

Release Notes

hp StorageWorks HSG60 and HSG80 Controller and HSx80 Cache Module Replacement Procedures for Array Controller Software V8.7x-x

Product Version: V8.7, V8.7-1, V8.7-2, V8.7-3

First Edition (October 2003)

Part Number: AA-RUQ2A-TE

This document details updated procedures for replacing HSG60 and HSG80 controllers and HSx80 cache modules that use Array Controller Software (ACS) V8.7x-x. For the latest Release Notes versions and related information, see the HP storage website at <http://h18006.www1.hp.com/products/storageworks/acs/index.html>.



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HP StorageWorks HSG60 and HSG80 Controller and HSx80 Cache Module Replacement
Procedures for Array Controller Software V8.7x-x Release Notes
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About this Document

This section covers the following subsections:

- [Release Notes Information](#), page 3
- [Intended Audience](#), page 3
- [Other Documentation](#), page 4

Release Notes Information

These Release Notes cover the following major topics:

- [What's New](#), page 5
- [Special Considerations](#), page 7
- [Replacing HSG60 and HSG80 Controllers in Single and Dual-Redundant Controller Configurations](#), page 14
- [Replacing HSx80 Cache Modules in Single and Dual-Redundant Controller Configurations](#), page 34
- [Troubleshooting](#), page 51
- [Software Anomalies](#), page 59

Intended Audience

This document is intended for customers who purchased the following controllers or cache modules with HP StorageWorks Array Controller Software (ACS) V8.7x-x and plan to replace one of the following components:

- HP StorageWorks HSG80 controller
- HP StorageWorks HSG60 controller
- HP StorageWorks HSx80 cache module

This document is also for HP technical support personnel who service HSG60 or HSG80 controllers and HSx80 cache modules.

Other Documentation

Additional and recently published documentation, including white papers and best practices documents, are available through the HP website at <http://www.hp.com>. You may also refer to the ACS documents listed in [Table 1](#) for other pertinent information.

Table 1: List of Related Documents and Part Numbers

Item	Document Title	Part Number
1	<i>HP StorageWorks HSG80 Array Controller V8.7 Maintenance and Service Guide</i>	EK-G80MS-SA
2	<i>HP StorageWorks HSG80 Array Controller V8.7 CLI Reference Guide</i>	EK-G80CL-RA
3	<i>HP StorageWorks HSG80 Array Controller V8.7 Troubleshooting Guide</i>	EK-G80TR-SA
4	<i>HP StorageWorks Addendum for ACS Solution Software Version 8.7 Differences Between HSG60 and HSG80 Array Controllers Addendum</i>	AV-RS8CA-TE
5	<i>HP StorageWorks HSG80 ACS V8.7-1 Upgrade Procedures for Windows NT and Windows 2000 Host Systems</i>	AA-RTE0A-TE
6	<i>Data Replication Manager HSG80 ACS Version 8.7P Configuration Guide</i>	AA-RPHZE-TE

What's New

These Release Notes address procedural enhancements for replacing any of the following HP hardware devices that use ACS V8.7x-x. HP StorageWorks HSG80 controller.

- HP StorageWorks HSG60 controller
- HP StorageWorks HSx80 cache module

Note: The information in these Release Notes supersedes all other HSG60 and HSG80 controller and HSx80 cache module replacement procedures, including procedures detailed in the *HP StorageWorks HSG80 Array Controller V8.7 Maintenance and Service Guide*.

Specific ACS version changes are summarized below:

- ACS V8.7, V8.7-1, and V8.7-2 Changes
 - The program card must *not* be installed before the replacement controller is inserted.
 - The controller **Port #5** button must be pressed at the same time as the controller **Reset** button when you insert the program card into its bay during a new controller installation.
 - The baud rate for the replacement controller after it is installed now changes to 19200 after a **Port #5** button reset.
- ACS V8.7-3 Changes
 - The program card must *not* be installed before the replacement controller is inserted.
 - The **Port #5** button must be pressed at the same time as the **Reset** button when you insert the program card into its bay during a new controller installation.
 - The **Port #5** button reset clears the nonvolatile random access memory (NVRAM) cache configuration information.
 - The *Field Replacement Utility (FRUTIL)* output states that the halt LED code is 33 appropriately.

- The baud rate for the replacement controller changes to 9600 after the **Port #5** button reset during the replacement controller installation.
- *FRUTIL* inhibits you from selecting the option to install both controller and cache module on the **Install options** menu.

Refer to the “[Software Anomalies](#)” section on page 59 for information on anomalies associated with ACS V8.7x-x.

Special Considerations

Before using the procedures covered in these Release Notes, review the following subsections:

- [Replacing Modules When Both Controller and Cache Module Have Been Removed](#), page 7
- [ACS Versions Affected](#), page 8
- [Enclosures](#), page 8
- [Replacement Controller Configuration and Cache Module Prerequisites](#), page 10
- [Controller Replacement in DRM Configurations](#), page 10
- [Technical Support](#), page 13

Replacing Modules When Both Controller and Cache Module Have Been Removed

With ACS V8.7, V8.7-1, and V8.7-2, *FRUTIL* allows you to install both the controller and cache module during the same procedure. However, HP does not recommend replacing the controller and cache module in one procedure. HP recommends that you follow the appropriate instructions in the “[Installing an HSx80 Cache Module in Dual-Redundant Controller Configurations](#)” section which starts on page 45 or the “[Installing an HSG60 or HSG80 Controller in Dual-Redundant Controller Configurations](#)” section which starts on page 26.



Caution: With ACS V8.7, V8.7-1, and V8.7-2, *FRUTIL* allows you to install both the controller and cache module in the same process. HP does not recommend this. Replacing both the controller and cache module at the same time can result in loss of controller configuration information and will render the controller unusable.

Note: With ACS V8.7-3, *FRUTIL* prohibits you from installing both the controller and cache module in one process.

ACS Versions Affected

The information in these Release Notes applies to the following ACS versions:

- ACS 8.7F ■ ACS 8.7G ■ ACS 8.7L ■ ACS 8.7P ■ ACS 8.7S
- ACS 8.7-1F ■ ACS 8.7-1G ■ ACS 8.7-1L ■ ACS 8.7-1P ■ ACS 8.7-1S
- ACS 8.7-2F ■ ACS 8.7-2G ■ ACS 8.7-2L ■ ACS 8.7-2P ■ ACS 8.7-2S
- ACS 8.7-3F ■ ACS 8.7-3G ■ ACS 8.7-3L ■ ACS 8.7-3P ■ ACS 8.7-3S



Caution: Do not use the procedure in these Release Notes with any other controller ACS version. These Release Notes pertain to all ACS versions noted above. Failure to follow this precaution can result in erasure of controller configuration information, and the controller can become unusable.

Enclosures

These procedures apply to HSG60 and HSG80 controllers and HSx80 cache modules in one of the following enclosures:

- HP StorageWorks BA370 enclosure (see [Figure 1](#))
- HP StorageWorks M2100 or M2200 enclosures (see [Figure 2](#))

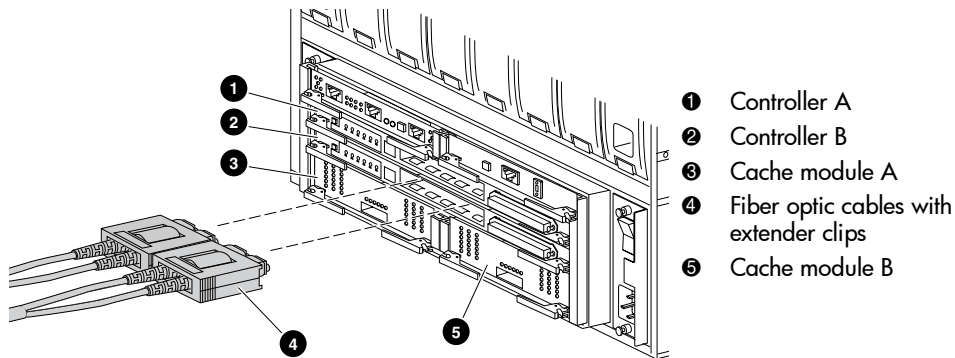


Figure 1: Dual-redundant controller and cache module setup in a BA370 enclosure

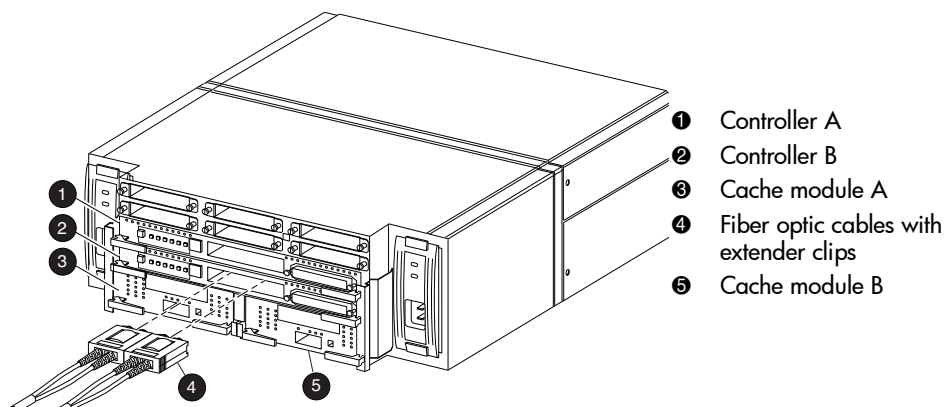


Figure 2: Dual-redundant controller and cache module setup in a M2100/M2200 enclosure

Replacement Controller Configuration and Cache Module Prerequisites

Note the following prerequisites before starting replacement procedures:

- **Hardware Compatibility**—The replacement controller hardware *must* be compatible with the remaining controller hardware. Refer to product-specific release notes and documentation for information regarding hardware compatibility.
- **Software Compatibility**—The software versions and patch levels of the replacement controller *must* be the same as that of the operational controller or the controller being replaced.
- **Cache Module Memory Configuration**—The replacement cache module normally uses DIMMs from the cache module being replaced. When replacing DIMMs, you *must* install DIMMs in the replacement cache module in same position as they were in the cache module that is being replaced.
- **Facility Baud Rate**—Record the baud rate of the operational controller.



