cabinet configurations.

**NOTE:** If you wish to use a controller from an existing RA8000 or ESA12000 storage system, the Cache Bulkhead upgrade for installation of the controller in the Model 2200 is required.

- For information about how to install the array controller in a Model 2200 Ultra SCSI controller enclosure, see the *Model 2100 and 2200 Ultra SCSI Controller Enclosures User Guide*.
- For information about how to install drives in either a Model 4314 disk enclosure or a Model 4354 disk enclosure, see the *Model 4300 Family Ultra3 LVD Disk Enclosures User Guide*.
- For information about modular solution configurations and restrictions, see the *Modular Array Cabinet Restrictions* user document.

## Disk Enclosures

The array controller firmware addresses up to 14 disks per SCSI bus. The maximum number of disks supported by an array controller (single or cooperating pair) is 84. The disk enclosures can be configured for single bus or for dual bus operation.

**NOTE:** The 43xx disk enclosures do not allow daisy chaining between shelves.

**Table 1: Single Bus Mode Enclosure Options**

Disk Enclosures Options/Single Bus Mode	Part Number
Model 4310R—Rack-mountable 10-drive enclosure with single bus, single power supply	174631-B21
Model 4314R—Rack-mountable 14-drive enclosure with single bus, single power supply	190209-001
Model 4314T—Tower mount 14-drive enclosure with single bus, single power supply, LCD monitor	190210-001
Second power supply for 4314 (adds a redundant power supply to the 4314)	119826-B21

**Table 1: Single Bus Mode Enclosure Options (Continued)**

Single bus I/O module for existing 4314	190212-B21
Dual bus I/O module for existing 4314 (changes the 4314 from a single bus to a dual bus)	119829-B21

**Table 2: Dual Bus Mode Enclosure Options**

Disk Enclosures Options/Dual Bus Mode	Part Number
Model 4350R—Rack-mountable 10-drive enclosure with dual bus, dual power supply	174630-B21
Model 4354R—Rack-mountable 14-drive enclosure with dual bus, dual power supply	190211-001

**NOTE:** Use a single bus I/O module to transform a Model 4354 disk enclosure to single bus.

## SCSI Cables

SCSI cables must be ordered separately to connect the 43xx shelves to the Model 2200 enclosure. The following SCSI cables are supported.

**Table 3: SCSI Cable Options**

SCSI Cable Options	Part Number
1-meter SCSI cable	168256-B21
2-meter SCSI cable	168258-B21
3-meter SCSI cable	189505-B21
5-meter SCSI cable	400983-005
10-meter SCSI cable	400983-010

## Ordering Modular Storage Systems

The Modular Array/Enterprise Modular Array storage systems can be ordered in one of the following three ways:

- Predefined models are available that provide a set number of controller shelves and drive shelves in a Modular Storage Cabinet:
  - MA8000: One Model 2200 controller enclosure and three dual bus Model 4354 disk enclosures in a 22U Modular Storage Cabinet
  - EMA12000 D14: Three Model 2200 controller enclosures and nine dual bus Model 4354 disk enclosures in a 42U Modular Storage Cabinet

- EMA12000 S14: One Model 2200 controller enclosure and six single bus Model 4314 disk enclosures in a 36U Modular Storage Cabinet
- EMA12000 Blue: One Model 2200 controller enclosure and three dual bus Model 4354 disk enclosures in a 41U Modular Storage Cabinet
- EMA16000 S14: Two Model 2200 controller enclosures and twelve single bus 4314 disk enclosures in a 41U Modular Storage Cabinet
- EMA16000 D14: Four Model 2200 controller enclosures with twelve dual bus 4354 disk enclosures in a 41U Modular Storage Cabinet

**NOTE:** The predefined models require the following options: Controllers, ECBs, Controller firmware and drives.

- Configure-to-Order. Allows you to specify the number of controller shelves and drive shelves desired in a Modular Storage Cabinet.
- Assembly onsite. Allows you to order the components separately and install them in any supported RETMA rack or cabinet.

## Hardware and Software Support

This section lists the hardware, devices, and operating system versions that are compatible with this Fibre Channel Solution Software Kit.

### Array Hardware Support

The following Enterprise/Modular Storage RAID Array hardware products are supported:

- DS-SW600-AA—600mm 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 single-ended I/O modules; metric mounting hardware

- DS-BA370-AA—RAID rack mount 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, FRU
- DS-BA35X-HH—180-watt, 100- to 200-V power supply; 240-V, AC factor-corrected power supply; blue color carrier
- DS-BA35X-MK—High-powered blower for the SW370 and BA370
- 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
- HS35X-BA—Single external cache battery in an SBB
- HS35X-BD—Dual external cache battery in an SBB
- DS-HSDIM-AB—64 MB cache upgrade for HSX80
- DS-HSDIM-AC—256 MB cache upgrade for HSX80

## Disk Device Support

This Fibre Channel Solution Software Kit supports the disk devices listed in Table 4 at the indicated hardware and microcode levels.

**NOTE:** Full 14-slot drive support per channel is available on MA/EMA Series arrays only.

**IMPORTANT:** All new Universal SCSI disk drives sold by *StorageWorks* come with an 8 MB EISA style partition at the start of the disk. This includes new *StorageWorks* SBB drives, which contain the basic universal disk drive brick internally. The EISA partition, when left on the media, is presented to a host at the storage unit level by the HSG80 storage system. Some hosts and applications may misinterpret this information. In order to resolve this potential issue, approximately 8 MB needs to be erased from the beginning of the disk. See the "Windows NT Specific Notes", page 48, for details.

**Table 4: Supported Disk Drives**

Option Part Number	Device/ Model	Capacity (GB)	Speed (RPM)	Minimum Microcode Version	Minimum Hardware Version
176494-B21	BC072638A2	72.8	10,000	BDC7	A01
232432-B22	BD07264546			B209	
	BD0726459C			B008	
	BD0726536C			3B02	
232916-B22	BF03664664	36.4	15,000	3B06	A01
	BF03665223			B003	
176496-B22	BD0366349C	36.4	10,000	3B02	A01
	BD036635C5			B020	A05
	BD03663622			BDC4	A01
	BD03664545			B209	
	BD03664553			3B04	
	BD0366459B			B005	
	BD0366536B			3B02	
127968-001	DS-RZ1FC-VW	36.4	10,000	3B02/2B07/ B020/BDC4	A01
147533-001	DS-RZ1FB-VW	36.4	7,200	N1H1/0372/ 1614/3B05	A01
188122-B22	BF01863644	18.2	15,000	3B01	A01
	BF01864663			3B06	
	BF01865222			B003	
128418-B22	BD018122C9	18.2	10,000	B016	A01

**Table 4: Supported Disk Drives (Continued)**

Option Part Number	Device/ Model	Capacity (GB)	Speed (RPM)	Minimum Microcode Version	Minimum Hardware Version
142673-B22	BD01862A67	18.2	10,000	B007	A01
	BD01862376			BCJE	
	BD018635C4			B020	
	BD01864544			B209	
	BD01864552			3B04	
	BD0186459A			B008	
	BD0186349B			3B07	
380589-B21	DS-RZ1ED-VW	18.2	10,000	0306/1614/ 3B07/B020/ BDC4	A01
388144-B22	BB01811C9C	18.2	7,200	3B05	A01
147598-001	DS-RZ1EA-VW	18.2	7,200	N1H1/0306/ 3B05	A01
380694-B21	DS-RZ1EF-VW	18.2	7,200	0372/N1H1	A01
188120-B22	BF00963643	9.1	15,000	3B01	A01
328939-B22	BD009122BA	9.1	10,000	3B07	A01
142671-B22	BD00962373	9.1	10,000	BCJE	A01
	BD00962A66			B007	
	BD009635C3			B020	
380588-B21	DS-RZ1DD-VW	9.1	10,000	0306/1614/ 3B07/B020	A01
123065-B22	BB00911CA0	9.1	7,200	3B05	A01
147597-001	DS-RZ1DA-VW	9.1	7,200	N1H1/3B05/ B020	A01
380595-B21	DS-RZ1DF-VW	9.1	7,200	0372/N1H1/ 1614	A01

**Table 4: Supported Disk Drives (Continued)**

Option Part Number	Device/ Model	Capacity (GB)	Speed (RPM)	Minimum Microcode Version	Minimum Hardware Version
380693-B21	DS-RZ1DB-VW	9.1	7,200	LYJ0/0307	A01
N/A	DS-RZ1CD-VW	4.3	10,000	0306	A01
N/A	DS-RZ1CB-VW	4.3	7,200	LYJ0/0656	A01
380691-B21	DS-RZ1CF-VW	4.3	7,200	0372/N1H1/ 1614	A01

## Switch Support

This Fibre Channel Solution Software Kit supports the Fibre Channel switches and firmware versions listed in Table 5.

