



# Release Notes

## Compaq StorageWorks HSZ80 Array Controller ACS Version 8.3 for OpenVMS

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*This document summarizes features and characteristics of the StorageWorks HSZ80 Array Controller (Array Controller Software Version 8.3) for OpenVMS that are not covered elsewhere in the documentation.*

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These *Release Notes* provide information for the HSZ80 Array Controller Software (ACS) version 8.3 not covered elsewhere in the Configuration and CLI Reference Guide or in the Maintenance and Service Guide. This release note should be used by individuals responsible for configuring, installing, and using the HSZ80 Array Controller.

**NOTE**

**Read this entire document before installing or upgrading the software.**

These release notes cover the following topics:

1. Identifying the Software Revision Level
2. Hardware and Software Supported by HSZ80 Array Controller Software (ACS) Version 8.3
3. New Features
4. New CLI Commands
5. Configuration Rules
6. Avoiding Problem Situations
7. Host Operation System Notes
8. StorageWorks Command Console (SWCC)

## Release Package Content

The HSZ80 ACS version 8.3 Solutions Software kit consists of the following:

- A customer letter
- A PCMCIA program card containing HSZ80 ACS version 8.3
- The HSZ80 Solutions documentation set:

*Command Console V2.1 User's Guide*

*HSZ80 Array Controller ACS Version 8.3 Configuration and CLI Reference Guide*

*HSZ80 Array Controller ACS Version 8.3 Maintenance and Service Guide*

*RA8000/ESA12000 HSZ80 Solution Software V8.3 for OpenVMS - Installation Reference Manual*

*Quick Start Guide for OpenVMS*

*Registration Card*

*Release Notes - COMPAQ StorageWorks HSZ80 Array Controller ACS V8.3 for OpenVMS (this document)*

*StorageWorks Warranty Terms and Conditions Booklet*

*CD-ROM Containing the HSZ80 Solution Software for OpenVMS and Documentation*

## Intended Audience

This document has been prepared for customers who have purchased either an RA8000 or an ESA12000 enclosure with an HSZ80 Array Controller and for Compaq Customer Service Center (CSC) personnel responsible for installing and maintaining systems that include the HSZ80 Array Controller.

## Visit our Web Site for the Latest Information

Check our Web site for the latest drivers, technical tips and documentation for the HSZ80 Array Controller:

*<http://www.compaq.com/>*

## 1.0 IDENTIFYING YOUR ACS VERSION LEVEL

You can identify ACS version 8.3 by entering the SHOW THIS\_CONTROLLER command at the CLI prompt. The resulting display lists the software revision level as **V83Z-0**.

## 2.0 HARDWARE AND SOFTWARE SUPPORT

This section lists the hardware and software supported by ACS version 8.3.

## 2.1 System Components

ACS version 8.3 is supported by the following operating system versions:

**Table 1 Minimum System Requirements**

Component	Requirement
Platform	Alpha Servers 800, 1000A, 1200, 4000, 4100, 8200, and 8400
Operating System	OpenVMS V7.1 1-H-1 or higher
Free Disk Space	500 KB for the program files
Controller Compatibility	Compaq StorageWorks HSZ80 Array Controller ACS Version 8.3
Adapter Compatibility	PCI Differential UltraSCSI adapter KZPBA-CB.

## 2.2 Device Support

ACS version 8.3 supports the devices listed in Table 2 at the indicated hardware and microcode levels.

**NOTE**

Not all operating systems support all device types. The following tables display the device types supported by ACS version 8.3.

**Table 2 Supported Disk Drives**

Device Type	Capacity in Gigabytes	Minimum Microcode Version	Minimum Hardware Version
RZ28-VW	2.1 GB	435E	B01
RZ28D-VW	2.1 GB	0008	A01
SWXD3-WF	2.1 GB	0008	A01
RZ28L-VW	2.1 GB	LYJO	A01
RZ28M-VW	2.1 GB	466	A01
DS-RZ28M-VZ	2.1 GB	1003	A01
SWXD3-WH	2.1 GB	466	A01
DS-RZ1BB-VW	2.1 GB	LYJO	A01
DS-RZ1BB-VW	2.1 GB	0656	A01
DS-RZ1CB-VW	4.3 GB	LYJO	A01
DS-RZ1CB-VW	4.3 GB	0656	A01
DS-RZ1CD-VW	4.3 GB	0306	A01
DS-RZ1DB-VW	9.1 GB	LYJO	A01
DS-RZ1DB-VW	9.1 GB	0307	A01
DS-RZ1EF-VW	18 GB	N1H1	A01
DS-RZ1EF-VW	18 GB	0372	A01
DS-RZ1CF-VW	4.3 GB	N1H1	A01

## 2.3 StorageWorks Command Console

StorageWorks Command Console (SWCC) version 2.1 is a graphical user interface for StorageWorks array controllers. You can configure and monitor the subsystem using SWCC. For installation instructions, refer to the *Command Console V2.1 User's Guide*.

When specifying the allocation class from SWCC, the limit is between 0 and 65535.

SWCC contains an on-line manual, which can be accessed in the on-line Help. For the latest information about SWCC, refer to the product links available on the Compaq Web site at:

<http://www.compaq.com/>

## 3.0 NEW FEATURES

This section briefly describes features that are supported by the HSZ80 Array Controller. For more information on these features, see the *HSZ80 Array Controller ACS Version 8.3 Configuration and CLI Reference Guide*.

### 3.1 FRUTIL Utility

Use the FRUTIL utility to replace the array controller, cache module, or external cache battery when operating in a dual-redundant array controller configuration. FRUTIL guides you through the process of replacing these modules without interrupting the system.

Enter RUN FRUTIL from the terminal prompt to begin the utility.

### 3.2 Unit Cache Policy

You can set the cache policy for each individual unit via the CLI. The cache policy for each is displayed when you use the SHOW UNITS command.

### 3.3 Battery Hysteresis

Battery Hysteresis allows write-back caching while a battery is returning to its fully charged state. With battery hysteresis, write-back caching can occur as long as a previous down time has not drained more than 50 percent of a battery's rated capacity. If the battery's capacity is below 50 percent, the battery is considered to be charging and write-back caching is disabled.