Caution: Failure to use a newly initialized controller causes cache corruption on the replacement controller mirrored cache.

Controller Replacement in DRM Configurations

Perform the procedure in the following subsections if a controller in Data Replication Manager (DRM) configuration needs to be replaced. [Figure 3](#) on page 11 provides a graphical illustration of the controller replacement process for DRM configurations.



Caution: In DRM configurations, use a factory-provided or newly initialized (configuration-free) controllers to avoid mirrored cache corruption on the replacement controller or recursive bugchecks (OCP code 25) on both initiator controllers.

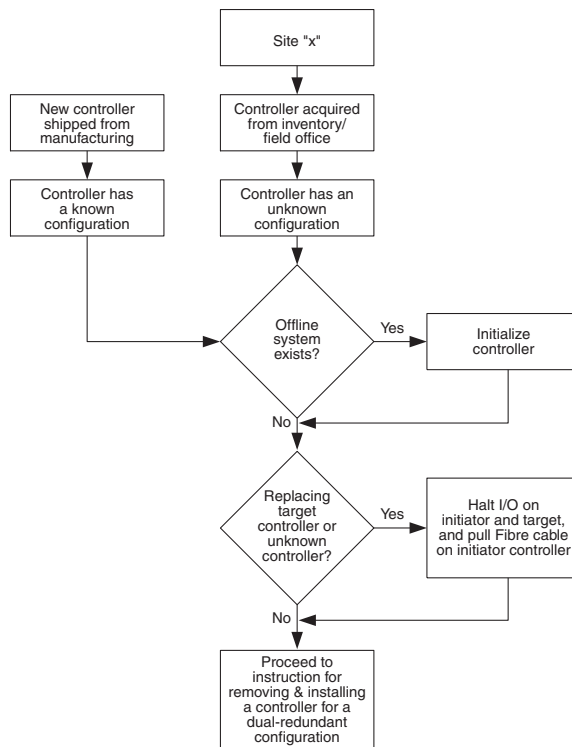


Figure 3: Controller replacement process for DRM configurations

Replacing a Controller With an Unknown Status

Perform the following procedures to initialize your controller configuration if you are unsure of your replacement controller configuration.

1. Determine whether you have an offline or non-DRM-configured subsystem, and then complete one of the following options:
 - Complete the following substeps if you have an offline or non-DRM-configured subsystem:
 - a. Remove a controller from the non-DRM-configured subsystem by completing the instructions in the [“Removing an HSG60 or HSG80 Controller in Dual-Redundant Configurations”](#) section which starts on page 21.

- b. Complete [step 1](#) through [step 7](#) of the “[Installing an HSG60 or HSG80 Controller in Dual-Redundant Controller Configurations](#)” section (which starts on page 26) to initialize the replacement controller in the non-DRM-configured subsystem.
The replacement controller is initialized with no configuration.
- c. Remove the replacement controller from the non-DRM-configured subsystem.
- d. Reinsert the controller that was removed in [substep a](#) above, and complete [step 8](#) through [step 11](#) (see page 32) in the “[Installing an HSG60 or HSG80 Controller in Dual-Redundant Controller Configurations](#)” section.
- Complete the following substeps if you do *not* have an offline or non-DRM-configured subsystem:
 - a. Halt all I/O on the initiator and target sites of the DRM configuration.
 - b. Dismount all units associated with the DRM configuration.
 - c. Disconnect the host port Fibre cables from all DRM controllers (initiator and target).
 - d. Remove a controller by completing the instructions in the “[Removing an HSG60 or HSG80 Controller in Dual-Redundant Configurations](#)” section which starts on page 21.
 - e. Initialize and install the new controller by completing the instructions in the “[Installing an HSG60 or HSG80 Controller in Dual-Redundant Controller Configurations](#)” section which starts on page 26.
 - f. Reconnect the host port Fibre cables to all of the DRM controllers (initiator and target).
 - g. Remount the units that were dismantled in [substep b](#) above.
 - h. Start all jobs that were halted in [substep a](#) above.

Replacing a Controller With a Known Status

Perform the following procedures when the configuration of the replacement controller is known.

1. Determine whether the controller to be replaced is a target controller, and then complete one of the following options:
 - Proceed to the “[Replacing HSG60 and HSG80 Controllers in Dual-Redundant Controller Configurations](#)” which starts on page 20 if the controller to be replaced is *not* a target controller.
 - Complete the following substeps if the controller to be replaced is a target controller:
 - a. Halt all I/O on the initiator and target sites of the DRM configuration.
 - b. Dismount all units associated with the DRM configuration.
 - c. Disconnect the host port Fibre cables from all DRM controllers (initiator and target).
 - d. Remove the controller by completing the instructions in the “[Removing an HSG60 or HSG80 Controller in Dual-Redundant Configurations](#)” section which starts on page 21.
 - e. Install the controller by completing the instructions in the “[Installing an HSG60 or HSG80 Controller in Dual-Redundant Controller Configurations](#)” section which starts on page 26.

Technical Support

If you encounter controller or cache module installation or removal problems, contact HP technical support. Telephone numbers for worldwide technical support are listed on the HP website at <http://www.hp.com/support>.

Replacing HSG60 and HSG80 Controllers in Single and Dual-Redundant Controller Configurations

Use the procedures in this section to replace a controller in either single or dual-redundant controller configurations.

This section contains the following topics:

- [Replacing HSG60 and HSG80 Controllers in Single Controller Configurations](#), page 14
- [Replacing HSG60 and HSG80 Controllers in Dual-Redundant Controller Configurations](#), page 20



Caution: Electrostatic discharge (ESD) can easily damage the controller. Wear a snug-fitting, grounded ESD wrist strap when completing controller removal and installation procedures.

Replacing HSG60 and HSG80 Controllers in Single Controller Configurations

To remove or replace an HSG60 or HSG80 controller in a single controller configuration, follow the instructions in this subsection.

Removing a Controller in Single Controller Configurations

Perform the following steps to remove a controller in a single controller configuration.

1. Connect a PC or terminal to the controller maintenance port (see [Figure 4](#) on page 15) if the controller is operational. If the controller is not operational, proceed to [step 7](#).

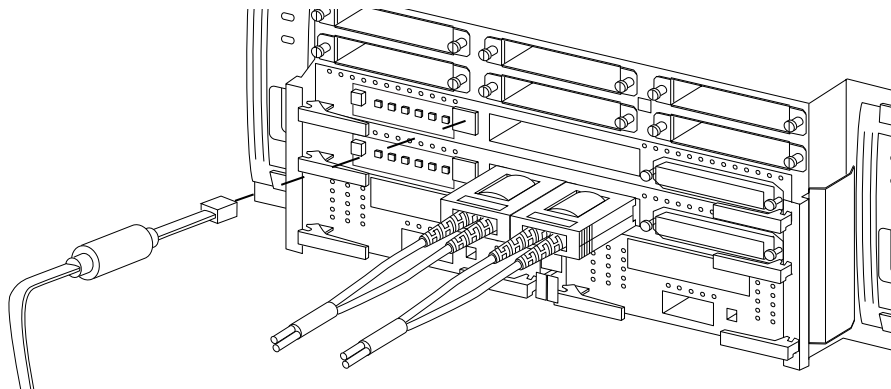


Figure 4: Connecting PC and terminal cables to the controller maintenance port (dual-redundant configuration shown)

2. From the host console, halt all host activity to the controller, and dismount the logical units in the subsystem.
3. If you are using Microsoft® Windows® NT® or Windows 2000, shut down the server.
4. Run the *Fault Management Utility (FMU)* to obtain the last failure codes, if necessary.
5. Determine whether the disk was initialized with the `SAVE_CONFIGURATION` switch, and then perform one of the following options:
 - Locate existing information that will support the manual configuration of the subsystem, and then proceed to [step 6](#) if the disk was not initialized with the `SAVE_CONFIGURATION` switch.
 - Enter the following Command Line Interpreter (CLI) command from the controller prompt to save the current device configuration for “this controller” if the disk was initialized with the `SAVE_CONFIGURATION` switch:

```
CONFIGURATION SAVE
```

6. Shut down “this controller” with the following command:

```
SHUTDOWN THIS_CONTROLLER
```

Note: After the controller shuts down, the **Reset** button and the first three LEDs turn on (see [Figure 5](#)). This might take several minutes to occur, depending on the amount of data that needs to be flushed from the cache module. Proceed only after the **Reset** button stops flashing and remains on.