**IMPORTANT:** *StorageWorks* recommends that you do not mix switch firmware versions in your SAN. It is considered best practice to uniformly upgrade all switches in the SAN.

**Table 5: Fibre Channel Switch Support**

Description	Part Number	Firmware Version
SAN Switch 8 (8 Ports FC, 1 Gbps)	158222-B21 DS-DSGGB-AA	2.6.0c
SAN Switch 16 (16 Ports FC, 1 Gbps)	158223-B21 DS-DSGGB-AB	2.6.0c
SAN Switch 8-EL (8 Ports FC Entry Level, 1 Gbps)	176219-B21 DS-DSGGC-AA	2.6.0c
SAN Switch 16-EL (16 Ports FC Entry Level, 1 Gbps)	212776-B21 DS-DSGGC-AB	2.6.0c
SAN Switch Integrated (32 Ports FC, 1 Gbps)	230616-B21 DS-DSGGS-AA	2.6.0c
SAN Switch Integrated 64 (64 Ports FC, 1 Gbps)	230617-B21 DS-DSGGS-AB	2.6.0c
SAN Switch 2/16 (16 Ports FC, 2 Gbps)	240602-B21 DS-DSGGD-AA	3.02f
SAN Switch 2/8-EL (8 Ports FC Entry Level, 2 Gbps)	258707-B21 DS-DSGGD-AC	3.02f

**Table 5: Fibre Channel Switch Support (Continued)**

SAN Switch 2/16-EL (16 Ports FC Entry Level, 2 Gbps)	283056-B21 DS-DSGGD-AD	3.02f
SAN Switch 2/32 (16 Ports FC, 2 Gbps)	230616-B21 DS-DSGGS-AA	4.0.2b
SAN Core Switch 2/64 (32-64s Ports FC, 2 Gbps)	254508-B21 DS-DSGGE-AB	4.0.0b
SAN Director 64 Switch (32-64 Ports FC, 1 Gbps)	254512-B21 DS-DMGGD-AA	02.00.00
SAN Edge Switch 32 (32 Ports FC, 1 Gbps)	2T-M3032-AA (See Note)	02.00.00
SAN Edge Switch 16 (16 Ports FC, 1 Gbps)	2T-M3016-AA (See Note)	02.00.00
SAN Director 2/64 Switch (32-64 Ports FC, 2 Gbps)	286809-B21 DS-DMGGD-BA	02.00.00
SAN Edge Switch 2/32 (32 Ports FC, 2 Gbps)	286810-B21 DS-DMGGE-BC	02.00.00
SAN Edge Switch 2/16 (16 Ports FC, 2 Gbps)	286811-B21 DS-DMGGE-BB	02.00.00

**NOTE:** The listed 1 Gbps SAN Edge Switches are CSS (Custom Services and Solutions) orderable only. Please contact your *StorageWorks* sales representative at 1-800-STORWORK for further information on these CSS components.

For the latest versions of switch firmware, please visit the *StorageWorks* website:

<http://h18000.www1.hp.com/products/storageworks/softwaredrivers/fcsanswitch816/index.html>

## System Components

This Fibre Channel Solution Software Kit supports the system components and operating system versions listed in Table 6.

**Table 6: Minimum System Requirements**

Component	Requirement
Controller Compatibility	<p><i>StorageWorks</i> HSG80 Array Controller, ACS Version 8.7F (or a subsequently patched version of ACS Version 8.7F)</p> <p><b>NOTE:</b> This Solution Software is backward compatible with ACS Version 8.6, but only for the purpose of performing upgrades to the ACS firmware. <i>StorageWorks</i> does not recommend mixing ACS versions in the same SAN.</p>

**Table 6: Minimum System Requirements (Continued)**

Platform	Intel and ProLiant X86 Servers
Operating System	Microsoft Windows NT 4.0, Service Pack 6A Microsoft Windows 2000, Service Pack 2 and Service Pack 3 Microsoft Cluster Server
Topology	Fibre Channel Switched (FC-SW) Fibre Channel Arbitrated Loop (FC-AL)
SCSI Protocol	SCSI-2 SCSI-3 (recommended)
Failover Mode	Transparent Multi-Bus (requires Secure Path software)
Host Mode	WINNT
Disk Space	5 MB
Adapter Compatibility	<i>StorageWorks</i> 64-bit, 1 Gbps PCI FC HBA DS-KGPSA-CB (176479-B21), HBA driver V4-4.81a9 (NT) or V5-4.81a9 (W2K), Firmware Version 3.82a1/BIOS Version 1.60a5
	<i>StorageWorks</i> 64-bit, 2 Gbps PCI FC HBA 3R-A3515-AA (245299-B21), HBA driver V4-4.81a9 (NT) or V5-4.81a9 (W2K), Firmware Version 3.82a1/BIOS Version 1.60a5
	<i>StorageWorks</i> 64-bit, 2 Gbps PCI FC HBA 3R-A4214-AA (308540-B21) HBA driver V4.82a9, Firmware Version 3.82a1/BIOS Version 1.60a5 <b>NOTE:</b> HBA driver V4.82a9 is required with this HBA but is not included as part of this Solution Kit. This common driver can be used on all HBAs and storage systems and is downloadable from: <a href="http://h18007.www1.hp.com/storage/diskarrays-support.html">http://h18007.www1.hp.com/storage/diskarrays-support.html</a>

**Notes**

- HsxDisk.sys and HszDisk.sys are required drivers for array controller configurations. The Solution Software CD-ROM that came with your kit includes the following versions of these drivers:
  - HszDisk.sys Version 4.4.0.9 for Windows NT 4.0
  - HsxDisk.sys Version 5.4.21 for Windows 2000 (used only in transparent failover configurations)
- HS\_Service records system errors used in conjunction with remote diagnostics services provided through Proactive Services software.

- If you see a constantly blinking light on your Fibre Channel Switch, the topology setting may be set to arbitrated loop mode on your server. To correct this, remove the existing installation of the Fibre Channel Software and reinstall the desired setup.

## StorageWorks Command Console

SWCC Version 2.5 is included in this release. Version 2.5 is used to identify the SWCC suite of components.

SWCC provides a graphical user interface that can be used to configure and monitor your storage system. Use of SWCC is highly recommended, but not required. The SWCC Agent is installed as part of the Solution Software Kit.

For more information on SWCC installation, see the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*. For more information on SWCC Client operation, see the *Command Console Version 2.5 User Guide* and the *Command Console Version 2.5 Release Notes*.

## SWCC Scalability

- The SWCC Client can monitor up to 128 host systems, each with up to 32 storage systems, for a maximum of 4096 concurrent storage connections and a total of 2.65 PB of storage.
- One Agent can support up to 32 Clients.

## Multiple Agents

This Solution Software Kit contains an SWCC Agent that supports controller locking during CLI command execution, which allows support for multiple Agents. This locking feature is required in order to use the Management Appliance in addition to the host-based SWCC Agent. However, it is not recommended or required to use multiple Agents for any other purpose.

**NOTE:** SWCC Agent Version 2.3.2, Build 77 or higher supports the locking feature. This release of Solution Software exceeds this requirement.

## Multiple Management Sessions

Though multiple clients can be used to monitor your storage system, *StorageWorks* recommends that only one instance of storage system management be active at a time. The client does allow for multiple management sessions, but there are no ownership rights given to any particular session. Without a highly coordinated effort, multiple

management sessions can undermine the integrity of system maintenance. This same principle applies to multiple management sessions initiated through the Management Appliance as well.