### 3.4 UPS Flush/Delayed Power Switch

The POWEROFF command allows for automatic shutdown of the array controller and ECB charge depending on two new optional CLI switch settings for battery and cache flush.

If in mirrored mode and both array controllers cannot be powered off, then both array controllers and their batteries remain on.

### 3.5 Maintenance Terminal Port Speeds

ACS version 8.3 supports a default terminal port connection at 9600 BPS. You can also configure a higher data transfer rate at 19200 BPS.

### 3.6 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 an array 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 an array 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 enable mirrored write-back cache mode, enter `SET controller MIRRORRED_CACHE`. Because this command places both array controllers in mirrored write-back cache mode, it only needs to be entered through one array controller.

#### NOTE

Because the cache modules operate in parallel on the same bus, the performance of the array controller is not impacted. The array controller performs as if it were configured to operate in single write-back cache mode.

### 3.7 Read-Ahead Cache

By default, read-ahead caching is enabled for all disk units. Read-ahead caching is a method used by the array controller to anticipate subsequent read requests once an initial read request has been initiated.

### 3.8 Extended Device SCSI ID Support

The array controller supports SCSI device ID numbers 0 through 15 excluding SCSI ID numbers 4 through 7. SCSI ID number 7 is reserved for the array controller in a single-array controller configuration. SCSI ID numbers 6 and 7 are reserved for the array controllers in a dual-redundant configuration. SCSI ID numbers 4 and 5 cannot be used.

### 3.9 Host Bus SCSI ID Support

The array controller host interface supports SCSI Ultra and Wide options. Supporting SCSI Wide addressing, the array controller allows the host to address ID numbers from 0 to 15.

### 3.10 Multiple Bus Access from a Host to a Single Controller

The host can access the array controller through both ports at the same time, which increases system performance and throughput.

### 3.11 Code Load and Code Patch (CLCP) Utility

An array controller code patch is performed via the SCSI Write Buffer command. The CLCP utility upgrades the controller software and the EMU software. It can also be used to patch the controller software. See the *HSZ80 Array Controller ACS Version 8.3 Maintenance and Service Guide* for specific information regarding procedures.

### 3.12 Exclusive Mapping

Exclusive mapping allows the array controller to reserve selected storage devices for use only with specified SCSI initiator ID numbers. This eliminates the possibility of a storage device being accessed by an unauthorized host.

Enter `SET unit ENABLE_ACCESS_PATH=nn` to assign exclusive host access privileges to the device.

See the “Set unit” command in the *HSZ80 Array Controller ACS Version 8.3 Configuration and CLI Reference Guide* for configuring your devices to use exclusive mapping.

### 3.13 Configuring with the Command Console LUN

The Command Console LUN (CCL) is a type of LUN for communicating between the host and the controller using StorageWorks Command Console (SWCC) or CLI commands. The CCL operates differently in SCSI-2 and in SCSI-3 modes depending on whether you are using transparent failover or multiple bus failover.

### 3.14 Configuring Units with Multiple Hosts

The HSZ80 Array Controller allows equal but separate access to the targets and units through multiple hosts running on different operating systems and is called *heterogeneous host support*. The array controller allows hosts equal access to their targets and units by designating the host mode using the `HOST_FUNCTION` commands. For V8.3, two new modes have been added: Host Mode E and Host Mode F. The controller prevents one host from accessing another host's units through the use of separate SCSI buses or through the `ENABLE_ACCESS_PATH` switch.

The following modes can be assigned:

- A—DIGITAL UNIX®, OpenVMS, and Hewlett-Packard® HP-UX (Default)
- B—IBM AIX®
- C—HSZ15
- D—Windows NT™ Server
- E—Silicon Graphics® IRIX
- F—Sun® Solaris™

In transparent failover mode, you can configure units in one of three ways:

- 1) by designating the port
- 2) on a shared host bus referenced by the host ID number
- 3) by designating the port and on a shared host bus referenced by the host ID number

In multiple-bus failover, you can configure units through multiple host adapters.

See the *HSZ80 Array Controller ACS Version 8.3 Configuration and CLI Reference Guide* for illustrations of the configurations and for details on the CLI commands used in configuring units.

### 3.15 EMU Microcode Installation

The microcode resident in the EMU memory controls all operations of the Ultra SCSI RAID enclosure EMU. When loading the EMU microcode, the array controllers must be shutdown. The EMU microcode can be downloaded from a CPU. See the documentation that accompanied your enclosure for more details about the EMU microcode.

Generally, the EMU microcode will be installed by Compaq Customer Service Center (CSC) personnel. See the installation guide, *COMPAQ StorageWorks Installing the EMU Microcode*, for specific procedures.

### 3.16 External Cache Battery

If the primary power source becomes disabled, the external cache battery (ECB) provides a source of backup power to the cache module DIMMs only. The ECB can preserve 512 MB of cache memory for 24 hours of backup power when the cache module is fully loaded with four 128-MB DIMMs. A maximum of 96 hours of backup power is available when the cache module contains only two 32-MB DIMMs. The holdup time of the ECB is proportional to the amount of memory installed in the cache module.

Size	DIMM Combinations	Capacity
64 MB	Two, 32 MB each	96 hours
128 MB	Four, 32 MB each	48 hours
256 MB	Two, 128 MB each	48 hours
512 MB	Four, 128 MB each	24 hours

### 3.17 Host Ports

Each array controller has two host ports. An array controller can present up to 32 units to the host on each target ID number. Unit numbers identify both the target ID number and the LUN. However, access to LUNs 8 through 31 requires support by both the host adapter and operating system. This maximum is a limitation of the host. Refer to the *HSZ80 Array Controller ACS Version 8.3 Configuration and CLI Reference Guide* for information about unit numbering.