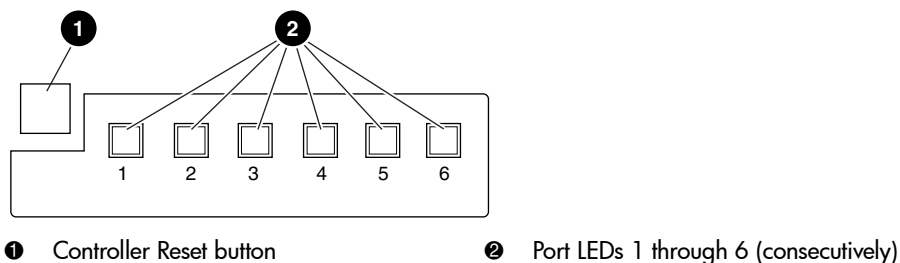


Figure 5: [Controller LEDs and Reset button



Caution: The cache module might contain unwritten data if the controller crashes and it is not shut down with the `SHUTDOWN THIS_CONTROLLER` command. Loss of data could occur.

7. Remove the program card ESD cover (see [Figure 6](#)) and the program card, and save them in an antistatic bag or on a grounded antistatic mat for the replacement controller.

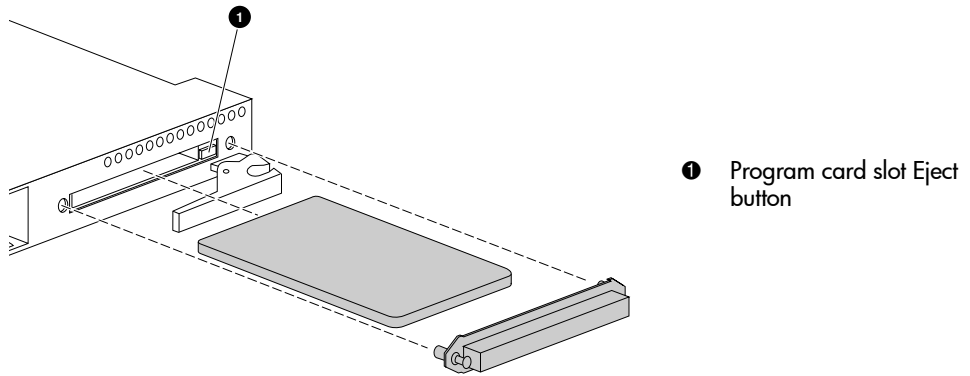


Figure 6: Removing the controller ESD cover

8. Disconnect all host bus cables or terminators from the controller.

Note: Use thin needle nose pliers to disconnect the cables if the extender clips are not installed on the optical cables.

9. If connected, disconnect the PC or terminal from the controller maintenance port.
10. Disengage both retaining levers (see [Figure 7](#)), remove the controller, and then place the controller in an antistatic bag or on a grounded antistatic mat.

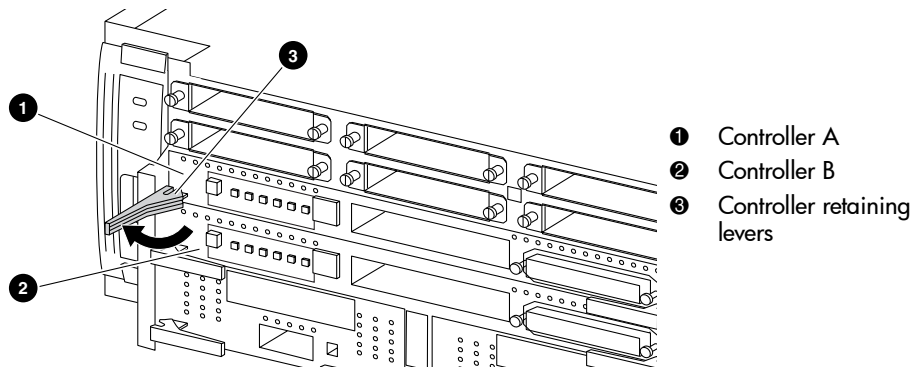


Figure 7: Disengaging the controller retaining levers (dual-redundant configuration shown)

Installing a Controller in Single Controller Configurations

Perform the following steps to install a controller in a single controller configuration.



Caution: Carefully align the controller in the appropriate guide rails. Misalignment could damage the backplane.

Note: Ensure that the program card is not installed in the controller.

1. Insert the replacement controller into Controller A bay and engage the retaining levers.
2. Connect a PC or terminal to the controller maintenance port.
3. Press and hold the **Reset** button while inserting the program card into the controller.
4. Without releasing **Reset** button, press and hold the **Port #5** button on the controller.
5. Release the **Reset** button.

The controller resets its internal configuration cache and halts with an OCP code 33. LEDs 6, 5, 2, and 1, and the **Reset** button LED light up.

For ACS V8.7, V8.7-1, and V8.7-2, the controller resets its baud rate to 19200.

For ACS V8.7-3, the controller resets its baud rate to 9600.

6. Release the **Port #5** button.
7. Press and release the **Reset** button.

The controller restarts. This process may take up to three minutes.

Note: Perform the following steps if the controller did not restart:

1. Press and hold the **Reset** button.
 2. Reseat the controller program card.
 3. Release the **Reset** button.
-

8. Display details about the configured controller by entering the following command:

```
SHOW THIS_CONTROLLER FULL
```
9. Determine whether the cache is good, and then perform one of the following options:
 - Refer to [Table 3](#) through [Table 5](#), as applicable, if the cache is *not* good.
 - Proceed to the next step if the cache is good.
10. Configure the controller as described in the appropriate array controller user guide or CLI reference guide.
11. Determine whether the current device configuration is saved on a disk drive, and then perform one of the following options:
 - Manually restore the current device configuration using existing information and the appropriate array controller user guide or CLI reference guide if the current device configuration is not saved on a disk drive.
 - Automatically restore the configuration by entering the following command below if the current device configuration is saved on a disk drive:

```
CONFIGURATION RESTORE
```
12. Determine whether configuration restore process completed successfully, and then perform one of the following options:
 - Perform the following substeps if the configuration restore process did not complete successfully.
 - a. Reset the PC or terminal baud rate to match the original configuration of the controller.
 - b. Repeat [step 9](#) and [step 10](#).
 - c. Proceed to the next step after a successful configuration.
 - Proceed to the next step if the configuration restore process completed successfully.
13. Connect all host bus cables or terminators to the controller.
14. Mount the logical units on the host.
15. Restart the server if you are using Windows NT or Windows 2000.

16. Disconnect the PC or terminal from the controller maintenance port.
17. Install the program card ESD cover (see [Figure 6](#) on page 17).

Replacing HSG60 and HSG80 Controllers in Dual-Redundant Controller Configurations

Follow the instructions in this subsection to remove or replace an HSG60 or HSG80 controller in a dual-redundant controller configuration.



Caution: With ACS V8.7, V8.7-1, and V8.7-2, *FRUTIL* allows you to install both the controller and cache module in the same process. HP does not recommend this. Replacing both the controller and cache module at the same time can result in loss of controller configuration information and will render the controller unusable.

Note: With ACS V8.7-3, *FRUTIL* prohibits you from installing both the controller and cache module in one process.



Caution: Electrostatic discharge (ESD) can easily damage the controller. Wear a snug-fitting, grounded ESD wrist strap when completing controller removal and installation procedures.

To differentiate on which controller activity is being completed, symbols are displayed in the margin of text for your convenience. [Table 2](#) describes those symbols.

Table 2: Replacement Procedure Symbols

Symbol	Description
▲	Indicates that the procedural step must be completed for the <i>operational</i> controller, which is <i>not</i> being replaced.
↻	Indicates that the procedural step must be completed for the <i>controller or cache module that has failed or is to be replaced</i> .
🎯	Indicates that the procedural step must be completed for the <i>field replaceable unit (FRU), new or replacement controller, or new or replacement cache module being installed</i> .

Removing an HSG60 or HSG80 Controller in Dual-Redundant Configurations

Perform the following steps to remove a controller in a dual-redundant controller configuration.

1. *If the controller to be replaced (↻) is functional, complete the following substeps. Otherwise, go to [step 2](#) below.*
 - a. Connect a PC or terminal to the maintenance port of the controller.
 - b. Press **Enter** or **Return** 2 or 3 times to display the controller prompt.
 - c. Start the *Virtual Terminal Display (VTDPY) Utility* by entering the following command:


```
RUN VTDPY
```
 - d. Record which units have I/O activity.
 - e. Exit *VTDPY* by pressing **Ctrl+Y**.
 - f. Restart the controller by entering the following command:


```
RESTART THIS_CONTROLLER
```

Note: Restarting the controller ensures that the unit persistent reservation flags transfer to the operational controller.

- g. Disconnect the PC or terminal from the maintenance port.
2. For the operational controller (▲), complete the following substeps:
 - a. Connect a PC or terminal to the maintenance port of the operational controller (see [Figure 4](#) on page 15).

Note: The controller connected to the PC or terminal becomes “this controller.” The controller being removed becomes the “other controller.”

- b. Set the terminal baud rate to match the controller baud rate, and then press **Enter** or **Return** 2 to 3 times to display the controller prompt.
- c. Display and note configuration information (for example, the Failover mode, Cache mode, serial numbers, SCSI mode, and so forth) for the operational controller by entering the following command:


```
SHOW THIS_CONTROLLER
```

- ▲ d. Verify that the I/O for the controller that is being replaced fails over to the operational controller (see [step 1d](#) above) by entering the following command:

```
RUN VTDPY
```

Note: In Transparent Failover mode, units that failed over due to a `RESTART` command will revert back to preferred controller after about 1 minute.

- ▲ e. Exit `VTDPY` by pressing **Ctrl+Y**.

- ▲ f. Disable Failover mode, and take the controllers out of the dual-redundant configuration by entering the following command:

```
SET NOFAILOVER
```

- ↻ 3. For the controller to be replaced (↻), complete the following substeps:

- ↻ a. Make sure that the **Reset** button (see [Figure 5](#) on page 16) is a constant green.