## SWCC Client Installation

The SWCC client software is installed on your host system from the *StorageWorks* Solution Software CD-ROM.

1. Insert the Solution Software CD-ROM into the host system. A menu appears on your screen.
2. If the program does not start automatically after inserting the CD-ROM, go to the CD-ROM drive directory and run the `launch.exe` file.
3. The installation program provides one primary option: **Solution Software V8.7 for Windows NT/2000**.
  - a. If you are just installing SWCC, skip the driver upgrade screen.
  - b. Select **SWCC** to install.
  - c. Select **HSG80ACS85 Controller for ACS85 or newer** and complete the installation as prompted.

## Secure Path Software

Secure Path is a high availability, multi-bus software application that supports FC-AL and FC-SW connectivity. This Fibre Channel Solution Software Kit supports the Secure Path software shown in Table 7.

**Table 7: Secure Path Compatibility**

Operating System	Supported Product Version
Windows NT 4.0 Service Pack 6A	Version 2.2.2 Version 3.1A Service Pack 1
Windows 2000 Service Pack 2 and 3	Version 3.1A Service Pack 1 Version 4.0 or higher

For more information on Secure Path software, see the product documentation that comes with the product, or visit the *StorageWorks* website:

<http://h18000.www1.hp.com/products/sanworks/secure-path/index.html>

## Layered Software Applications

Compatibility with *StorageWorks* layered software applications is defined in Table 8.

**Table 8: Layered Application Compatibility**

Application	Version	Supported ACS Variants
Data Replication Manager (DRM)	Version 8.7P	Version 8.7P
Enterprise Volume Manager (EVM)	Version 2.0D	Version 8.7F/S/P
Storage Resource Manager (SRM)	Version 4.0B	Version 8.7F
Command Scriptor	Version 1.0	Version 8.7F/S/P
Virtual Replicator	Version 3.0A	Version 8.7F
Network View	Version 2.0B	Version 8.7F/G/S/P
Management Appliance	Version 1.0C	Version 8.7F/S/P
Storage Allocation Reporter	Version 1.0D	Version 8.7F

In cases where ACS functional builds other than Version 8.7F are required, ensure that all necessary components for those configurations are at the proper level prior to upgrading your ACS code.

If you run EVM with ACS Version 8.7F, you can use scripting with CLONEs. If you want to create SNAPSHOTs with EVM, you must run ACS Version 8.7S or 8.7P.

For more information on these and other Storage Management software, see the product documentation that comes with the product, or visit the following *StorageWorks* website:

<http://h18006.www1.hp.com/storage/software.html>

## ACS Feature Support

The following sections provide details for specific ACS features.

### Maximum Host Connections

The maximum number of host connections is 96 for the table of known connections. A connection is unique to the node WWN, port WWN, and controller port. This table is maintained in the NVRAM of the controller. If the table contains 96 entries, new

connections cannot be added unless unused entries are deleted. Otherwise, a host attempting FC login is rejected from becoming a connection into the connection table, but not necessarily from the fabric.

## Rolling Upgrades

This section supersedes both the rolling upgrade and ACS upgrade procedures found in the *HSG80 ACS Solution Software Version 8.7 for Windows NT and Windows 2000 Installation and Configuration Guide*.

## Operating Constraints

When performing rolling upgrades on the HSG80 array controller, the following rules and guidelines apply:

- Rolling upgrades must occur in succession. For example, you must upgrade from V8.6 to V8.7-1.
- If you are performing a rolling upgrade, ensure that the variant for the existing ACS version being upgraded is the same as that of the next version to be upgraded. For example, if you want to upgrade ACS V8.6P-10, the ACS version to be upgraded must be the P variant of ACS V8.7-*x*.
- You must use a dual-redundant configuration to perform rolling upgrades.
- If you are upgrading the P variant of an applicable ACS version, use the procedures provided in the *hp StorageWorks HSG80 Array Controller Version 8.7 Maintenance and Service Guide*. This guide provides specific instructions on upgrading ACS on the initiator and target site.
- You must upgrade the Solution Software Kit before performing the rolling upgrade procedure in the “Upgrading ACS” section.



**CAUTION:** HP *StorageWorks* Secure Path V3.1A for Windows, Service Pack (SP) 3 or Secure Path V4.0-1 for Windows must be used before performing the rolling upgrade procedure in the “Upgrading ACS” section. If you don’t, data loss may occur.

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## Solution Software Kit Upgrade Procedures

Use the procedures in this and the following sections to upgrade your Solution Software Kit:

1. Perform backups of data prior to upgrade.
2. Verify operating system versions, and upgrade operating systems to supported versions and patch levels.
3. Upgrade switch firmware.
4. Upgrade the Solution Software Kit.
5. Quiesce all I/O and unmount all file systems for the server being updated before proceeding.
6. If you are installing an operating system that uses Secure Path, upgrade Secure Path to the latest version at this time.
7. Upgrade the ACS software.

**NOTE:** Solely for the purpose of performing upgrades to ACS, the Solution Software Kit supports ACS V8.6. HP recommends that you avoid mixing ACS versions in the same Storage Area Network (SAN).

The extended interoperability of the heterogeneous SAN allows you to mix several types of *StorageWorks* storage systems. HP recommends that you adhere to the following configuration rules when different storage products are shared in the same SAN:

- HSG80 ACS Version 8.6 and EVA VCS Version 2.0—Use ACS Solution Software Version 8.6 (if SWCC Version 2.4 components are desired) and VCS Version 2.0-compatible multi-bus software and drivers.
- HSG80 ACS Version 8.7 and EVA VCS Version 2.0—Use ACS Solution Software Version 8.7 (includes SWCC Version 2.5) and VCS Version 2.0-compatible multi-bus software/drivers.
- HSG80 ACS Version 8.6 and HSG80 ACS Version 8.7—Use ACS Solution Software Version 8.7 (includes SWCC Version 2.5).

**NOTE:** Any multi-bus storage system configuration that includes EVA VCS Version 2.0 requires multi-bus support. See Table 7 for compatible Secure Path versions. ACS Version 8.7-compatible Secure Path versions and HBA drivers are compatible with VCS 2.0.

See the following documentation for additional information:

- *hp StorageWorks HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*
- *Solution Software Release Notes—HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7 for Windows NT and Windows 2000*
- The “Upgrading ACS” section for the additional information on upgrades.

**NOTE:** If you are upgrading ACS, complete the upgrade after all Windows server updates are finished. Be sure to back up data before updating servers.

These procedures are applicable to only Secure Path V3.1A for Windows (SP 3) or Secure Path V4.0-1 for Windows. To obtain Secure Path V3.1A for Windows (SP 3), visit the HP website at <http://www.hp.com>. Follow the applicable storage-related links to the software download page. To obtain Secure Path V4.0-1, contact your HP technical support representative.

**NOTE:** For information on updating the Solution Software Kit using transparent failover procedures, see the *hp StorageWorks HSG80 ACS Solution Software Version 8.7 for Windows 2000 Installation and Configuration Guide*.

## New Solution Software Kit (V8.7) Installation Procedures

To install the Solution Software Kit for the first time, complete the following steps:

1. Ensure that the Fibre Channel Adapter (FCA) is not connected.
2. Insert the CD that shipped with the Solution Software Kit and click **Solution Software v8.7 for Windows NT/2000**.
  - a. Click **Perform FCA Driver Update** to install the HBA driver.
  - b. Click **Fibre Channel Software Setup**, and then choose one of the multi-bus Fibre Channel setups, based on your configuration.
  - c. Click **SWCC** (optional) to install SWCC components.

**NOTE:** Do *not* restart the server at this time if instructed to do so.

3. Using your Secure Path Software CD, install Secure Path V3.1A for Windows or Secure Path V4.0-1 for Windows in accordance with the instructions provided with that product. If you are using Secure Path V3.1A, apply the Secure Path V3.1A for Windows SP 3 update.
4. Shutdown the server.
5. Connect the FCA fibre cables to the switch(es).