## 4.0 NEW CLI COMMANDS

New CLI commands for the HSZ80 Array Controller include:

- CONFIGURATION
- POWEROFF
- SET FAILEDSET

Several CLI commands have new or modified switches:

- ADD *mirrorset-name disk-name* DT\_SUPPORT
- ADD *mirrorset-name disk-name* NODT\_SUPPORT
- ADD *units* ENABLE\_ACCESS\_PATH
- ADD *units* DISABLE\_ACCESS\_PATH
- ADD *units* THIS\_PORT\_1\_ENABLE\_ACCESS\_PATH
- ADD *units* THIS\_PORT\_1\_DISABLE\_ACCESS\_PATH
- ADD *units* THIS\_PORT\_2\_ENABLE\_ACCESS\_PATH
- ADD *units* THIS\_PORT\_2\_DISABLE\_ACCESS\_PATH
- ADD *units* OTHER\_PORT\_1\_ENABLE\_ACCESS\_PATH
- ADD *units* OTHER\_PORT\_1\_DISABLE\_ACCESS\_PATH

- ADD *units* OTHER\_PORT\_2\_ENABLE\_ACCESS\_PATH
- ADD *units* OTHER\_PORT\_2\_DISABLE\_ACCESS\_PATH
- ADD *units* READAHEAD\_CACHE
- ADD *units* NOREADAHEAD CACHE
- CREATE\_PARTITION *container-name size=n* TRACKSIZE
- CREATE\_PARTITION *container-name size=n* CYLINDERS
- CREATE\_PARTITION *container-name size=n* HEADS
- CREATE\_PARTITION *container-name size=n* CAPACITY
- INITIALIZE *container-name* TRACKSIZE
- INITIALIZE *container-name* CYLINDERS
- INITIALIZE *container-name* HEADS
- INITIALIZE *container-name* CAPACITY
- SET *controller* NODE\_ID
- SET *controller* PORT\_1\_ID
- SET *controller* NOPORT\_1\_ID
- SET *controller* PORT\_2\_ID
- SET *controller* NOPORT\_2\_ID
- SET *controller* PORT\_1\_PREFERRED\_ID
- SET *controller* NOPORT\_1\_PREFERRED\_ID
- SET *controller* PORT\_2\_PREFERRED\_ID
- SET *controller* NOPORT\_2\_PREFERRED\_ID
- SET *controller* PORT\_1\_TRANSFER\_RATE\_REQUESTED
- SET *controller* PORT\_2\_TRANSFER\_RATE\_REQUESTED
- SET *controller* SCSI\_VERSION
- SET *mirrorset-name disk-name* DT\_SUPPORT
- SET *mirrorset-name disk-name* NODT\_SUPPORT
- SET *device-name* LOCAL
- SET *device-name* REMOTE
- SET *unit-number* ENABLE\_ACCESS\_PATH
- SET *unit-number* DISABLE\_ACCESS\_PATH
- \*SET *unit-number* THIS\_PORT\_1\_ENABLE\_ACCESS\_PATH
- \*SET *unit-number* THIS\_PORT\_1\_DISABLE\_ACCESS\_PATH
- \*SET *unit-number* THIS\_PORT\_2\_ENABLE\_ACCESS\_PATH
- \*SET *unit-number* THIS\_PORT\_2\_DISABLE\_ACCESS\_PATH
- \*SET *unit-number* OTHER\_PORT\_1\_ENABLE\_ACCESS\_PATH
- \*SET *unit-number* OTHER\_PORT\_1\_DISABLE\_ACCESS\_PATH
- \*SET *unit-number* OTHER\_PORT\_2\_ENABLE\_ACCESS\_PATH
- \*SET *unit-number* OTHER\_PORT\_2\_DISABLE\_ACCESS\_PATH
- SET *unit-number* READAHEAD\_CACHE
- SET *unit-number* NOREADAHEAD CACHE

**NOTE**

\*These CLI commands are used in multiple-bus failover configurations.



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## 5.0 CONFIGURATION RULES

The following list outlines the configuration rules for the array controller:

- Maximum 15 targets with up to 32 LUNs on each target, depending on the operating system
- Maximum 128 assignable, host-visible LUNs across all 15 targets
- Maximum 512-GB LUN capacity
- Maximum 72 physical devices
- Maximum 20 RAID-5 storagesets
- Maximum 30 RAID-5 and RAID-1 storagesets
- Maximum 45 RAID-5, RAID-1, and RAID-0 storagesets
- Maximum 8 partitions on a storageset or individual disk
- Maximum 6 members per mirrorset
- Maximum 14 members per RAID-5 storageset
- Maximum 24 members per stripeset
- Maximum 48 physical devices per striped mirrorset

## 6.0 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.

### 6.1 Adding, Moving, and Changing Devices

The array controller maintains a configuration map of a device's type and location. 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 has been restored to the array controller.

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

See the *HSZ80 Array Controller ACS Version 8.3 Configuration and CLI Reference Guide* for correct device removal and replacement procedures.

### 6.2 Moving Storagesets

Move only normal storagesets. Do not move storagesets that are reconstructing or have been reduced, or data corruption will result.

### 6.3 Adding, Moving, and Changing Array Controllers, Cache Modules, or External Cache Battery (ECB) Storage Building Blocks (SBBs)

It is permissible to replace the array controller, cache module, or external cache battery SBB 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 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 SET controller command or maintenance and replacement of the array controller, cache module, and external cache battery, see the *HSZ80 Array Controller ACS Version 8.3 Configuration and CLI Reference Guide*.

## 7.0 Host Operating System Notes

### 7.1 StorageWorks Command Console (SWCC) Version 2.1

This version of StorageWorks Solutions Software includes the StorageWorks Command Console (SWCC) Version 2.1 Client and Agent program. SWCC may be used to configure and monitor storage subsystems attached to SGI, IBM, SUN, HP and Digital systems. The SWCC Version 2.1 Agent is supported for use with the HSZ20, HSZ40, HSZ50, HSZ70, and HSZ80 storage subsystems. This agent does not support the RA3000. Refer to the SWCC sections of this document for installation instructions and restrictions.

### 7.2 Command Console LUN (CCL)

The HSZ80 can provide a dedicated communications LUN. This can simplify the installation and operation of SWCC. Since the CCL is enabled by default, a **dk device** will be displayed by OpenVMS when the **SHOW DEVICE** command is executed. This logical device should be left intact for future installation of SWCC.

## 8.0 StorageWorks Command Console (SWCC) V2.1

This portion of the Release Notes cover version 2.1 of Command Console Client for HSZ80 Solutions. It summarizes features and operational information not covered elsewhere in the product documentation.