- ↻ b. Remove the program card ESD cover (see [Figure 6](#) on page 17).

- ↻ c. Remove the program card from the controller being replaced by pressing the program card slot **Eject** button (see [Figure 6](#) on page 17).

- ↻ d. Save the ESD cover and program card in an antistatic bag or on a grounded antistatic mat for use with the replacement controller.

- ▲ 4. For the operational controller, complete the following substeps:

- ▲ a. Start `FRUTIL` by entering the following command:

```
RUN FRUTIL
```

`FRUTIL` automatically asks if you intend to replace the controller cache battery.

- ▲ b. Enter **N(o)**. The **FRUTIL Main Menu** is displayed (see [Figure 8](#) or [Figure 9](#), as applicable).

```
FRUTIL Main Menu:
1. Replace or remove a controller or cache module
2. Install a controller or cache module
3. Replace a PVA module
4. Replace an I/O module
5. Exit

Enter choice: 1,2,3,4,5 ->
```

Figure 8: FRUTIL Main Menu for a controller in a BA370

```
FRUTIL Main Menu
1. Replace or remove a controller or cache module
2. Install a controller or cache module
3. Replace an I/O module
4. Exit

Enter choice: 1,2,3,4 ->
```

Figure 9: FRUTIL Main Menu for a controller in a M2100/M2200 enclosure

- ▲ c. Enter option **1** to remove the controller or cache module. The **Replace or remove Options** screen is displayed (see [Figure 10](#)).

```
Replace or remove Options:
1. Other controller and cache module
2. Other controller module
3. Other cache module
4. Exit

Enter choice: 1,2,3,4 ->
```

Figure 10: Replace or remove Options screen

- ▲ d. Enter option **2** to remove the controller being replaced. The **Slot Designations** screen is displayed (see [Figure 11](#) or [Figure 12](#), as applicable).

```

Slot Designations (BA370)
      (front view)
[ ---- EMU ---- ][ ---- PVA ---- ]
[ ----- Controller A ----- ]
[ ----- Controller B ----- ]
[ Cache Module A ] [ Cache Module B ]
    
```

Figure 11: Slot Designations screen for controllers in a BA370 enclosure

```

Slot Designations M2100/M2200
      (back view)
[ Port1 ]      [ Port3 ]      [ Port5 ]
[ Port2 ]      [ Port4 ]      [ Port6 ]
[ ----- Controller A ----- ]
[ ----- Controller B ----- ]
[ Cache Module A ] [ Cache Module B ]
    
```

Figure 12: Slot Designations screen for controllers in an M2100/M2200 enclosure



e. Make sure that the program card was removed from the controller to be replaced. Do not proceed until it is removed.



f. Enter **Y**(es) to confirm the intent to remove the “other controller.”



Caution: Wait for *FRUTIL* to quiesce the device ports—indicated by an “All device ports quiesced” message. Failure to allow the ports to quiesce might result in data loss. Quiescing might take several minutes.

Note: After the ports quiesce, a countdown timer allows you a total of 2 minutes to remove the controller. After 2 minutes, the operational controller exits *FRUTIL* and resumes operations. If this happens, return to [step 4](#) on page 22 and proceed.

- ↻ 5. For the controller to be replaced, complete the following substeps:



Caution: Use thin needle-nose pliers to remove the cable from the controller without potentially damaging the cable for fiber optic cables without extender clips.



- a. Disconnect all host bus cables from the controller being removed.



- b. Disengage both controller retaining levers, and remove the controller from the enclosure (see [Figure 7](#) on page 17).



- c. Place the controller in an antistatic bag or on a grounded antistatic mat.



6. For the operational controller, complete the following substeps:



- a. Observe that after the “other controller” is removed that *FRUTIL* restarts all device ports and asks if a replacement controller is available.



- b. Enter **N(o)** after *FRUTIL* asks you if a replacement controller is available, and disconnect the PC or terminal from the controller maintenance port. *FRUTIL* exits. If you have a replacement controller available, complete the instructions in “[Installing an HSG60 or HSG80 Controller in Dual-Redundant Controller Configurations](#).”



Caution: If reverting to a single-controller configuration, fill the vacant controller bay with a blank bezel to prevent the enclosure from developing an over-temperature condition.




Installing an HSG60 or HSG80 Controller in Dual-Redundant Controller Configurations

Perform the following steps to install a controller in a dual-redundant controller configuration if only the controller is not installed. If both controller and associated cache module are not installed, proceed to “[Installing an HSx80 Cache Module in Dual-Redundant Controller Configurations](#)” on page 45” first, and then return to this section to install the controller.









Caution: Be sure that the controller being installed has the same ACS version as the operational and previous controller. Failure to follow this precaution will cause controller configuration information to be erased, and the controller will be rendered unusable.




1. Determine whether you will be installing the replacement controller (🎯) in an ACS V8.7, V8.7-1, V8.7-2, or V8.7-3 environment, and then complete one of the following options:
 - Go to [step 2](#) and proceed if you are installing the replacement controller in an ACS V8.7-3.
 - Go to [step 4](#) (on page 28) and proceed if you are installing the replacement controller in an ACS V8.7, V8.7-1, or V8.7-2 environment.
2. Complete one of the following options:
 - Proceed to [step 4](#) (on page 28) if you have the ACS V8.7-3 *patch-on-card PCMCIA card*.
 - Complete the following substeps, and then proceed to the next step, if you do *not* have the ACS V8.7-3 *patch-on-card PCMCIA card*:
 - a. Use an offline subsystem to manually install the ACS V8.7-2 and V8.7-3 patches to the replacement controller.
 - b. Connect a PC or terminal to the replacement controller.
 - c. Insert the replacement controller in the subsystem without the program card.
 - d. Press and hold the **Reset** button.
 - e. Insert the ACS V8.7-1 program card while pressing the **Reset** button.

-  f. Press and hold the **Port #5** button.
-  g. Release the **Reset** button, while continuing to hold the **Port #5** button, until the OCP LEDs read 33.
-  3. For the replacement controller, complete the following substeps to install and remove ACS patches:

Note: In the following substeps, all nonapplicable patches are removed from the replacement controller, and ACS V8.7-2 and V8.7-3 patches are applied.

-  a. Locate and obtain the ACS V8.7-2 and V8.7-3 patches from the HP website.
-  b. Remove the unwanted patches by using *Code-load Code-patch (CLCP)* as described in *HP StorageWorks HSG80 Array Controller V8.7 Maintenance and Service Guide*.
-  c. Install the ACS V8.7-2 and V8.7-3 patches using the *CLCP* utility and following the instructions described in *HP StorageWorks HSG80 Array Controller V8.7 Maintenance and Service Guide*.
-  d. Exit *CLCP*, and restart the replacement controller.
-  e. Verify the replacement controller code version ACS V8.7-3 using the following command:

```
SHOW THIS_CONTROLLER
```
-  f. Shut down the replacement controller with the following command:

```
SHUTDOWN THIS_CONTROLLER
```
-  g. Remove the program card from the replacement controller.
-  h. Remove the replacement controller from the enclosure.
-  i. Disconnect the PC or terminal from the replacement controller.

- ▲ 4. For the operational controller, complete the following substeps:
- ▲ a. Connect a PC or terminal to the maintenance port of the operational controller if not already connected.

Note: The controller connected to the PC or terminal becomes “this controller.” The controller being removed becomes the “other controller.”

- ▲ b. Ensure that the controller configuration is customized to your needs, and then record the controller configurations (for example, Failover mode, cache status, serial numbers, SCSI mode, mirrored/nonmirrored information, and so forth).
- ▲ c. Start *FRUTIL* by entering the following command:

```
RUN FRUTIL
```
- ▲ d. Enter **N(o)** to the question about replacing the cache battery. The **FRUTIL Main Menu** is displayed (see [Figure 8](#) or [Figure 9](#) on page 23).
- ▲ e. Enter option **2** to install a controller or cache module.
If both the controller and cache are missing, the **Install Options** screen is displayed (see [Figure 13](#) or [Figure 14](#)):

```
Install Options:  
1. Other controller and cache module  
2. Other controller module  
3. Other cache module  
4. Exit
```

Figure 13: Install Options screen (as displayed using ACS V8.7, V8.7-1, or V8.7-2)

```

Install Options:
1. Other controller and cache module
2. Other controller module
3. Other cache module
4. Exit

NOTE: OPTION 1 DISABLED (So: Do cache, then controller.)
      Enter choice: 1,2,3,4 ->
    
```

Figure 14: Install Options Screen (as displayed using ACS V8.7-3)

- f. Enter option **4** to exit *FRUTIL*, and then proceed to “[Installing an HSx80 Cache Module in Dual-Redundant Controller Configurations](#)” on page 45 if both the controller and cache modules have been removed. Otherwise, continue to the next substep.
- ▲ g. Enter **Y**(es) to confirm the intent to install the “other controller.” *FRUTIL* quiesces the device ports and displays a message indicating that the controller is being installed.



Caution: Wait for *FRUTIL* to quiesce the device ports—indicated by an “All device ports quiesced” message. Failure to allow the ports to quiesce might result in data loss. Quiescing might take several minutes. The length of time is dependent on the amount of I/O activity and the number of units that are online.

Note: If you are using ACS V8.7, 8.7-1, 8.7-2, *FRUTIL* states that the replacement controller OCP LED code is 38 and that port LEDs 1, 2, and 3 are on. However, the actual OCP LED code should be 33 and port LEDs 1, 2, 5, and 6 should be on.

Note: If *FRUTIL* times out before a replacement controller is installed, restart *FRUTIL*.