6. Restart the server.

## Updating the Solution Software Kit with Secure Path on Windows NT/2000 Server

The following procedures demonstrate how to upgrade your Solution Software Kit, in conjunction with your Secure Path software, in a multi-bus failover environment.

### Updating an Existing Standalone Server

To update an existing standalone server by using Secure Path in multi-bus failover mode, complete the following steps:

1. Log in to an account with administrator privileges.
2. Stop all applications that access Secure Path storage.
3. Stop the SWCC STEAM agent in **Services**.
4. Click **Add/Remove Program** on the **Control Panel** and uninstall:
  - SWCC
  - *Large LUN* utility (if installed)

**NOTE:** Do *not* restart the server at this time if instructed to do so.

5. Insert your Secure Path Software CD and install Secure Path V3.1A for Windows or Secure Path V4.0 for Windows in accordance with the instructions provided with the product.
6. If you are using Secure Path V3.1A for Windows, apply the Secure Path V3.1A for Windows SP 3 update.
7. If you are using Secure Path V4.0 for Windows, apply the Secure Path V4.0-1 update.
8. Reboot the server.
9. Insert your Solution Software Kit CD and click **Solution Software v8.7 for Windows NT/2000**.
  - a. Click **Perform FCA Driver Update** to install the HBA driver.
  - b. Click **Fibre Channel Software Setup**, and then choose one of the multi-bus Fibre Channel setups, based on your configuration.

- c. Click **SWCC** (optional) to install SWCC components.

**NOTE:** The latest *Large LUN* utility must be installed if the storage system is used prior to upgrading ACS to Version 8.7-1 and a Large LUN configuration was previously employed.

10. Restart the server.

## Updating an Existing Cluster

To update an existing cluster by using Secure Path in multi-bus failover mode, complete the following steps:

1. Log in to the server with an account with administrator privileges.
2. Make note of your original configuration by using Cluster Administrator, and then move disk resources to the other cluster node. The node being updated should not have any disk resources online.
3. Set all cluster groups to **Prevent failback**, by using Cluster Manager, while the upgrade is taking place.

**NOTE:** The Cluster Service must continue to run on all nodes. Stopping the Cluster Service during this procedure could result in a Cluster Service failure and subsequent reinstallation.

4. Stop the SWCC STEAM agent in **Services**.
5. Select **Add/Remove Program** from the **Control Panel**, and uninstall:
  - SWCC
  - *Large LUN* utility (if installed)

**NOTE:** Do *not* restart the system at this time if instructed to do so.

6. Insert your Secure Path Software CD and install Secure Path V3.1A for Windows or Secure Path V4.0 for Windows in accordance with the instructions provided with that product.
7. If you are using Secure Path V3.1A for Windows, apply the Secure Path V3.1A for Windows SP 3 update.
8. If you are using Secure Path V4.0 for Windows, apply the Secure Path V4.0-1 update.
9. Insert your Solution Software Kit CD and click **Solution Software v8.7 for Windows NT/2000**.
  - a. Click **Perform FCA Driver Update** to install the HBA driver.

- b. Click **Fibre Channel Software Setup**, and then choose one of the multi-bus Fibre Channel setups, based on your configuration.
- c. Click **SWCC** (optional) to install SWCC components.

**NOTE:** The latest *Large LUN* utility must be installed if the storage system is used prior to upgrading ACS to Version 8.7-1 and a Large LUN configuration was previously employed.

10. Restart the updated cluster node.
11. Repeat step 2 through step 10 for the next cluster node.
12. After all cluster nodes are upgraded, restore all cluster groups to their original **Prevent failback** setting, and restore storage groups to their original configuration.

## Upgrading ACS

The following subsections provide background and some detailed information applicable to the HSG80 ACS V8.7-1 Update. HP recommends that you review the *hp StorageWorks HSG80 Array Controller V8.7 Maintenance and Service Guide* before attempting to use the rolling upgrade feature.

**NOTE:** The following rolling upgrade procedures for ACS V8.7-1 (variants F, G, and S) take precedence over rolling upgrade procedures documented for variants F, G, and S in the *hp StorageWorks HSG80 Array Controller V8.7 Maintenance and Service Guide*.

- Rolling Upgrades, page 26
- Solution Software Kit Upgrade Procedures, page 27



**CAUTION:** Failure to follow the recommendations and instructions for the rolling upgrade feature may result in data loss or system inoperability. See the “Operating Constraints” section for additional information.

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**CAUTION:** Before attempting the ACS upgrade procedure in the “Rolling Upgrades” section, verify that the subsystem is in a stable state. The HSG80 array controller **Reset** button should be flashing, and all adjacent LEDs should be off (no light). Failure to perform this verification may result in the loss of data or leave the HSG80 array controller in an unusable state.

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## About Rolling Upgrades

There are two ways to upgrade the ACS:

- Using the rolling upgrade procedure—Rolling upgrades take advantage of HSG80 array controller failover capabilities and allow you to upgrade the ACS while I/O activity continues.
- Using the shutdown upgrade procedure—The shutdown upgrade procedure requires you to halt I/O activity, shut down your controllers, and dismount your host systems and any associated units.

**NOTE:** Shutdown upgrade procedures are documented in the *hp StorageWorks HSG80 Array Controller V8.7 Maintenance and Service Guide* that shipped with the HSG80 array controller. You can download a copy of this guide from the HP website at <http://www.hp.com>. Follow the storage-related links to access technical documentation for the HSG80 array controllers, which are part of the HP *StorageWorks* Enterprise Modular Array and the HP *StorageWorks* Modular Array.

## Rolling Upgrade Procedure

The following rolling upgrade procedures for ACS V8.7-1 (variants F, G, and S) take precedence over rolling upgrade procedures documented for variants F, G, and S in the *hp StorageWorks HSG80 Array Controller V8.7 Maintenance and Service Guide*.

**NOTE:** For upgrade procedures for variant P of ACS, see the *hp StorageWorks HSG80 Array Controller V8.7 Maintenance and Service Guide*.

To perform a rolling upgrade, complete the following steps. For clarity, the terms *Controller A*, *Controller B*, *HSGA>*, and *HSGB>* are used to help you identify which controller is used.



**CAUTION:** Attempt a rolling upgrade *only* when each controller in a dual-redundant configuration is at least 50% idle. Otherwise, I/Os may be dropped during the upgrade.

---

1. Connect a PC or terminal to the maintenance port of Controller A, if not already done.

**NOTE:** If you have several servers with multiple LUNs in your storage area network (SAN), HP recommends that you verify that all units are online by using the `SHOW UNITS FULL CLI` command. Afterwards, use the Secure Path Manager to move all LUNs to the controller to be updated last. (LUNs may be removed by either controller.)

2. Verify the utilization percentage for *each* controller by entering the following RUN command:

```
HSGA> RUN VTDPY
```

The idle percentage for the HSG80 array controller is the first item displayed on the second line of the VTDPY display. If the HSG80 array controller is less than 50% idle and the screen display indicates activity, the processing load is reduced. See your operating system documentation for more information on reducing the processing load.

**NOTE:** The default VTDPY display refreshes every ten seconds.

To exit VTDPY, press <Ctrl> C, and then enter the following:

```
HSGA> exit
```

3. Repeat step 2 above on the OTHER\_CONTROLLER.
4. Disable the Command Console LUN (CCL) prior to upgrading if the HSG80 array controller is running in SCSI-2 mode and the CCL is enabled:
  - a. Type the following command to verify the current SCSI mode:

```
HSGA> SHOW THIS_CONTROLLER
```

The following text is only a portion of the resulting display. Arrows point to the pertinent status indication.