### 8.1. Minimum System Configuration

Client requires the minimum system configuration shown in Table 3 to operate:

**Table 3 Client Minimum System Configuration Requirements**

Feature	Requirement
Architecture	Intel 486, 66 MHz, 16 MB memory, 1 MB free disk space or Windows NT - compatible Digital Equipment Corporation Alpha(r) system, 1 MB free disk space
Operating System	Windows NT or Windows 95
Monitor	15-inch VGA Monitor
Input Devices	Keyboard, Mouse
Modem	Hayes-compatible
Adapter (for local connection bus only)	Ultra SCSI Differential
Serial Port (for serial port only)	Standard, PC serial port capable of at connection via least 9600 baud
Controller Compatibility	StorageWorks HSZ80 Array Controller

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## 8.2 Installation Notes

### Client Installation Claims System Files are Out-of-Date Even After Installing New Files

SWCC 2.x Client software requires at least version 2.20.0.0 of Microsoft's OLEAUT32.DLL file. If the version installed is older than 2.20.0.0, the SWCC installation will show a dialog box with the following information:

- Systems files are out-of-date.
- It will install new system files.
- Rerun the installation after the system reboots.

With some versions of OLEAUT32.DLL, the version check will fail and InstallShield will not overwrite with the newer file. This action will cause the install to always say that the system files need to be upgraded and to never allow you to install SWCC. To fix this, ensure that a proper version of OLEAUT32.DLL was installed by installing a clean version of the operating system.

### HSZ-Series Agent Upgrade SWCC 1.1b to SWCC 2.x (OpenVMS Only) (HSZ-Series Controllers Except HSZ22)

Before you install SWCC 2.x for the HSZ-series Agent, you must uninstall SWCC 1.1b and delete CHANGE\_REGISTER.COM from the SYSSYSDEVICE:[SWCC\$AGENT] directory. SWCC 1.1b is incompatible with SWCC 2.x. Furthermore, if you interrupt the installation of SWCC 2.x, neither SWCC 2.x nor SWCC 1.1b will work.

### Invalid Network Port Numbers During Installation

During Client or Agent installation, you may experience an error if the installation program cannot find an acceptable pair of network port numbers.

Your client uses Windows sockets (sometimes called “network ports”) to communicate with its Agents. The socket numbers at the Client and Agent ends must match for network communication to occur. In Windows NT the socket numbers are assigned in the service file in the \winnt\system32\drivers\etc subdirectory.

In Windows 95, the socket numbers are assigned in the services file in the \windows” directory.

### Stand-Alone Installations

After doing a stand-alone install of any Client, exit Command Console before adding or accessing a system with that type of controller. Command Console will then recognize the installation.

### SWCC 1.1B Client Will Not Work if Version 2.x Client Was Already Installed

SWCC 1.1b will malfunction if you already have SWCC 2.x on a Windows NT operating system. The Asynchronous Event Service that comes with SWCC 2.x uses the same port as SWCC 1.1b. SWCC 1.1b can be removed without impacting SWCC or ServerWORKS 3.3.

Perform the following to solve this:

1. Uninstall SWCC 1.1b. Ignore the error box that appears.
2. Reboot the computer. The integration for SWCC 1.1b will have been removed.
3. Integrate SWCC 2.x with ServerWORKS 3.3 by referencing "Getting Started."

### **Remove Version 1.1 Components Before Installation**

(HS-Series Except HSZ22). Remove the version 1.1 software, including Clients and Agents before you install version 2.x components. Version 2.x software components are not compatible with version 1.1 components, and the operation with mixed components is not supported. Use the instructions that came with your version 1.x software to remove it.

Before you install your new Client software, you must remove any existing version 2.x CLI Window. Use the Windows NT or Windows 95 Add/Remove Programs feature or the instructions that came with your existing software to remove it. The installation will upgrade your CLI Window.

Before you install your new Client software, you must remove any existing version 2.x Storage window of the same type as the one that you wish to install. Use the Windows NT or Windows 95 Add/Remove Programs feature or the instructions that came with your existing software to remove it. The installation will upgrade your Storage window.

Note that, in configurations with existing version 2.x components, you need only to remove the Storage window components that you plan to upgrade. Do not remove the Navigation Tree and any other Storage window components. The installation will install your new Client Storage and CLI windows seamlessly under your existing Navigation Tree.

## **8.3 Uninstall Notes**

### **Configuration File Deleted on Reinstallation or Upgrade**

Save a copy of the current swcc2.mdb file to another directory if you intend to reinstall or upgrade Client. If you uninstall the program, you will delete the swcc2.mdb file. This file contains your configuration of host systems and storage subsystems used in the Navigation Tree window.

To reinstate your current Navigation Tree window configuration after installing a new version of Command Console, copy your saved swcc2.mdb file back to the directory to which you installed Command Console.

### **SWCC Client Uninstall Does Not Remove AsyncEventService Entries**

Before uninstalling StorageWorks Command Console (but not individual controller Clients), first remove the AsyncEventService entries. Under Windows 95, go into Control Panel | Async Event Service and uncheck "Automatic startup on boot." Under Windows NT, change to the directory to which you installed SWCC and run the following command:

```
AsyncEventService -remove
```

Then remove the SWCC Client. Failing to remove the service will cause the system to report that a service failed to start every time the system is booted.

## **8.4 Adobe Acrobat Reader**

There is an on-line version of "Getting Started" in .PDF format. You need to view the .PDF file by using Adobe Acrobat Reader version 3.0 or later. You can obtain a copy of the Adobe Acrobat Reader from the ar32e301.exe file (Windows NT Intel) on the StorageWorks CD-ROM. You can also download the newest version of Adobe Acrobat from the following Web site:

*[www.adobe.com](http://www.adobe.com)*

If you have an Alpha computer, you can also use the ar32e301.exe file by utilizing the fx!32 emulator that came with the Alpha computer. You can download the fx!32 emulator from the following Web site:

[www.digital.com/semiconductor/amt/fx32/index.html](http://www.digital.com/semiconductor/amt/fx32/index.html)

## **8.5 Command Console Client Troubleshooting**

### **Authorization Error When Adding the Server to the SWCC Navigation Tree**

SWCC 2.x includes support for different SWCC Agents. Each Agent supports a different subset of Compaq StorageWorks' storage subsystems.