5. For the replacement controller, complete the following substeps:
 - a. Remove the program card in the replacement controller if it is installed.
 - b. Insert the replacement controller (*without the program card installed*) into the appropriate bay, and engage the controller retaining levers.
 - c. Press and hold the **Reset** button, insert the program card, and continue holding the **Reset** button.
 - d. Press and hold the replacement controller **Port #5** button, release the **Reset** button, and continue holding the **Port #5** button for an additional 5 to 20 seconds (see [Figure 5](#) on page 16).

The nonvolatile memory in the replacement controller is updated, and the controller halts with an LED code of 33. Port LEDs 1, 2, 5, and 6 are on (see [Figure 5](#) on page 16).
 - e. Press and release the **Reset** button.

The replacement controller restarts normally.
 - f. Wait at least 15 seconds after releasing the **Reset** button, and then immediately complete [substep 6a](#) below. Be sure to wait 15 seconds *before* continuing to [substep 6a](#).

Note: A controller restart can take as long as 60 seconds, indicated by the temporary cycling of the port LEDs and a flashing **Reset** button.

6. For the operational controller, complete the following substeps:
 - a. Press **Enter** or **Return** within 3 minutes of completing [substep 5f](#) above to exit *FRUTIL*, and then wait 1 minute to allow the replacement controller to restart.

Note: If **Enter** or **Return** is not pressed within 3 minutes in [substep 6a](#) above, the operational controller issues an automated command to cancel the installation of the replacement controller. This cancellation causes all the port LEDs on the replacement controller to go off. If this situation occurs, press **Enter** to exit *FRUTIL*, and then enter the following command from the operational controller:

```
RESTART OTHER_CONTROLLER
```

- ▲ b. Verify that the status of the cache of the operational controller is good by entering the following command:

```
SHOW THIS_CONTROLLER
```

- ▲ c. Complete one of the following steps from the operational controller:
 - ▲ — Proceed to [substep 6d](#) below if the controller reported that the cache and mirrored cache (if enabled) is good in [substep 6b](#) above.
 - ▲ — Take corrective actions as defined in [Table 3](#) through [Table 5](#), as appropriate, if the controller reported that the cache and mirrored cache (if enabled) is not good in [substep 6b](#).
- ▲ d. Disconnect the PC or terminal from the maintenance port of the operational controller.



- 7. For the replacement controller, complete the following substeps:



- a. Connect a PC or terminal to the maintenance port of the replacement controller.



- b. Perform one of the following options:



- If your controller uses ACS V8.7, 8.7-1, or 8.7-2, set the terminal baud rate to 19200, and then press **Enter** or **Return**, .



- If your controller uses ACS V8.7-3, perform the following substeps:




- i. Set the terminal baud rate to 9600.







- ii. Press **Enter** or **Return** several times to get a prompt.



- iii. Proceed to the next substep.




-  c. Verify that the controller restarts in the following reset configuration by entering the following command:

```
SHOW THIS_CONTROLLER
```

-  — Verify that the controller prompt displays HSG>.
-  — Verify that the NODE_ID is 0000-0000-0000-0000.
-  — Verify that mirrored cache matches the original configuration.
-  — Verify that the controller cache is good. Refer to [Table 3](#) through [Table 5](#), as applicable if the cache is not good.




Caution: Failure to clear an invalid cache message (especially a “Cache is FAILED” message) in *substep 7c* before setting the Failover mode can result in a recursive bugcheck condition that renders the controller unusable.

-  d. Disconnect the PC or terminal from the maintenance port of the replacement controller.
-  8. For the operational controller, complete the following substeps:
 -  a. Connect a PC or terminal to the maintenance port of the operational controller.



Caution: In *substep 8b* below, entering the appropriate SET command is critical. Enabling an incorrect Failover mode can cause loss of data and incur system down time.

-  b. Restore the Failover mode and re-establish the dual-redundant controller configuration with one of the following commands. For example, if you noted that the Failover mode in *substep 1c* on page 21 was Multibus, enter the second command below.

```
SET FAILOVER COPY=THIS_CONTROLLER
```

OR

```
SET MULTIBUS_FAILOVER COPY=THIS_CONTROLLER
```


The above commands copy the subsystem configuration from the operational controller to the controller that failed or is being replaced.

- ▲ c. Verify that the replacement controller restarts and that the cache for both the operational and replacement controller is good by entering the following command:

```
SHOW THIS_CONTROLLER
```

```
SHOW OTHER_CONTROLLER
```

Refer to [Table 3](#) through [Table 5](#), as applicable if the cache is not good.

Note: The replacement controller might fail with a recursive bugcheck (OCP code 25), and the **Reset** button LED remains steady on. Contact HP technical support or replace the controller if this condition occurs.

- ▲ 9. Disconnect the PC or terminal from the controller maintenance port of the operational controller.
- 🎯 10. Connect the host bus cables to the replacement controller.
- 🎯 11. Install the program card ESD cover on the controller being replaced.

Replacing HSx80 Cache Modules in Single and Dual-Redundant Controller Configurations

Replacing a cache module involves transferring the cache memory DIMMs from the failed cache module to the replacement cache module. Use the procedures in this section to replace a cache module in either single or dual-redundant controller configurations.



Caution: With ACS V8.7, V8.7-1, and V8.7-2, *FRUTIL* allows you to install both the controller and cache module in the same process. HP does not recommend this. Replacing both the controller and cache module at the same time can result in loss of controller configuration information and will render the controller unusable.

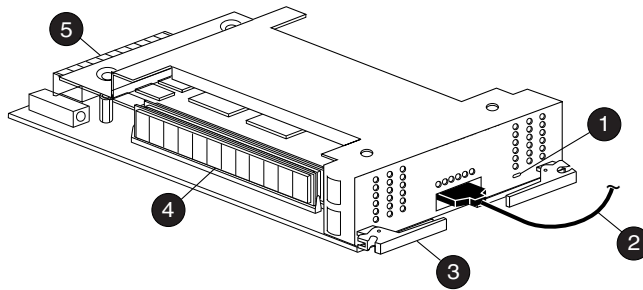
Note: With ACS V8.7-3, *FRUTIL* prohibits you from installing both the controller and cache module in one process.

This section contains the following topics:

- [Replacing HSx80 Cache Modules in Single Controller Configurations](#), page 36
- [Replacing HSx80 Cache Modules in Dual-Redundant Controller Configurations](#), page 41

Note: In dual-redundant configurations, both cache modules *must* contain the same memory configuration, regardless of the ACS version.

Figure 15 and Figure 16 provide general information about the cache module.



- ❶ Cache memory power LED
- ❷ External cache battery (ECB) cable
- ❸ Retaining lever
- ❹ Dual inline memory module (DIMM)
- ❺ Backplane connector

Figure 15: Cache module

Note: In Figure 16, the environmental monitoring unit (EMU) and power verification assembly (PVA) modules are present in only HP StorageWorks BA370 enclosures. The controller and cache module locations are consistent with other HP StorageWorks controller enclosures.

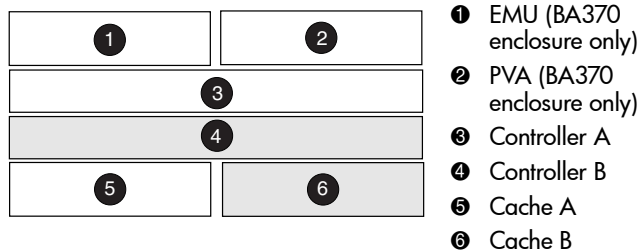


Figure 16: Cache module locations

Replacing HSx80 Cache Modules in Single Controller Configurations

Complete the steps in the following subsections to replace HSx80 cache modules in single controller configurations.



Caution: Static electricity can easily damage the cache module or a DIMM. Wear a snug-fitting, grounded ESD wrist strap when completing controller cache module removal and installation procedures.

Removing HSx80 Cache Modules from Single Controller Configurations

Perform the following steps to remove a cache module in a single controller configuration.

1. Determine whether the controller is operational, and then complete one of the following two options:
 - Connect a PC or terminal to the controller maintenance port if the controller is operational, and then proceed to [step 2](#) below.
 - Proceed to [step 6](#) if the controller is *not* operational.
2. From the host console, stop all host activity to the controller, and dismount the logical units in the subsystem.
3. If you are using Microsoft Windows 2000 or Windows NT, shut down the server.
4. Run the *FMU* to obtain the last failure codes, if necessary.
5. Shut down “this controller” by entering the following command:

```
SHUTDOWN THIS_CONTROLLER
```

Proceed to the next step only after the **Reset** button stops flashing and remains on.

Note: After the controller shuts down, the **Reset** button and the first three port LEDs light up. This might take several minutes to happen, depending on the amount of data that needs to be flushed from the cache module.

6. For the cache module to be replaced, complete one of the following two options:

- For cache modules in an M2100/M2200 enclosure, disengage both cache module retaining levers, and remove the cache module.
- For cache modules in a BA370 enclosure, complete the following substeps:
 - a. Disengage both cache module retaining levers, and partially remove the cache module—about halfway.



Caution: You must disable the ECB before disconnecting the ECB Y-cable. (If the ECB status light is off, this indicates that the ECB is disabled.) Failure to do so can result in cache module damage.

- b. Disable the ECB by pressing the battery disable switch until the status light stops flashing. The status light should stop flashing in approximately 5 seconds.

Note: Refer to the documentation that shipped with the ECB for additional battery information.

- c. Disconnect the ECB Y-cable from the cache module.
- d. Remove the cache module from the enclosure.
- e. Place the cache module on a grounded antistatic mat or in an antistatic bag.