Controller:

```

HSG80                ZG80200258 Software V86S, Hardware E01
NODE_ID              = 5000-1FE1-0007-B780
ALLOCATION_CLASS      = 1
→ SCSI_VERSION       = SCSI-2
Configured for MULTIBUS_FAILOVER with ZG92810098
                    In dual-redundant configuration
Device Port SCSI address 7
Time: 14-MAR-2001    15:44:25
→ Command Console LUN is lun 0 (IDENTIFIER = 0)
```

- b. Record the status for restoration in step 23.
- c. Disable the CCL by using the following command:

```
HSGA> SET THIS_CONTROLLER NOCOMMAND_CONSOLE_LUN
```

5. Delete all SNAPSHOT units, if you are upgrading from ACS V8.6S-*x* to V8.7S-*x*.

- a. Identify all SNAPSHOT units by using the following command:

```
HSGA> SHOW UNITS FULL
```

- b. Record the configuration for each SNAPSHOT unit for restoration in step 22.
- c. Individually delete all SNAPSHOT units by using the following command:

```
HSGA> DELETE <snapshot-unit-name>
```

6. Verify that all appropriate units were deleted by using the following command:

```
HSGA> SHOW UNITS FULL
```

**NOTE:** If any other SNAPSHOT units exist, repeat step 5 until they are all deleted.

7. Identify and record the current cache flush timer value by using the following command:

```
HSGA> SHOW THIS_CONTROLLER
```

The following text is only a portion of the resulting display. An arrow points to the pertinent status indication:

Cache:

```
256 megabyte write cache, version 0022
```

```
Cache is GOOD
```

```
No unflushed data in cache
```



```
CACHE_FLUSH_TIMER=DEFAULT (10 seconds)
```

**NOTE:** The cache flush timer value is displayed in the caching parameters section. This parameter is modified during the procedure and must be restored in step 20.

8. For each unit, identify and record the unit write-back cache, read-ahead cache, read cache, and Preferred Path characteristics by using the following command:

```
HSGA> SHOW UNITS FULL
```

These characteristics are modified during the upgrade procedure and must be restored in step 21.

**NOTE:** The switch for Preferred Path is available only with a multi-bus configuration. It is not available in the transparent failover mode.

9. Set the cache flush timer to 1 second by using the following commands:

```
HSGA> SET THIS_CONTROLLER CACHE_FLUSH_TIMER=1
HSGA> SET OTHER_CONTROLLER CACHE_FLUSH_TIMER=1
```

10. Clear any unit with the PREFERRED\_PATH switch set, by using the following command as required for each unit:

```
HSGA> SET <unit-name> NOPREFERRED_PATH
```

11. Disable write-back, read-ahead, and read caching on all units by using the following command as required for each unit:

```
HSGA> SET <unit-name> NOWRITEBACK_CACHE NOREADAHEAD_CACHE
NOREAD_CACHE
```

**NOTE:** The xxx\_CACHE switches must be entered in the specified order, or the command is rejected.

12. Determine whether all data was flushed from the cache module by using the following command on both controllers:

```
HSGA> SHOW THIS_CONTROLLER
HSGA> SHOW OTHER_CONTROLLER
```

The following text is only a portion of the resulting display. An arrow points to the pertinent status indication:

```
Cache:
      256 megabyte write cache, version 0022
→      Cache is GOOD
      No unflushed data in cache
      CACHE_FLUSH_TIMER=1 SECOND
```

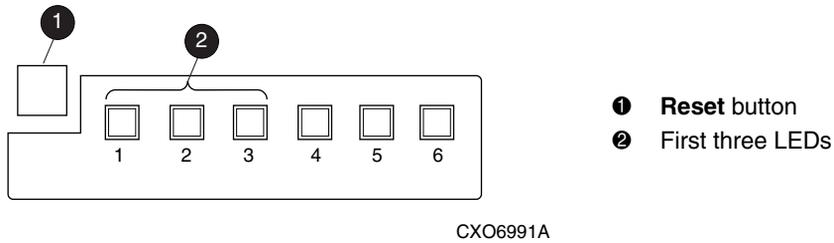
**NOTE:** Repeat step 12 on both controllers (THIS\_CONTROLLER and OTHER\_CONTROLLER) until no unwritten data remains in either cache module memory. If unwritten data is present after several minutes, verify that the WRITEBACK\_CACHE switch is disabled on all units by using the SHOW UNITS FULL command. For any units with the WRITEBACK\_CACHE switch enabled, return to step 11 and proceed.

13. Shut down Controller B by using the following command:

```
HSGA> SHUTDOWN OTHER_CONTROLLER
```

**NOTE:** Disregard any messages pertaining to misconfigured controllers or failover status.

**NOTE:** After Controller B shuts down, the **Reset** button ❶ and the first three LEDs ❷ light up (see Figure 1). Proceed only after the **Reset** button stops flashing and remains on.



**Figure 1: HSG80 array controller Reset button and LEDs**

14. Verify that all units failed over to Controller A by using the following command to show the status of each unit:

```
HSGA> SHOW UNITS FULL
```

The following text is only a portion of the resulting display. An arrow points to the pertinent status indication:

State:

```

→ ONLINE to this controller
   Not reserved
   NOPREFERRED_PATH

```

15. Run VTDPY to verify that all units are online and that there is no I/O activity by entering the following CLI command:

```
HSGA> RUN VTDPY
```

The idle percentage for the HSG80 array controller is the first item displayed on the second line of the VTDPY display. If the HSG80 array controller is less than 50% idle and the screen display indicates activity, the processing load should be reduced.

**NOTE:** You must wait a minimum of 60 seconds to allow for the failover and cache-flushing process to complete. The VTDPY display refreshes every 10 seconds.

To exit VTDPY, press <Ctrl> C, and then enter the following:

```
HSGA> exit
```

16. Upgrade the software on Controller B by performing the following steps:

**NOTE:** After step 16 is successfully performed, the previous ACS version cannot be restored to this subsystem.

- a. Remove the program card ESD cover from Controller B.
- b. Press and hold the HSG80 array controller **Reset** button while ejecting the old program card.
- c. Release the **Reset** button.
- d. Press and hold the **Reset** button while inserting the new program card (ACS V8.7-1).
- e. Release the **Reset** button. Controller B restarts.

**NOTE:** An HSG80 array controller restart can take as long as 60 seconds, indicated by the temporary cycling of the port LEDs and a flashing **Reset** button. Disregard messages about misconfigured controllers or failover status. When Controller B restarts, it automatically shuts down Controller A.

- f. Install the program card ESD cover on Controller B.

17. Verify that Controller B completed initialization:

- a. Connect the PC or terminal to the maintenance port of Controller B.
- b. Make sure that the CLI prompt for Controller B appears.
- c. Verify that Controller A is shut down. (The **Reset** button and the first three LEDs light up. See Figure 1.) Proceed only after the **Reset** button stops flashing and remains on.

18. Run VTDPY to verify that all Controller B units are online and that there is I/O activity by entering the following CLI command:

```
HSGB> RUN VTDPY
```

**NOTE:** You must wait a minimum of 60 seconds to allow for the failover and cache-flushing process to complete. The VTDPY display refreshes every 10 seconds.

To exit VTDPY, press <Ctrl> C, and then enter the following:

```
HSGB> exit
```

19. Install the new (V8.7-1) program card on Controller A by performing the following steps:

- a. Remove the program card ESD cover from Controller A.

- b. Press and hold the HSG80 array controller **Reset** button while ejecting the old program card.
- c. Release the **Reset** button.
- d. Press and hold the **Reset** button while inserting the new program card (ACS V8.7-1).
- e. Release the **Reset** button.

**NOTE:** An HSG80 array controller restart can take as long as 60 seconds, indicated by the temporary cycling of the port LEDs and a flashing **Reset** button. Disregard messages about misconfigured controllers or failover status.

- f. Install the program card ESD cover on Controller A.
- g. Connect the PC or terminal to the maintenance port of Controller A.