Each Agent maintains its list of authorized Client nodes. If you have more than one type of subsystem installed or attached to a server, you must keep the list of authorized Clients in sync so that every Client listed in the Client list of an Agent is also listed in every other Client list of an Agent with at least "Overview Status" access rights.

If a Client is missing from any of the authorized Client list of an Agent, all Clients will receive an authorization error when attempting to add the server to the SWCC navigation tree.

### **Help Files Still Appear after Uninstall**

After you have uninstalled a storage subsystem Client, its help files will still appear. Delete the CCONSOLE.GID file, which may be hidden. This file will regenerate the next time you use the Client's help files.

### **Missing Help Files**

You may be unable to access the help files for a particular storage subsystem Client if you install that storage subsystem Client on a computer that already has SWCC. Delete the CCONSOLE.GID file, which may be hidden. This file will regenerate the next time you use a help file.

### **Some Graphics Do Not Scale Well with Large Fonts**

It is recommended that small fonts be used when utilizing the SWCC client software in Windows 95 and Windows NT. Some of the graphics do not scale as well when large fonts are used.

### **Windows 95 SWCC Installation Problem**

When you run SWCC on Windows 95, the operating system will gradually increase its use of memory, especially when SWCC opens and closes a large number of sockets. Microsoft has released an upgraded version of kernel32.dll that corrects this situation. This file is available from the following Web site:

[www.microsoft.com/windows/downloads/contents/Updates/W95Kernel32/default.asp](http://www.microsoft.com/windows/downloads/contents/Updates/W95Kernel32/default.asp)

The following is the name of the file:

kernel32.dll version 4.00.951 (7/29/97, 337016 bytes) or later

**NOTE**

Microsoft may not support the Kernel32 upgrades on all versions of Windows 95. Check Microsoft's Web page to determine if it is supported for your operating system revision and language kit. Do not install the kernel32 upgrade unless Microsoft supports it.

## **8.6 Troubleshooting Connection and Access Problems**

This section documents known connection problems and suggests some solutions. SWCC is a TCP/IP socket-based application. As a result, SWCC requires that each node running a SWCC Client or Agent must have access to a valid hosts file or Domain Name Service (DNS) server. The valid hosts file must include at least the system itself and any other systems running a SWCC Client or Agent that it will connect to.

### **Dynamic IP Address Allocation, Such as DHCP, Not Supported**

SWCC will not work properly if the Client or Agent systems are obtaining an IP address dynamically. This means the Dynamic Host Configuration Protocol (DHCP) is not supported. RAS servers and IP tunneling servers are not supported unless they can be configured not to allocate IP addresses dynamically.

### **WINS Not Supported**

WINS is a name resolution service available for Windows NT and Windows 95. SWCC does not support WINS. Each system using SWCC must have access to either a DNS server or a valid hosts file.

### **Access Denied Problem**

This section covers some of the most common reasons for a Client to receive an "Access Denied" message when it attempts to add an Agent system to the navigation tree.

#### ***Check Client Lists***

The Client is probably not in the authorized Client list for the Agent. Please see the section in the "Getting Started" guide on configuring the appropriate Agent.

#### ***Multiple Agents***

If the Agent system is running multiple SWCC Agents (for example, to support different controller types) then the Client system must be authorized for ALL of the Agents. If the Client system is missing from any authorized Client list of an Agent, then that Agent cannot be added to the navigation tree.

#### ***HSZ-series Agent and Mixed or Uppercase Node Names (Except HSZ22)***

The HSZ-series Agent does not handle mixed case node names properly. The case of the node name in the Client authorization list must match the case returned by the DNS server or hosts file.

The Windows NT configuration utility for the HSZ Agent forces node names to be entered in lowercase. If the actual node name contains uppercase letters, the authorization check against the Client list will fail.

Manually edit the Client authorization list to change the node name to the correct case. The Client authorization list is a file named "client.ini". It can be found in the subdirectory "etc" under the directory to which the HSZ Agent was installed.

### **Add New System Using IP Address Crashes**

The SWCC Client may crash when the you attempt to add a system using the Agent system's IP address rather than the Agent system's node name. This occurs when the Client system does not have a DNS server configured that knows the Agent system, and the Agent system is not in the Client system's hosts file. To correct this situation, add the Agent system to the hosts file on the Client system.

If you receive an "Invalid host" or "Host not known" message when you attempt to connect to an Agent system, the solution is not to try the IP address. Fix your DNS server configuration, or if that is correct, confirm the DNS server knows the Agent system. If you are not using DNS, make sure the Agent system is in the Client system's hosts file. Remember, WINS is not supported by SWCC.

### **“No Agent Running” Message**

When trying to add a new system to the navigation tree, you may receive a message, stating "No Agent running on specified system". This message can appear for several reasons. The error most likely occurred as a result of the following:

- Wrong system name was entered.
- Agents were not installed on the entered system.
- Agents were installed on a system that stopped functioning.
- The specific Client required to support the Agents, running on the Agent system, was not installed. For example, if the Agent system only has a HSZ70 Agent and the Client system has only RA200 support, the message will appear. To check if Client support for an Agent had been installed, look at the following registry key:

HKEY\_LOCAL\_MACHINE\Software\DigitalEquipmentCorporation\AppletManager

You should see a series of keys for supported products. Port names and numbers in the services file may be missing or may not match between Client and Agent. This may occur if the default value for a SWCC port was already in use. There is a list of port numbers and their default values in the Getting Started guide, Appendix A under System Requirements, Network Port Assignments.

If you change the network card on a computer running Windows 95, your services file may be deleted and replaced by the version on the Windows 95 distribution kit. In this case, you will need to add the entries required for SWCC.

## 8.7 Clarifications

This section presents clarifications on the behavior of the software in certain situations.

### Cautions When Configuring from a Configuration File

When reconfiguring a storage subsystem from a configuration file, the program prompts you to choose whether or not the program initializes your virtual disks. You must choose the appropriate option or you risk the loss of your data as the configuration file is loaded and your subsystem is reconfigured.

- **Do not initialize virtual disks** – Choose this option when your virtual disks contain valuable user data, and you wish to retain that data. You might, for instance, need to replace a failed subsystem component such as a controller or cache module. In this case, your subsystem configuration must be transferred to the new hardware, but you do not wish to change any information on your storage devices themselves.
- **Initialize virtual disks** – Choose this option when your virtual disks do not contain user data, or when you do not care if the data on them is lost. You might use this option when configuring a storage subsystem from scratch to make it match the configuration in your configuration file.