Note: The DIMMs must be removed for installation in the replacement cache module.

7. Note the location for each DIMM in the cache module that is being replaced, and install the DIMMs in the corresponding locations in the replacement cache module. Use the following substeps to remove the DIMMs:

Note: To facilitate pressing down on the DIMM retaining clips, consider using the eraser end of a pencil or a small screwdriver.

- a. Press down on the DIMM retaining clips (see [Figure 17](#)) at both ends of the DIMM being removed.
- b. Gently remove the DIMM from the DIMM slot, and place the DIMM on an antistatic bag or a grounded antistatic mat.
- c. Repeat [substep 7a](#) and [substep 7b](#) above for each DIMM.
- d. Proceed to [step 1](#) of “[Installing HSx80 Cache Modules in Single Controller Configurations](#)” on page 39 to install the DIMMs in the replacement cache module.

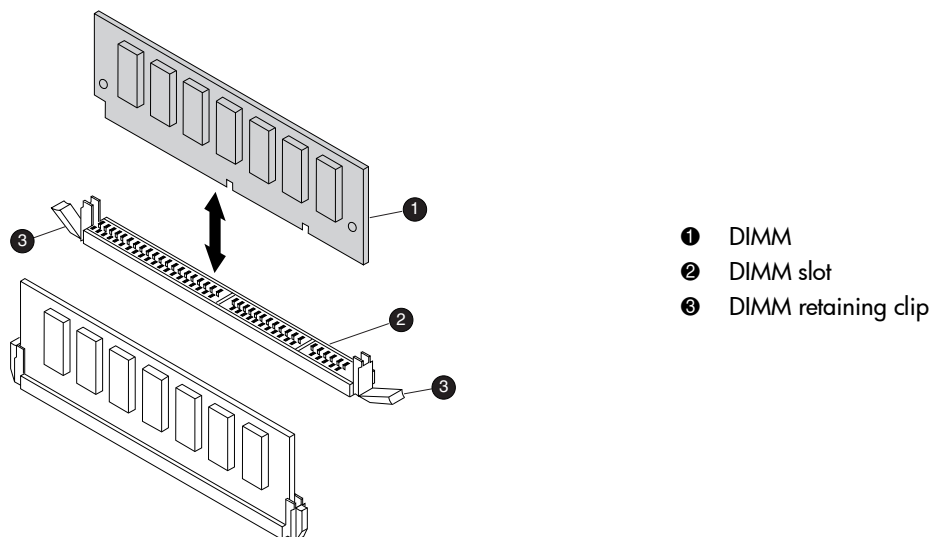


Figure 17: Removing or installing a DIMM

Installing HSx80 Cache Modules in Single Controller Configurations

Perform the following steps to install a cache module in a single controller configuration.

Note: The replacement cache modules *must* contain the same memory configuration as that of the cache module which was removed.

1. Insert each DIMM (see [Figure 17](#)) straight into the appropriate slot of the replacement cache module, ensuring that the notches in the DIMM align with the tabs in the slot. Use the following substeps to install the DIMMs:
 - a. Press the DIMM gently into the slot until it is seated at both ends.
 - b. Engage the two retaining clips for the DIMM.
 - c. Make sure both ends of the DIMM are firmly seated in the slot and both retaining clips engage the DIMM.
 - d. Repeat [substep 1a](#) through [substep 1c](#) above for each DIMM.



Caution: Misaligning the module might damage the backplane.

2. Carefully align and partially insert the cache module in the Cache A guide rails.



Caution: If your cache module is in a BA370 enclosure, you must disable the ECB. Failure to disable the ECB can result in cache module damage. To disable the ECB, complete the following steps:

1. Disable the ECB by pressing the battery disable switch on the battery module.
 2. Connect the ECB Y-cable to the cache module.
-
3. Insert the replacement cache module completely into the appropriate bay, and engage the cache module retaining levers.
 4. Connect a PC or terminal to the controller maintenance port for the replacement cache module, if not already connected.

- Restart the controller by pressing the **Reset** button.

Note: A controller restart can take as long as 60 seconds, indicated by the temporary cycling of the port LEDs and a flashing **Reset** button.

Note: If the controller did not restart, use the following steps:

- Press and hold the **Reset** button.
 - Reseat the controller program card.
 - Release the **Reset** button.
-

- From the CLI prompt, display details about the configured controller by entering the following command:

```
SHOW THIS_CONTROLLER FULL
```

- Set the date and time by entering the following command:

```
SET THIS_CONTROLLER TIME=dd-mmm-yyyy:hh:mm:ss
```

- Mount the logical units on the host.
- If using a Windows 2000 or Windows NT platform, restart the server.
- Disconnect the PC or terminal from the controller maintenance port.

Replacing HSx80 Cache Modules in Dual-Redundant Controller Configurations

To remove or replace an HSx80 cache module in a dual-redundant controller configuration, perform the instructions below.



Caution: ESD can easily damage the cache module or a DIMM. Wear a snug-fitting, grounded ESD wrist strap when completing controller cache module removal and installation procedures.

Note: Refer to [Table 2](#) on page 20 for information on symbols used throughout these instructions.

Removing an HSx80 Cache Module from Dual-Redundant Controller Configurations

Perform the following steps to remove an HSx80 cache module in a dual-redundant controller configuration.

- ↻ 1. For the controller associated with the cache module to be replaced, complete the following substeps:
 - ↻ a. Connect a PC or terminal to the maintenance port.
 - ↻ b. Run *VTDPY* by entering the following command:

```
RUN VTDPY
```
 - ↻ c. Record which units have I/O activity.
 - ↻ d. Exit *VTPY* by pressing **Ctrl+Y**.

Note: In Transparent Failover mode, units that failed over due to a `RESTART` command will revert back to preferred controller after about 1 minute. The next step may not show that the units have failed over.

- ↻ e. Restart the controller by entering the following command:

```
RESTART THIS_CONTROLLER
```
- ↻ f. Disconnect the PC or terminal from the maintenance port of the controller having its cache module replaced.

- ▲ 2. For the operational controller, complete the following substeps:
- ▲ a. Connect the PC or terminal to the maintenance port of the operational controller.

Note: The controller connected to the PC or terminal becomes “this controller.” The controller for the cache module being removed becomes the “other controller.”

- ▲ b. Display and note the configuration information (for example, the Failover mode, cache mode, serial numbers, SCSI mode, and so forth) for the operational controller by entering the following command:

```
SHOW THIS_CONTROLLER
```
- ▲ c. Disable failover and take the controllers out of the dual-redundant configuration by entering the following command:

```
SET NOFAILOVER
```
- ▲ d. Start the *FRUTIL* by entering the following command:

```
RUN FRUTIL
```

FRUTIL automatically asks you if you want to replace the controller cache battery.
- ▲ e. Enter **N(o)**.
- ▲ f. Enter **1** for the **Replace or remove a controller or cache module** option.
- ▲ g. Enter **3** for the **Other cache module** option.
- ▲ h. Enter **Y(es)** to confirm the intent to remove the slot *x* cache module. *FRUTIL* quiesces all device ports, indicates a 2-minute limit to remove the cache module, and begins counting down the time in 10-second intervals.



Caution: Wait for *FRUTIL* to quiesce the device ports—indicated by an “All device ports quiesced” message. Failure to allow the ports to quiesce can result in data loss. Quiescing might take several minutes.

Note: A countdown timer allows you a total of 2 minutes to remove the cache module. After 2 minutes, "this controller" will exit *FRUTIL*, restart the "other controller," and resume operations. If this happens, perform the following steps:

1. Connect the PC or terminal to the "other controller."
 2. Shut down the "other controller" by issuing the command:

```
SHUTDOWN THIS_CONTROLLER
```
 3. Disconnect the PC or terminal, and reconnect it to the operational controller.
 4. Return to [substep 2d](#), and proceed.
-

- ↺
 3. For the cache module to be replaced, complete one of the following two options:
 - ↺
 - For StorageWorks Model 2100 and 2200 enclosures, disengage both retaining levers, and remove the "other controller" cache module.
 - ↺
 - For all other supported enclosures:
 - ↺
↺
 a. Disengage both retaining levers and partially remove the "other controller" cache module—about halfway.
-



Caution: You must disable the ECB before disconnecting the ECB Y-cable from the cache module. (If the ECB status light is off, this indicates that the ECB is disabled.) Failure to disable the ECB can result in cache module damage.

- ↺
 - ↺
 - ↺
 - ↺
 b. Disable the ECB by pressing the battery disable switch until the status light stops flashing. This should take approximately 5 seconds.
 - ↺
 c. Disconnect the ECB Y-cable from the "other controller" cache module.
 - ↺
 d. Remove the cache module from the enclosure.
- ▲
 4. For the operational controller, observe that *FRUTIL* restarts I/O ports, disables writeback caching and mirrored writes, indicates that the mirrored cache is disabled, and terminates.
- ▲
 5. For the operational controller, place the cache module on an antistatic bag or a grounded antistatic mat.

- ↻ 6. For the cache module to be replaced, note the location for each DIMM in the cache module that was replaced, and install the DIMMs in the corresponding locations in the replacement cache module. Use the following substeps to remove the DIMMs:

Note: The DIMMs must be removed for installation in the replacement cache module.

- ↻ a. Press down on the DIMM retaining clips (see [Figure 17](#) on page 38) at both ends of the DIMM being removed.
- ↻ b. Gently remove the DIMM from the DIMM slot, and place the DIMM on an antistatic bag or a grounded antistatic mat.
- ↻ c. Repeat [substep 6a](#) and [substep 6b](#) above for each DIMM.
- ↻ 7. Enter **N(o)** to the question for a replacement cache module.
FRUTIL exits.