**NOTE:** Wait for the PC or terminal to display the CLI prompt before proceeding.

20. After the CLI prompt is displayed for Controller A, restore the `CACHE_FLUSH_TIMER` to the value recorded in step 9 by using the following commands:

```
HSGA> SET THIS_CONTROLLER CACHE_FLUSH_TIMER=<n>
HSGA> SET OTHER_CONTROLLER CACHE_FLUSH_TIMER=<n>
```

21. For each unit, restore the `PREFERRED_PATH`, `WRITEBACK_CACHE`, `READ_CACHE`, and `READAHEAD_CACHE` switch settings as recorded in step 10 and step 11 by using the following command:

```
HSGA> SET <unit-name> PREFERRED_PATH=THIS_CONTROLLER
WRITEBACK_CACHE READ_CACHE READAHEAD_CACHE
```

22. Restore all `SNAPSHOT` units removed in step 5.
23. If the `CCL` was disabled in step 4, enable it by using the following command:

```
HSGA> SET THIS_CONTROLLER COMMAND_CONSOLE_LUN
```

24. Disconnect the PC or terminal from the maintenance port of Controller A.

## Anomalies

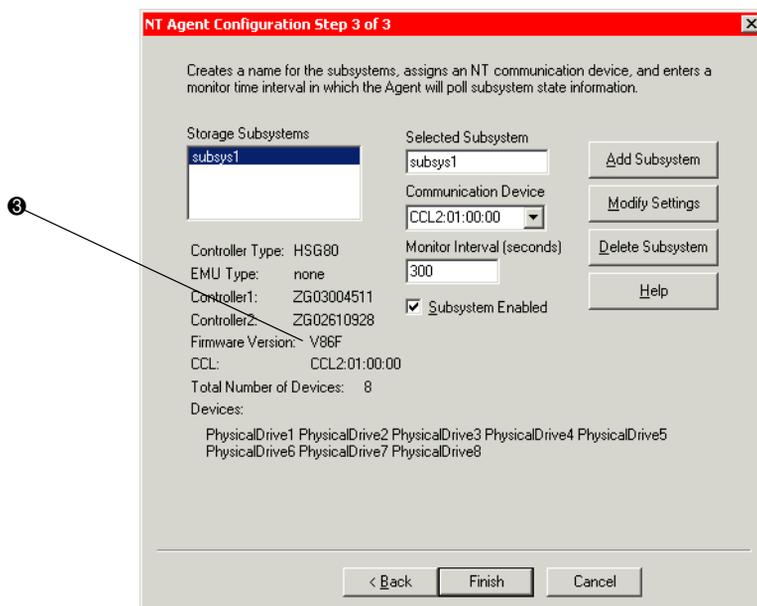
The following describes known anomalies of the HSG80 ACS 8.7-1 Update.

## SWCC Agent Configuration Utility and the Displayed ACS Firmware Version

After upgrading from ACS V8.6 (any variant or patch) to ACS V8.7-1, the SWCC Agent Configuration utility displays the previous ACS version before the upgrade (same variant) on the **NT Agent Configuration Step 3 of 3** screen.

**NOTE:** If you installed ACS 8.7 and then upgraded to ACS 8.7-1, SWCC displays the proper ACS version number on the **NT Configuration Step 3 of 3** dialog box.

Figure 2 shows where the ACS version displays ③ the previous version (before the upgrade) in SWCC after you upgrade from ACS V8.6 to V8.7-1.



**Figure 2: Location of the SWCC version number when upgrading from ACS V8.6 to V8.7-1**

To verify the correct version of ACS on the HSG80 array controller in this scenario, always use the `SHOW THIS_CONTROLLER` or `SHOW OTHER_CONTROLLER CLI` command from a CLI window or any CLI prompt.

## Disk Partitioning

ACS allows partitioning of disk drives or storage sets for improved device management. A partition appears to the operating system as a single virtual disk. Up to eight partitions may be created per storage set or disk drive. Disk partitioning is supported under all failover modes supported by your operating system.

## SNAPSHOT

ACS with SNAPSHOT capability provides a quick and efficient way to make a point-in-time copy of a storage container's data. SNAPSHOT freezes a map of the container's data, which can be separated and used for backup or testing and manipulation without having an impact on the original data. After the SNAPSHOT, the original data can continue to be updated and utilized while the SNAPSHOT copy remains unchanged.

When the need for the duplicate copy of data has ended, a new snap of a different storage container can be made and the process repeated. SNAPSHOT eliminates much of the overhead associated with mirroring and cloning since the SNAPSHOT is dissolved without having to re-merge the data.

SNAPSHOT is enabled when the following CLI command is entered:

```
HSG80> ADD SNAPSHOT_UNITS
```

See the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide* for additional syntax details.

The SNAPSHOT unit can be presented to the host. The SNAPSHOT unit remains until it is deleted.

**NOTE:** SNAPSHOT functionality requires either ACS Version 8.7P or ACS Version 8.7S.

**IMPORTANT:** ACS SNAPSHOT capability requires 512 MB of cache memory.

## Write History Logging

Write history logging, available to users of ACS Version 8.7P, uses a log unit to log a history of write commands and data from the host on the initiator side in either of the following situations:

- The target is inaccessible.
- The initiator site data needs to be synchronized during a planned failover.

**Mini-merge**—If the target becomes inaccessible, the writes that would have gone to the target are logged to the association set's assigned log unit. An inaccessible target in this context refers to both links or target controllers shutting down. When the target becomes accessible, a full copy is not necessary. Only those host writes that occurred while the links were down are reissued. This is referred to as a *mini-merge*. If a full copy was in progress at the time of the disconnect, write history logging is not initiated and the full copy is restarted when the target is accessible again.

**Fast-Failback**—During a planned failover, if write history logging was enabled at the target site, then when the failback is performed, the initiator site is synchronized through a process called *fast-failback*. The writes that would have gone to the initiator are logged to the association set's log unit. Only those writes that occurred since the failover are reissued. A full copy is not necessary.

## Dynamic Volume Expansion

Dynamic Volume Expansion creates a specialized volume called a concatset (short for concatenation set) from a storageset that was given a unit number. Another storageset can then be added to the concatset by using the `SET CONCATSET` command. See the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide* for syntax details.

## Dynamic Disks

The use of `SNAPSHOTs` and `SNAPCLONES` in Compaq SANs is not supported in a Windows 2000 environment if the `SNAPSHOT` or `SNAPCLONE` is presented to the same Windows 2000 host as the LUN from which the `SNAPSHOT` or `SNAPCLONE` was created. `SNAPSHOTs` and `SNAPCLONES` are features of the HSG80 and HSV110 controller based Compaq Storage systems. All Dynamic disks on a system have information in their metadata about the other dynamic disks that exist on the system. When Windows is presented with 2 dynamic disks that have the same information on them, it does not have code to resolve the conflict.

## Configuration Rules

The following list defines maximum configuration rules for the controller:

- 128 visible LUNs/200 assignable unit numbers
  - In SCSI-2 mode, the CCL is disabled, resulting in 128 visible LUNs.
  - In SCSI-3 mode, the CCL is enabled, resulting in 127 visible LUNs and one CCL.

- 1.024 TB storageset size
- 96 host connections
- 84 physical devices
- 20 RAID 3/5 storagesets
- 30 RAID 3/5 and RAID 1 storagesets (see Note)
- 45 RAID 3/5, RAID 1, and RAID 0 storagesets (see Note)

**NOTE:** For the previous two storageset configurations, this is a combined maximum, limited to no more than 20 RAID 3/5 storagesets.

- 8 partitions of a storageset or individual disk
- 6 physical devices per RAID 1 storageset (mirrorset)
- 14 physical devices per RAID 3/5 storageset (RAIDset)
- 24 physical devices per RAID 0 storageset (stripeset)
- 45 physical devices per RAID 0+1 storageset (striped mirrorset)

## SCSI-2 to SCSI-3 Migration

In order to extend interoperability within the heterogeneous SAN, *StorageWorks* highly recommends that customers begin migrating from SCSI-2 to SCSI-3 protocols. Moving to SCSI-3 allows greater diversity in the operating systems and storage products (including EVA) that comprise a SAN.

All migrations from SCSI-2 to SCSI-3 should be planned during scheduled downtime. SCSI migrations require a controller restart and most likely a server restart. Data contained on CCL units needs to be moved to new units once SCSI migration is complete.



**CAUTION:** Before attempting a SCSI-2 to SCSI-3 migration, it is extremely important that all data be backed up and that units be available for remapping CCL data. In addition, ensure that all redundant storagesets are in normal (non-reduced) mode.