### Virtual Disk Recovery from a Configuration File

Note that when you delete a virtual disk, the disk's member drives are all reinitialized and any user data is lost. You cannot restore the virtual disk's data by reconfiguring your subsystem from a configuration file. A configuration file contains only information about the structure of a virtual disk and does not contain the disk's data itself.

### Warning Message Windows

The controller software responds to problems in parsing and executing commands from Client and Agent by returning a message window entitled "Warning". The content of such messages may contain such indications as "Command Execution Error," along with pertinent detailed information. These messages are simply passed through for display by Client and Agent. They are not errors associated with problems in the software, rather in the array controller.

### Virtual Disk Maximum Capacity

- The maximum capacity of RAID-based virtual disks is determined by the capacity of the smallest member, not the largest.
- The maximum capacity of RAID 0 virtual disks is equal to the number of members times the capacity of the smallest member.
- The maximum capacity of RAID 1 virtual disks is equal to the capacity of the smallest member.
- The maximum capacity of RAID 0+1 virtual disks is equal to the number of members in one stripe times the capacity of the smallest mirrorset member.
- The maximum capacity of RAID 3/5 virtual disks is equal to the number of members minus one times the capacity of the smallest member.



## **Case Sensitivity in Client, Host, and Storage Subsystem Names**

In configuring Command Console for network operation, you must enter names or IP addresses to identify your hosts, storage subsystems, and Client systems. If you use names (as opposed to IP addresses) the names in Client and Agent must be consistent to allow the programs to communicate with each other. This section discusses issues of case sensitivity associated with name entry in Client and Agent. This information does not apply when you use IP addresses. In the connection dialogues in Client, you are required to enter host names, and you also have the option to enter specific storage subsystem names. In the Agent installation and configuration programs, you are required to enter Client and storage subsystem names.

### **Host and Subsystem Names in Client**

Enter host and subsystem names in Client without regard to case. The software converts all names internally to lower case regardless of the way you enter them.

### **Case Sensitivity in Agent STORAGE.INI File**

If you choose to manually edit an Agent STORAGE.INI file, enter storage subsystem names only in lower-case form. If you use upper-case characters in a name, Client and Agent may not be able to communicate because of a name mismatch.

### **Case Sensitivity in Agent CLIENT.INI File**

If you choose to manually edit an Agent client.ini file, enter Client names exactly as formatted within your network. The names you enter must match the names your name server recognizes, or Client and Agent may not be able to communicate with each other.

## **ServerWORKS Connections**

You can manually configure any Agent to send SNMP traps to a host running Compaq Computer Corporation's ServerWORKS by editing the client.ini file. Edit the file to include the ServerWORKS host name and SNMP notification.

## **Running Client via Network Connections**

You can operate Client over PPP, SLIP, or RAS network connections. Be aware though, that some restrictions on features exist. See "Operating Constraints".

## **Display in VGA Mode**

There are numerous issues involving the use of Client on a system with standard, VGA resolution. The Storage window requires a minimum amount of screen space to properly display its contents. When you use VGA display resolution, screen space becomes more limited. It is highly recommended that you use Client with a minimum of SVGA (800x600) display resolution.

## **Tuning Fault Notification**

For faster fault notification, remove any unused host system names in the client.ini file for each of your Agent programs. Inactive systems may force time-outs that slow Client response to your commands. Also, ensure that you are not using event notification while using RAS connections. See "Delayed Event Notification on RAS Connections" in the next section, for more details.

### **Paging and Event Logging Continues After Client Is Terminated**

In certain situations, you may experience continuing paging and Window NT Event Logging in response to subsystem faults, even though Client is not running. This behavior is normal and is a result of paging and Event Logging activity started by Client when it was running. Client's Asynchronous Event Services (AES) module runs under either Windows NT or Windows 95 as a Service, and continues to run, even after Client itself has terminated.

The AES module communicates with Agents whenever it is running, and activates paging and Event Logging when a subsystem event occurs. In Windows NT, to terminate paging and Event Logging after Client has been closed, go to the Services section of Control Panel, select the "AsyncEventSvc" Service, and stop it. In Windows 95, the state of the AES module and a control for it are available in Control Panel as a separate icon named "ASYNCEVENTSVC".

### **Setting Up Pager Notification**

You may need to tune the pager notification feature for proper functioning with certain pager systems. The pager feature supports both alphanumeric and numeric pagers and allows for notification of multiple pagers. You can select multiple pagers to be notified for multiple storage subsystems within different blocks of time. You can also temporarily disable any pager. Use the following procedure to set up and tune the pager notification system:

1. In Navigation Tree, select Options/Event Notification/User Profile.
2. Click on New and enter the name of the person to be notified.
3. Select the Pager folder and enter the person's pager number, along with any prefixes required to reach the outside phone system. It is good practice to place delays as commas (,) after any exchange switch that might occur. Each comma results in two seconds of delay.  
  
An example is:  
8,,1, 800,5551212.  
  
In this example, there is a 4-second delay between the 8 and the 1.
4. Select the Alphanumeric box if the paging system supports it. Leaving the box blank results in numeric paging only.
5. Click on the Enabled box to enable paging to this person.
6. Enter the start and end times that this person is available for paging. If you want 24 hour coverage, enter a start time of 0:00 and an end time of 24:00. You must enter a time period for paging. Leaving the start and end times at 0:00 has the effect of canceling paging for this person.
7. Close the User Profile menu.
8. Select Options/Event Notification/Notification List, to list all of the persons to be notified as a named group. (Later, you will be able to assign these groups to individual systems.) You can enter a description along with the name to state such information as times and subsystems that this person supports.
9. If you're using numeric paging, you can view the failure codes that are used under Options/Event Notification/Pager codes.
10. To set the communications port and baud rate for the pager modem, select Options/Preferences to view the Event Notification Preferences menu. You can also set the subsystem polling interval on this menu.