Installing an HSx80 Cache Module in Dual-Redundant Controller Configurations

Perform the following steps to install an HSx80 cache module in a dual-redundant controller configuration.



Caution: ESD can easily damage a cache module or a DIMM. Wear a snug-fitting, grounded ESD wrist strap.

Note: The replacement cache module *must* contain the same cache memory configuration as the module being replaced.

Note: If you are installing a cache module after resolving a failed cache state (see [Table 3](#) through [Table 5](#)), the operational controller and the replacement controller references that appear in this section may have been reversed. The operational controller is the one attached to the terminal or PC and the one from which *FRUTIL* is executed.



1. For the replacement cache module, insert each DIMM (see [Figure 17](#) on page 38) straight into the appropriate slot of the replacement cache module, ensuring that the notches in the DIMM align with the tabs in the slot. Use the following substeps to install the DIMMs:



- a. Press the DIMM gently into the slot until it is seated at both ends.



- b. Engage the two retaining clips for the DIMM.



- c. Make sure both ends of the DIMM are firmly seated in the slot and both retaining clips engage the DIMM.



- d. Repeat [substep 1a](#) through [substep 1c](#) above for each DIMM.



2. For the operational controller, complete the following substeps:



- a. Connect a PC or terminal to the operational controller, if not already connected.

Note: The controller connected to the PC or terminal becomes “this controller.” The controller for the replacement cache module becomes the “other controller.”

- ▲ b. Start *FRUTIL* by entering the following command:
RUN FRUTIL
- ▲ c. Enter **N(o)** to the question about replacing the cache battery.
- ▲ d. From the **FRUTIL Main Menu**, enter **2** for the **Install a controller or cache module** option.
If both the controller and cache module are missing, the **Install Options** screen is displayed.

```
Install Options:
1. Other controller and cache module
2. Other controller module
3. Other cache module
4. Exit

Enter choice: 1,2,3,4 ->
```

Figure 18: Install Options screen (as displayed using ACS V8.7, V8.7-1, or V8.7-2)

```
Install Options:
1. Other controller and cache module
2. Other controller module
3. Other cache module
4. Exit

NOTE: OPTION 1 DISABLED (So: Do cache, then controller.)
Enter choice: 1,2,3,4 ->
```

Figure 19: Install Options Screen (as displayed using ACS V8.7-3)

- ▲ e. Enter **3** to install the other cache module. The **Slot Designations** screen is displayed.
- ▲ f. Enter **Y(es)** to confirm the intent to install the slot *x* cache module.

FRUTIL quiesces all device ports, indicates a time limit of 2 minutes to install the replacement cache module, and begins displaying the time remaining in 10-second intervals.



Caution: Wait for *FRUTIL* to quiesce the device ports—indicated by an “All device ports quiesced” message. Failure to allow the ports to quiesce can result in data loss. Quiescing might take several minutes.

Note: A countdown timer allows you a total of 2 minutes to install the cache module. After 2 minutes, “this controller” exits *FRUTIL* and resumes operations. If this happens, return to [substep 2b](#), and proceed.



3. For the replacement cache module, complete the following substeps:



- a. Carefully align and partially insert the cache module in the appropriate guide rails.



Caution: Misalignment of the cache module in the guide rails can damage the backplane.



Caution: If your cache module is in a BA370 enclosure, you must disable the ECB. Failure to disable the ECB can result in cache module damage. To disable the ECB, complete the following steps:

1. Disable the ECB by pressing the battery disable switch on the battery module.
 2. Connect the ECB Y-cable to the cache module.
-



- b. Insert the replacement cache module completely into the appropriate bay, and engage the cache module retaining levers.

- ▲ 4. For the operational controller, note that in Mirrored mode, *FRUTIL* initializes the mirrored portion of the replacement cache module, checks for old data on the cache module, and then restarts all device ports. After device ports restart, *FRUTIL* tests the cache module and the ECB. After the test concludes, the device ports are quiesced, and a mirror copy of the cache module data is created on the newly installed cache module.
- 🎯 5. Determine whether the controller associated with the replacement cache module is installed.
 - 🎯 ■ If the controller associated with the replacement cache module is not installed, one of the following actions will automatically occur:
 - *FRUTIL* exits if you are running ACS V8.7-3.
 - *FRUTIL* asks if a replacement controller is available if you are not running ACS V8.7-3. Complete the following substeps after this occurs.
 - 🎯 a. Answer **N(o)** to this question.
 - 🎯 b. Observe that *FRUTIL* exits.
 - 🎯 c. Proceed to the [“Installing an HSG60 or HSG80 Controller in Dual-Redundant Controller Configurations”](#) section.
 - 🎯 ■ Continue to the next step if the controller associated with the replacement cache module is installed.
- 🎯 6. For the controller associated with the replacement cache module, note and observe the following:
 - 🎯 ■ The controller restarts.
 - 🎯 ■ The controller restart takes up to 60 seconds, indicated by the temporary cycling of the port LEDs and a flashing controller **Reset** button.
 - 🎯 ■ If the controller does not restart, complete the following substeps:
 - 🎯 a. Press and hold the controller **Reset** button on the controller.
 - 🎯 b. Reseat the program card on the controller.
 - 🎯 c. Release the controller **Reset** button.

- ▲ 7. For the operational controller, complete the following substeps:
 - ▲ a. Observe that *FRUTIL* restarts the device ports and then exits.
 - ▲ b. Identify invalid or failed cache conditions by entering the following command:


```
SHOW THIS_CONTROLLER
```
 - ▲ c. Clear invalid or failed cache conditions, if any exist. See [Table 3](#) through [Table 5](#) starting on page 52 for more information on clearing invalid or failed cache conditions.



Caution: Failure to clear an invalid cache message (especially a “Cache is FAILED” message) *before* setting the Failover mode can result in a recursive bugcheck error message that renders the controller unusable.

- ▲ d. Disconnect the PC or terminal from the maintenance port of the operational controller.
- 🎯 8. For the controller associated with the replacement cache module, complete the following substeps:
 - 🎯 a. Connect a PC or terminal to the maintenance port of the controller associated with the cache module to be replaced.
 - 🎯 b. Identify any invalid or failed cache conditions, if any exist, by entering the following command:


```
SHOW THIS_CONTROLLER
```
 - 🎯 c. Clear invalid or failed cache conditions, if any exist. See [Table 3](#) through [Table 5](#) starting on page 52 for more information on clearing invalid or failed cache conditions.



Caution: Failure to clear an invalid cache message (especially a “Cache is FAILED” message) *before* setting the Failover mode can result in a recursive bugcheck error message that renders the controller unusable.

- 🎯 d. Disconnect the PC or terminal from the maintenance port of the controller associated with the replacement cache module.

- ▲ 9. For the operational controller, complete the following substeps:
- ▲ a. Connect a PC or terminal to the maintenance port.



Caution: In [substep 9b](#) below, entering the appropriate SET command is critical. Enabling an incorrect Failover mode can cause loss of data and incur system down time.

Verify the original failover configuration, and use the appropriate SET command to restore this configuration.

Note: After you enter the appropriate SET command, the controller restarts. A controller restart can take as long as 60 seconds, indicated by the temporary cycling of the port LEDs and a flashing **Reset** button.

- ▲ b. Re-establish the previous Failover mode by entering one of the following commands:

```
SET FAILOVER COPY=THIS_CONTROLLER
```

or

```
SET MULTIBUS_FAILOVER COPY=THIS_CONTROLLER
```

The SET command copies the subsystem configuration from “this controller” to the “other controller.”
- ▲ c. Verify the failover configuration by entering the following command:

```
SHOW THIS_CONTROLLER
```

```
SHOW OTHER_CONTROLLER
```
- ▲ d. Verify that the controller cache and, if enabled, mirrored cache are good. If either the cache or mirrored cache is not good, refer to [Table 3](#) through [Table 5](#) starting on page 52.
- ▲ e. Disconnect the PC or terminal from the controller maintenance port.

Troubleshooting

This section provides instructions on resolving common problems that may occur while replacing controllers or cache modules. This section covers the following topics:

- [Resolving Invalid Cache Error Messages—Serial Number Mismatch Error Messages](#), page 51
- [Resolving Failed Cache Error Messages](#), page 52
- [Resolving Unexpected Bugcheck Condition Error Messages](#), page 57

Resolving Invalid Cache Error Messages—Serial Number Mismatch Error Messages

An invalid cache error message may display after the `SHOW THIS_CONTROLLER` command is submitted. The controller reports that the cache and mirrored cache with cache are invalid and that the cache should be installed in a specific controller with the serial number `ZGxxxxxxxx`.



Caution: Failure to clear an invalid cache message (especially a “Cache is FAILED” message) *before* setting the Failover mode can result in a recursive bugcheck error message that renders the controller unusable.

To resolve an invalid cache error message, see [Table 3](#) on page 52.

Table 3: Resolving an Invalid Cache - Serial Number Mismatch Error Message

	Description/Instruction
<p>Message</p>	<p>INVALID CACHE - Cache should be installed in controller serial number <i>xyz</i></p> <pre>%CER-HSG> This controller (replacement) has an invalid cache module</pre> <pre>%CER-HSG> cache modules inconsistent with mirror mode</pre>
<p>Resolution</p>	<ol style="list-style-type: none"> 1. Submit the following command from the controller reporting the error message: <pre>CLEAR_THIS_CONTROLLER (replacement) INVALID_CACHE</pre> <pre>DESTROY_UNFLUSHED_DATA</pre> <hr/> <p>Note: Enter this command again if this condition is not cleared.</p> <hr/> 2. Set the controller Failover mode by performing one of the following options: <ul style="list-style-type: none"> ■ Proceed to substep 9b on page 50 in the “Installing an HSx80 Cache Module in Dual-Redundant Controller Configurations” section if the error message occurred during the cache module installation process. ■ Proceed to substep 8b on page 32 in the “Installing an HSG60 or HSG80 Controller in Dual-Redundant Controller Configurations” section if the error message occurred during the controller installation process.