---

When migrating from SCSI-2 to SCSI-3, the controller checks for controller unit D0 and does not change modes until D0 (at all presented offsets) is deleted. One or more LUNs are lost after the mode change. If you are planning to move from SCSI-2 to

SCSI-3, back up your data first. The data in LUN 0 (and any other offsets that map to LUN 0) that was used in SCSI-2 requires that the data be moved to a different LUN. It may be necessary to retrieve this data from a backup.

**IMPORTANT:** If multi-bus failover configurations or server clustering are employed in the environment, there may be additional considerations regarding CCL usage during SCSI migration procedures. Please see your multi-bus failover or server clustering documentation prior to implementation.

In addition, there may be OS-based limitations on SCSI-3 usage to consider, particularly in down-level versions of your OS. Please review your OS documentation prior to migration.

For more information, see the “What is the Command Console LUN?” and “Assigning Unit Numbers Depending on SCSI\_VERSION” sections of Chapter 1 in the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*.

## Operating Constraints

This section describes the operating constraints for ACS Version 8.7. An operating constraint is a limitation placed on the operation of the controller. Other constraints on host adapters or other system components may also apply. Keep these constraints in mind to avoid problems and to help achieve the maximum performance from your controller. See the documentation that came with your host server for more details.

### External Cache Battery

*StorageWorks* recommends that you replace the External Cache Battery (ECB) every two years to prevent battery failure.

If you are shutting down your controller for longer than one day, complete the additional steps in “Shutting Down the Subsystem” in the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*. This prevents the ECB from discharging during planned power outages.

### Dual External Cache Battery Failures

The array controller cache policy provides for proper handling of a single ECB failure as described in the *HSG80 Array Controller ACS Version 8.7 Troubleshooting Reference Guide*. For dual ECB failures, it states that no failover occurs. For this release, if a dual ECB failure is detected, both controllers are restarted.

## SAN Boot Procedures

Bootting from the SAN is supported for Windows NT or Windows 2000. SAN boot procedures are available on the *StorageWorks* website.

<http://h18000.www1.hp.com/products/storageworks/san/documentation.html>

## File System Limitations

Table 9 describes known limitations that certain file systems have regarding storage unit size.

**Table 9: File System Storage Unit Limitations**

Disk Size	Storageset Configuration	Operating and File System
4 GB	Any	Windows NT4.0 /Windows 2000 FAT File System
16 TB	Any	Windows NT 4.0/Windows 2000 NTFS File System

## PVA Switch Setting

After installing the EMU in each cabinet, ensure that the SCSI ID number on the PVA is set according to Table 10 (BA370 enclosures only).

**Table 10: SCSI ID Number on the PVA**

Cabinet	PVA SCSI ID Setting
Master enclosure	0
First expansion enclosure	2
Second expansion enclosure	3

## Using FRUTIL to Insert a New Controller

When using FRUTIL to insert a new controller in a dual-redundant controller configuration, you see a new set of instructions after the new controller was inserted:

If the other controller did not restart, follow these steps:

1. Press and hold the **Reset** button on the other controller.
2. Remove and re-insert the program card for the other controller.
3. Release the **Reset** button.

**NOTE:** Whenever you are running FRUTIL you must quiesce all I/O.

## FRUTIL Limitation

This limitation applies to users of ACS Version 8.7P with DRM only.

FRUTIL cannot be run in remote copy set environments on the target side specifically when I/O is in progress.

If the host load was stopped, you can run FRUTIL on the initiator or target. If the host load is not quiesced and FRUTIL is run while remote copy I/O is running, the normalization process is reset.

## Saving Your Configuration

When enabled, the `SAVE_CONFIGURATION` function allows you to do the following (supported on single controller configurations only):

- Save a configuration to a disk or storage set. The configuration may be retrieved later and downloaded onto a replacement controller.
- Retain code patches to the ACS software.

## Saving a Configuration to Previously Initialized Storage Sets

If any storage set within the configuration was previously initialized with the `INITIALIZE container-name SAVE_CONFIGURATION` command to save your configuration to disk, it is not necessary to reconfigure your devices with a new controller. `SAVE_CONFIGURATION` also retains code patch information to the software. This option is supported on single controller configurations only.

ACS Version 8.7 saves any installed software patches on disks initialized with the `SAVE_CONFIGURATION` command. To replace a controller and restore the configuration from a disk, you do not have to reinstall any software patches.

Configuration information cannot be retrieved from storage sets created on other HSx controllers (for example, HSD, HSJ, or HSZ controllers). You can only restore a configuration from a configuration saved on this or another HSG80 array controller.

## Avoiding Problem Situations

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

### Adding, Moving, and Changing Devices

The array controller maintains a configuration map of device types and locations. This map is used to communicate with devices. If you add, move, or change a device while the array controller is powered off without first changing the array controller configuration, the array controller is not able to communicate with the changed device when it returns to service.

If a device is removed by mistake while the array controller is off, delete all containers associated with the removed device after power was restored to the array controller.

If a device is replaced while the array controller is off, install the replacement device before restoring power to the array controller. Once power is restored, use the `DELETE DISK` CLI command to remove the disk from the configuration. Then use the `ADD DISK` CLI command to add the new device. This correctly removes the failed device and adds the new device after restoring power to the array controller.

See the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide* for details on CLI command usage and syntax.

See the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide* for correct device removal and addition procedures.

### Moving StorageSets

Move only *normal* storageSets. Do not move storageSets that are *reconstructing* or were *reduced*.



**CAUTION:** Ensure all storageSets are in *normal* mode prior to moving them, or data corruption occurs.

---

## Replacing Array Controllers, Cache Modules, or External Cache Battery Storage Building Blocks

You can replace the array controller, cache module, or external cache battery (ECB) storage building block (SBB) while the storage system is shut down. However, you must enter the `SHUTDOWN THIS_CONTROLLER` command prior to shutting down the storage system in order to make configuration changes. If two array controllers are configured in a dual-redundant configuration, you must first enter the `SHUTDOWN OTHER_CONTROLLER` command.

These commands instruct the array controllers to flush all unwritten data from the cache modules and discontinue all I/O activity. For more information regarding the `SHUTDOWN` controller command, see the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide*. For information on maintenance and replacement of the array controller, cache module, and external cache battery, see the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*.

## Unit Offsets

Setting unit offsets requires a host reboot for the newly set offsets to take effect.

## SWCC SCSI Connection

The SWCC Client SCSI connection can sometimes produce the following error message when trying to connect through the CCL:

```
Error scanning subsystem. Command Execution Error: [DeviceIOControl  
Error:]
```

Additionally, physical devices may not appear in the **Select Device** drop-down list. The SWCC CLI Window terminates if the **New Window** icon is selected, or if **New** is selected from the **File** Menu, followed by clicking the **Cancel** button on the **Connection Selection** dialog box. If the connection becomes lost, restart the Client application.

*StorageWorks* strongly recommends that you use the SWCC Agent to manage the storage system.

## Host Operating System Notes

The following section lists host-specific operating notes.

## Host Operating System Support of Multi-Bus Failover

Multi-bus failover is supported on the Windows NT and Windows 2000 operating system through the use of Secure Path software. See "Secure Path Software", page 24, for version compatibility and restrictions.

### Windows NT and Windows 2000

- Both Windows NT and Windows 2000 can run MSCS software. See documents that come with Microsoft's software kits for instructions on setting up Microsoft clusters.
- There is no Hot Plug support for FC HBAs under Windows NT 4.0 or Windows 2000 at this time. Check the *StorageWorks* Support website for updates.
- Windows NT and Windows 2000 support SCSI-2 and SCSI-3 modes. See the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide* that comes with this kit for more information.
- *StorageWorks* recommends that you load software directly from the Solution Software CD-ROM when installing drivers and running the Fibre Channel Setup utility. You may experience problems on some systems if you first copy the CD-ROM contents to a disk drive and then install from there.
- Windows 2000 dynamic volumes are supported in transparent failover configurations or in Secure Path Version 4.0 multi-bus configurations.
- Cloning a Windows 2000 dynamic disk is allowed. However, either the CLONE or the original can be mounted to the same host but not both.