11. You can establish paging on three separate levels: You can establish paging on all levels on any combination of levels.
  - My Enterprise - Notifies all notifications list listed here for problems on all systems and subsystems.
  - Highlight "My Enterprise" in the Navigation tree and then select /File/Properties/Event Notification from the menu. Clicking on the Notification List box will list all of the lists you have created. Choice the list for persons that should be notified in case of a failure on any system.
  - System Level - Notifies all notifications lists listed here for problems on the specific system and all its subsystems selected.
12. Highlight the desired system name in the Navigation tree and then select /File/Properties/Event Notification from the menu. Clicking on the Notification List box will list all of the lists you have created. Choice the list for persons that should be notified in case of a failure on any subsystem of this specific system.
13. Subsystem Level - Notifies all notifications lists listed here for problems on the specific subsystem selected.

### Operating Parameters of Partition Virtual Disks

Keep in mind that virtual disks based on partitions on any container are all closely related. They all share the same target and operating parameters of the container. If you change any of this information for one partition on the container, it automatically changes for all the partitions on that container.

### 8.8 Operating Constraints

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

### Compatibility Among Product Versions

#### CAUTION

Pay particular attention to the instructions below for uninstalling existing Client and Agent components from your local system. Failure to remove existing components before installation may result in Windows Registry corruption.

Version 2.x software components are not compatible with version 1.1 components, and operation with mixed components is not supported. You must uninstall your version 1.1 software, including Clients and Agents, before you install version 2.x components.

Use the instructions that came with your version 1.x software to uninstall it. Before you install your new Client software, you must uninstall any existing version 2.x CLI Window. Use the Windows NT or Windows 95 "Add/Remove Programs" feature or the instructions that came with your existing software to uninstall it. The installation program will install a newer CLI Window version in your old version's place.

Before you install your new Client software, you must uninstall any existing Version 2.x Storage Window of the same type as the one you wish to install. Use the Windows NT or Windows 95 "Add/Remove Programs" feature or the instructions that came with your existing software to uninstall it. The installation program will install a newer Storage Window version in your old version's place.

Note that, in configurations with existing version 2.x components, you need not remove the Navigation Tree components. You also need not remove any Storage Window components other than one matching the one you wish to install. The installation program will install your new Client Storage and CLI Windows seamlessly under your existing Navigation Tree.

### **Failover Mode Set in CLI**

Client is intended to be used to configure and monitor your storage only, and there are some functions available in the CLI that are not available in graphic form in the GUI. If you wish to use your controller's multiple-bus failover mode, you must enable and control that function via the CLI. Also, if you wish to use virtual disk preferencing in multiple-bus failover mode, you must set your virtual disk preferences via the CLI when you set the failover mode.

### **Code Load Not Supported**

The array controller's software-upgrade function is not supported in version 2.1. Do not use the menu options for upgrading your controller's software.

### **Limitation on Host Access ID Settings**

There is a limitation on the host access ID settings in the virtual disk properties sheets. You can use either the "ALL" setting or you can specify a single host target ID. You cannot specify multiple target IDs in the dialog box.

### **Add Virtual Disk Wizard Limits Member Quantities**

The Add Virtual Disk wizard limits the number of members for RAID 0 virtual disks to 14. It also limits the number of members of RAID 0+1 virtual disks to 28.

**Table 4 Feature Limitations**

<b>Feature Connection Type</b>	<b>Create Virtual Disk</b>	<b>Delete Virtual Disk</b>	<b>Fault Events: Client Visual Notification</b>
Local Serial Connection (Navigation tree and Agent not used)	Supported	Supported	Supported
Local SCSI Bus Connection (Navigation Tree and Agent not used)	Supported	Supported	Supported
Local Network Connection (Client and Agent running on the same host)	Supported	Supported	Supported
Remote network Connection (Client running on a PC remote from Agent on a host)	See Note*	See Note*	See Note*
Remote RAS Connection (Client running on a remote PC with a dialup network connection)	See Note*	See Note*	See Note**
Local Serial Connection (Navigation Tree and Agent not used)	Not Supported	Not Supported	Not Supported
Local SCSI Bus Connection (Navigation Tree and Agent not used)	Not Supported	Not Supported	Not Supported
Local Network Connection (Client and Agent running on the same host)	Supported	Supported	Supported
Remote Network Connection (Client running on a remote PC with a dialup network connection)	See Note*	See Note*	See Note*
Remote RAS Connection (Client running on a remote PC with dialup network connection)	See Note *	See Note *	Supported

\*Supported, but not recommended. Follow-up operating system configuration cannot be performed remotely.

\*\*Supported reliably only while RAS intact. Some events may be missed while dialup connection is broken.

### **Delayed Event Notification on RAS Connections**

Visual fault notification, paging, and NT Event Logging may be delayed significantly in situations where RAS connections are used for multiple Clients. An Agent with multiple Clients in its client.ini file must poll each Client whenever a fault occurs. Any Clients not currently network-connected significantly delay this process, because Agent must wait for their connections to time out before moving on to the other Clients. To avoid this situation, set the notification\_method parameter for each Client in the client.ini file to "0", to defeat event fault notification.

### **CLI RUN Commands**

Do not issue RUN commands in the CLI Window. Use only a maintenance terminal connection to issue RUN commands.

### **Creating Partition Units Across Targets or Ports**

Be aware that the name you pick for a unit assigns it to a particular host bus target. If you create a unit from free space on a device, the program forces you use a unit name that puts the unit on the same host target as the other partitions on the device. On dual-port array controllers, partitions on the same device that are assigned to different host ports are not supported.

### **Avoiding Problem Situations**

In certain situations, under specific conditions, you may experience unusual behavior with the software. This section presents information to help you to avoid such situations and to recover from them if they occur.

### **Mirrored Cache Mode Not Retained After Configuration Restore**

If you restore your controller configuration from a configuration file, the mirrored cache setting may not be properly enabled. You must restore the mirrored cache setting manually, using a CLI Window.

### **Error Message on Exiting Storage Window**

Under certain conditions, when you exit a Storage Window, you may experience an "Illegal Operation Error" message. You may ignore this message.

### **Inappropriate Error Message on Device Delete**

If you select a disk, then chose Device/Delete, a dialog box may appear, asking "Are you sure?" If you choose the "NO" option, the message "Nothing selected to delete!" is displayed. You may ignore this message.

### **Cache Policy Not Shown in Controller Properties Sheet**

The array controller cache-policy may not be properly shown in the controller properties sheet. The field may be blank. You must use a CLI Window to obtain the cache-policy setting.