### Windows NT Specific Notes

- Fibre Channel software setup handles HszDisk and HS\_Service installation. This is sometimes referred to as HSZinstall in the documentation.  
**IMPORTANT:** Do not use the Large LUN model with Windows NT Service Pack 5 under any circumstances. Windows NT Service Pack 6A is the stated minimum for this Solution Software.
- In a situation where you are replacing a server with another and using the existing drives (storage sets) behind the array controllers, you may find drive to drive letter mapping changes. During such a system changeover, remap drives to drive letters using the Disk Administrator to restore proper access to your data.

- To delete the 8 MB EISA-type partition on new disk drives, as discussed in the "Disk Device Support", page 17, create a unit and delete the partition in Disk Administrator.

## Windows 2000 Specific Notes

- New Universal Disk Drives (or units that are migrated from SmartArray controllers usage) being configured into storageset members need to be initially written to with DILX (a diagnostic utility on the HSG storage systems). DILX only operates on units. Therefore, the new disks must be configured into a unit prior to running DILX. Optionally, the HSUTIL format disk utility may be used on a disk device.
- The Fibre Channel Setup utility installs HS\_Service and HsxDisk software components. These are similar to HS\_Service and HszDisk in the Windows NT setup procedure.
- There are two situations in which drive-letter remapping might occur and that could affect access to data by programs you may need to run. The first situation is one in which you replace one server with another. The second is a situation in which you simply replace an FC HBA in one of your systems. During such a system or adapter changeover, be sure to manually remap drives to drive letters using Disk Manager. This restores proper access to your data.
- If you replace an FC HBA in a server, you need to reinstall the HBA driver and then rerun the Fibre Channel Setup utility. This is so that Windows 2000 can automatically reload the original driver for this adapter and reset many of the important registry settings. New connections are created on the HSG controller. Those connections should be renamed and assigned to the appropriate units.

For more information about installing the adapter, see the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide* and use the software on the Solution Software CD-ROM.

## Upgrading from Windows NT 4.0 to Windows 2000

If you are upgrading from Windows NT 4.0 to Windows 2000, you must remove the software components installed by the previous version of the Fibre Channel Setup utility. Follow these steps:

1. Remove the software components installed from the previous Fibre Channel Setup utility. To do this, locate the previous CD-ROM and run the utility. Follow the procedures in it to remove components. Alternately, you can use the **Add/Remove Programs** applet.

2. Upgrade from Windows NT 4.0 to Windows 2000 as instructed by Microsoft's documentation.
3. Reboot.
4. Install the HBA driver upgrade as instructed in the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*.
5. Run the Fibre Channel Setup utility to complete your installation.

## ResetTPRLO Parameter in Windows Environments

All Windows SAN installations require the ResetTPRLO (Third Party Logout Extended Link Service) HBA driver parameter be set to a value of 1. When HBA driver Version x-4.53a7 or higher is installed, this parameter must be changed from the default value, which is set to 0.

For HBA driver versions above Version x-4.53a7, this value is set automatically by the Fibre Channel Software Setup included in this release of Solution Software.

For HBA driver Version x-4.53a7, this parameter must be set manually. For all Windows configurations using this driver version, verify that the ResetTPRLO HBA driver parameter is set to 1 by using the LPUTILNT utility. Use the following procedure:

1. Choose **Start** and then **Run**.
2. Type LPUTILNT and select the first HBA.
3. Select **Driver Parameters** in the Category pane.
4. Click **Parameters**.
5. Scroll down and double-click **ResetTPRLO**.
6. Set the value to **1**.
7. Select **Permanent** and **Global**.
8. Click **Change**.

You need to follow this procedure for each HBA that uses Version x-4.53a7 drivers in the system. If you use this method, you do *not* have to restart Windows after the registry is modified. The ResetTPRLO parameter is dynamic.

See Customer Advisory OI020510\_CW0x for additional information.

## Registry Growth in Windows

The Windows plug-and-play architecture has a limitation on the number of plug-and-play device entries that can be added to the registry. Whenever devices are added or removed, or SNAPSHOT is created or deleted, entries are added to the registry by the Plug-and-Play manager, potentially causing the registry to grow beyond the allowed capacity.

If more than 700 entries are in the registry, the next time the system reboots for any reason, the following error message occurs before the operating system boots up:

```
"Failed to load Windows 2000 due to a file missing or corrupt in the  
\WINNT\SYSTEM32\CONFIG\SYSTEM directory."
```

Please see the Microsoft Knowledge Base article (Q269075), which provides more information about the registry growth problem.

## Large LUNs for Windows NT and Windows 2000

Enabling Large LUNs allows a Windows NT or Windows 2000 server to have access to LUNs beyond the 0-7 range, and to access more than 8 LUNs per target. The host can access unit D10 by leaving the connection offset at 0.

The maximum number of LUNs supported is 128 per storage system. If using Secure Path Version 3.1A SP1, the maximum number of LUNs is 64 per storage system. If using Secure Path Version 4.0, the maximum number of LUNs is 128 per storage system. The LUNs can be contiguous or non contiguous.

**NOTE:** Large LUNs are supported on Windows NT, Windows 2000 Server, and Windows 2000 Advanced Server.

## Large LUN Utility for Windows

The Large LUN utility is available for download at the *StorageWorks* website:

<http://h18006.www1.hp.com/storage/index.html>

**NOTE:** The Large LUN utility is provided, but it is unnecessary if ACS Version 8.6 or higher is running alone or in conjunction with Secure Path software, which has built-in support.

## Controller Configuration

It is recommended that you set the SCSI\_VERSION to SCSI-3 for maximum availability.

- Multi-bus failover mode (with Secure Path Version 3.1A SP1)—Support for 64 LUNs per storage system (SCSI-2 mode) or 63 LUNs + 1 CCL (SCSI-3). These LUN numbers must be between 0 and 63.
- Multi-bus failover mode (with Secure Path Version 4.0)—Support for 128 LUNs per storage system (SCSI-2 mode) or 127 LUNs + 1 CCL (SCSI-3). These LUN numbers must be between 0 and 199.
- Transparent failover mode—Support for 128 LUNs per storage system (SCSI-2 mode) or 127 LUNs + 1 CCL (SCSI-3). These LUN numbers must be between 0 and 199.

The chart below indicates which cases Large LUNs are enabled.

	ACS Version 8.5		ACS Version 8.6/8.7	
	WNT	W2000	WNT	W2000
SCSI-2 LUN 0 present	Y	Y	Y	Y
SCSI-2 LUN 0 not present	N	N	N	Y
SCSI-3 LUN 0 always present	Y	Y	Y	Y

Y = functional

N = not functional

## Known Limitations

In Windows 2000, if any LUN greater than 7 is removed and a subsequent disk rescan is performed, the **Found New Hardware** wizard may ask you to finish the installation of the device that was removed. The Device Manager may show the device with a yellow warning icon on it. A reboot of the system completely removes the device.

## KGPSA Popup Message with Driver Update Utility

When running the driver update utility, you may see a popup message that says "Digital Signature Not Found." Click **Yes** to continue the installation.

The digital signature for the driver is there and the driver installs correctly.

You can verify this digital signature by going to:

Control Panel -> Administrative Tools -> Computer Management ->  
Device Manager -> SCSI and RAID Controllers

Right-click the Compaq KGPSA-xx, PCI-Fibre Channel HBA (with adjunct driver), choose **Properties**, and then choose the **Driver** tab. The "Digital Signer:" section is displayed which includes "Microsoft Windows Hardware Compatibility Publ." This "Digital Signer:" section verifies that a digital signature was found for the specified driver.

## Documentation Anomalies

The following are known additions and corrections to the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*.

- In order to successfully perform a rolling upgrade on controllers connected to Windows 2000 hosts, the change to "Solution Software Upgrade Procedures," found on page 3-24, must be observed. See sections "Disk Partitioning", page 40, and "Rolling Upgrades", page 26 of these Release Notes for further details.