### **Incorrect Capacity Shown in Add Virtual Disk Wizard**

In some circumstances, in Step 3 of the Add Virtual Disk wizard, if you specify a capacity greater than the available disk capacity, an error message results. If you back up to Step 2 of the wizard and return to Step 3, the correct capacity is then displayed. An attempt to move to Step 4 of the wizard at this point, however, results in the same error message, even though the correct capacity is shown. To complete your virtual disk, you must exit the wizard and attempt to recreate the virtual disk.

### **Storage Window Corruption While Deleting a Virtual Disk**

In some circumstances, if you delete and confirm deletion of a RAID-based virtual disk, a "Subsystem Connection Status" window may be displayed, and the Storage Window goes blank. The Storage Window may remain blank for several seconds until the "Subsystem Connection Status" window disappears.

### **Application Errors When Restarting Agent**

You may experience an "application error" error when attempting to restart Agent after manually changing the Agent configuration files. Either of the following issues may be the cause:

- The client.ini file must end with a carriage return. If any other character terminates the file, it may cause an application error.
- The storage.ini file must not end with a carriage return. If a carriage return terminates the file, it may cause an application error.

### **False Restart Message on Agent Installation**

When you first install a Windows NT Agent, and you modify more than one configuration parameter, the installation program may prompt you with a message indicating the Agent must be "restarted" even though it has not yet been completely installed. You may ignore this message, and you must respond to the subsequent prompt, "Would you like to start the Agent service now?" by answering "Yes".

### **Client Access Changes Not in Effect**

After manually editing or changing the Agent client.ini file with a configurator program, you may notice that your Clients' access has not changed. To place your changes in effect, you must restart the SWCC Agent after editing any of the Agent configuration files.

### **Reconfiguration After Controller Replacement**

If you replace either of the array controllers in your subsystem, you must reconfigure your Agent storage.ini file to match the serial numbers of the new hardware. See your Agent documentation for details on reconfiguring your storage.ini file.

### **Storage Window Won't Open**

If you cannot open a Storage Window from the Navigation Tree or in standalone mode, the client.ini ACCESS\_ALLOWED parameter for your Client is probably set to "0", disabling Storage Window access. Use the Agent configuration script or edit the client.ini file to enable access to the subsystem.

### **Configuration File Deleted on Reinstallation or Upgrade**

Make sure to save a copy of the current swcc2.mdb file to another directory if you intend to reinstall or upgrade Client. If you uninstall the program, you may inadvertently delete the swcc2.mdb file. This file contains your configuration of host systems and storage subsystems used in the Navigation Tree window display. To reinstate your current Navigation Tree window configuration after installing a new version of Command Console, copy your saved swcc2.mdb file back to the directory in which you installed Command Console.

### **Character Limit on Max Cached Transfer Quantity Entry**

There is a four-character limit on the maximum cached transfer entry field in the Advanced Options dialogue box accessed when creating virtual disks. The range of acceptable entries is 1-1024. Do not enter more than four digits in this field, as it may terminate Client with an error.

### **Invalid Network Port Numbers During Installation**

During Client or Agent installation, you may experience an error if the installation program cannot find an acceptable pair of network port numbers. Your client uses Windows sockets (sometimes called "network ports") to communicate with its Agents. The socket numbers at the Client and Agent ends must match for network communication to occur. In Windows NT the socket numbers are assigned in the service file in the \winnt\system32\drivers\etc subdirectory.

In Windows 95, the socket numbers are assigned in the services file in the \windows"directory.

### **Network Port Assignments for UNIX-Client/Server Systems**

A UNIX host may use Network Information Services (NIS) to serve the services file containing its network port assignments. Agent must use the services file to determine which network ports to use. Because of this requirement, you may need to configure your system so that Agent can access the proper services file.

### **Error on First Attempt to Make Connection**

You may experience a system error such as a "Command Execution Error" on your first attempt to make a network connection using the Storage Window. If this happens, try the connection again, and it will succeed.

### **Client Hangs When Virtual Disk Deleted**

If Client is monitoring a particular subsystem, and you delete the virtual disk being used to communicate with that subsystem, the program may hang. To delete the virtual disk Client is using for communications with an Agent, you must first reassign another virtual disk as the communications LUN, using the Agent configurator. If you are using the Command Console LUN (CCL) as your communications LUN, and you disable it, Client may lose its connection with your subsystem. If you wish to disable the communication LUN, you must first reassign another virtual disk as the communications LUN.

### **Missing Tabs in Search Menu in Help**

When you select the Search button in Command Console Help, Windows Help may not display an Index or Find Tab. To prevent this problem, delete any hidden files with a .GID extension that are in the Command Console directory. The WinHelp engine uses .GID files to construct the Index and Find Tabs. If the files are corrupted, the engine may not display one or both of the tabs. Deleting the files causes the engine to reconstruct the .GID files.

### **Invalid Cache Errors**



Your controller module, cache module, and subsystem devices all contain configuration information used to keep their activity synchronized. This data is called metadata. The controller software reports an invalid cache error on the affected controller in situations in which there is a mismatch between the metadata in the controller module and a cache module containing unwritten data. This mismatch can result in loss of the unwritten cache data if the error is not cleared properly.

**CAUTION**

Use extreme care in responding to the Command Console invalid cache error prompt.

If you inappropriately instruct the program to delete unwritten cache data, you may lose valid user data. Client displays a message and prompt box when an invalid cache error occurs. You must tell the program whether or not to delete unwritten cache data as the error is cleared. If you are not familiar with the proper treatment of unwritten cache data, see the information in the on-line Help documentation under the topic "Invalid Cache Errors."

**Communications Failure on Power Up with Low Batteries**

If the battery in your cache is discharged when you power up the array controller, the controller may produce an invalid cache error. If you are using Client as your controller interface at that time, the error may prevent communication with the controller. In this case, the controller status bar in Client changes to yellow, and the program displays a window containing error information. To clear the error, you must exit Client and use a normal controller maintenance terminal to issue the `CLEAR ERRORS INVALID_CACHE` command before you can use the controller. See your controller documentation for instructions on use of the `CLEAR ERRORS INVALID_CACHE` command.