Resolving Failed Cache Error Messages



Caution: Failure to clear an invalid cache message (especially a “Cache is FAILED” message) *before* setting the Failover mode can result in a recursive bugcheck error message that renders the controller unusable.

An invalid mirrored cache error message may be displayed after one of the two following events:

Event 1: After Setting the Failover Mode

After the Failover mode has been set and after the replacement controller restarts, the replacement controller CLI message indicates that its cache module is invalid.

After a `SHOW THIS_CONTROLLER` or `SHOW OTHER_CONTROLLER` command is submitted, the controller displays one or both of the following cache conditions:

```
Cache: Cache is GOOD
Mirrored Cache: Cache is FAILED
```

Note: This condition cannot be resolved with the `CLEAR OTHER_CONTROLLER INVALID_CACHE DESTROY_UNFLUSHED_DATA` command.

To resolve the error message, see [Table 4](#) on page 54.



Caution: The resolution for a failed cache error message in [Table 4](#) on page 54 involves the interruption of service to the customer. Notify your manager and customers of this situation, *and* make sure that the controllers are not in use *before* proceeding to resolve a failed cache condition. Avoiding this precaution may result in data loss.

■ **Event 2: Before Setting the Failover Mode**

Before Failover mode has been set and after the replacement controller restarts following the **Port #5** button reset process (see [substep 5c](#) through [substep 5f](#) on page 30), the replacement controller CLI message indicates that the mirrored cache is in a failed condition. When a `SHOW THIS_CONTROLLER` command is submitted, the replacement controller indicates that its mirrored cache is in a Failed state:

```
Cache: Cache is GOOD
Mirrored Cache: Cache is FAILED
```

[Table 5](#) on page 56 provides instructions for resolving the above event. If the failure cannot be cleared using the procedures in [Table 5](#), a defective hardware component may exist. If this is the case, identify which component is defective, and replace it.

Table 4: Resolving a Failed Cache Error Message (Event 1)


Details	
Message	%CER-Atop> This controller (replacement) has an invalid cache module
Resolution	<div style="border: 1px solid black; padding: 10px;">  <p>Caution: If the cache has failed, disable mirrored cache to clear the failed condition. Since unmirroring a controller pair destroys all persistent reservation bits in the controllers, you must halt all host activity to this controller pair before proceeding.</p> </div> <hr/> <p>Complete the following steps to resolve a failed cache module (event 1) error message.</p> <ol style="list-style-type: none"> 1. Connect a PC or terminal to the maintenance port of the operational controller if not already connected. 2. Halt all host I/O activity. 3. Unmount all devices. 4. Complete the instructions for removing a cache module in the “Removing an HSx80 Cache Module from Dual-Redundant Controller Configurations” section on page 41. 5. Complete the instructions for installing a cache module in the “Installing an HSx80 Cache Module in Dual-Redundant Controller Configurations” section on page 45. Doing this causes cache diagnostics to be performed and should repair the bad cache condition. 6. Display configuration information for both controllers by entering the following commands: <pre>SHOW THIS_CONTROLLER SHOW OTHER_CONTROLLER</pre> 7. Verify whether the cache and mirrored cache are good (“Cache is GOOD”), and then complete one the following two options: <ul style="list-style-type: none"> ■ If the cache is good, return the controller to service. The resolution of the failed cache condition is complete. ■ If the cache is failed, complete step 8 through step 11 on page 55.

Table 4: Resolving a Failed Cache Error Message (Event 1) (Continued)



Resolution (Cont'd)	Details
	<p> Caution: In step 8, you must break up mirrored cache. Before completing this step, note that breaking up mirrored cache configurations loses persistent reservation conditions on the units in these controllers. Before proceeding with this procedure, inform customers and your manager that you are about to break the mirror cache configuration.</p> <hr/> <p>8. Break the controller pair mirrored cache configuration by entering the following command:</p> <pre>SET THIS_CONTROLLER NOMIRRORED</pre> <p>Both controllers restart.</p> <p>9. Check cache status of both controllers by entering the following commands:</p> <pre>SHOW THIS_CONTROLLER SHOW OTHER_CONTROLLER</pre> <p>10. If the cache is good, complete the following substeps. Otherwise, proceed to step 11.</p> <ol style="list-style-type: none"> a. Set the controllers into Mirrored Cache mode by entering the following command: <pre>SET THIS_CONTROLLER MIRRORED</pre> <p>Both controllers restart.</p> <ol style="list-style-type: none"> b. Verify whether the controller configuration is mirrored and whether both cache and mirrored cache are good ("Cache is GOOD"). c. If the cache is good, return the controller pair to service. Resolution to the failed cache condition is complete. If cache has failed, proceed to step 11. <p>11. If cache has failed ("Cache is FAILED"), attempt to clear the invalid cache condition by entering the following command:</p> <pre>CLEAR_ERROR THIS_CONTROLLER INVALID_CACHE DESTROY_UNFLUSHED_DATA</pre> <p>If the attempt to clear the failed cache is unsuccessful, a failed cache module is installed, or the DIMMs failed. Refer to the <i>HP StorageWorks Array Controller V8.7 Troubleshooting Guide</i>, or contact HP technical support for additional help.</p>

Table 5: Resolving a Failed Cache Error Message (Event 2)

Details	
Message	%CER-Atop> This controller (replacement) has an invalid cache module
Resolution	<div style="border: 1px solid black; padding: 10px;">  <p>Caution: If the cache has failed, you must disable mirrored cache in order to clear the failed condition. Because unmirroring a controller pair will destroy all persistent reservation bits in the controllers, you must halt all host activity to this controller pair before proceeding.</p> </div> <hr/> <p>Complete the following steps to resolve an invalid cache module error message.</p> <ol style="list-style-type: none"> 1. Connect a PC or terminal to the maintenance port of the replacement controller if not already connected. If you are returning to this step after attempting to resolve a failed cache condition, proceed to step 6 below. 2. Halt all host I/O activity to the controller pair. 3. Unmount all units. 4. Complete the instructions for removing a cache module in the “Removing an HSx80 Cache Module from Dual-Redundant Controller Configurations” section on page 41. 5. Complete the instructions for installing a cache module in the “Installing an HSx80 Cache Module in Dual-Redundant Controller Configurations” section on page 45, and then proceed to the next step. 6. Verify whether the cache and mirrored cache are good (“Cache is GOOD”), and then complete one of the following two options: <ul style="list-style-type: none"> ■ If the cache is good, return the controller pair to service. The resolution of the failed cache condition is complete. ■ If the cache is failed, complete the following substeps. <ol style="list-style-type: none"> a. Complete substep 3a through substep 3d, which start on page 22, to remove the controller. b. Remove the “other controller.” c. Clear the NV configuration by lifting the holddown tab on the lithium battery. d. Refer to step 6 through step 11 in Table 6 to restore the minimum operating configuration of the controller. Then proceed to “Installing an HSx80 Cache Module in Dual-Redundant Controller Configurations” on page 45 to continue. e. After restoring defaults, complete the instructions for installing a controller in the “Installing an HSG60 or HSG80 Controller in Dual-Redundant Controller Configurations” section that starts on page 26. f. Return controller pair to service.

Resolving Unexpected Bugcheck Condition Error Messages

If the replacement controller restarts at the same time that **Enter** or **Return** is pressed to terminate *FRUTIL* on the operational controller, an unexpected bugcheck condition error message can occur.

Note: This condition cannot be cleared with CLI commands. The NVRAM of the replacement controller must be erased by lifting a contact tab to the lithium battery on the controller (which causes the controller NVRAM to return to a basic configuration without a controller serial number present). It is necessary to run the **DANGEROUS** command to restore the controller.

Refer to [Table 6](#) for procedures on resolving the unexpected bugcheck condition error message.

Table 6: Resolving an Unexpected Bugcheck Condition Error Message

	Resolution
Message	<p>UNEXPECTED BUGCHECK CONDITION - LAST FAILURE CODE: 120E0310LAST FAILURE CODE: 120F0310%FLL---28-MAY-2003 17:50:08-- OCP Code: 30An unexpected bugcheck occurred before subsystem initialization completed. Exec flags: 00000039 RIP: C013154C System Information Valid: Yes Last Failure Code: 120E0310 (No Last Failure Parameters) -OR-Last Failure Code: 120F0310 (No Last Failure Parameters)</p>
Resolution	<ol style="list-style-type: none"> 1. Display configuration information for both controllers (if possible) by entering the following commands from the operational controller: <pre>SHOW THIS_CONTROLLER FULL</pre> <pre>SHOW OTHER_CONTROLLER FULL (if possible)</pre> <p>If you are unable to submit the <code>SHOW OTHER_CONTROLLER FULL</code> command above, proceed to the next step.</p> 2. Record all controller configuration information for both controllers, if possible. Otherwise, record controller configuration information for the operational controller only, and proceed to the next step. 3. Shut down the operational controller by entering the following command: <pre>SHUTDOWN THIS_CONTROLLER</pre> 4. Disconnect the PC or terminal from the operational controller. 5. Connect a PC or terminal to the maintenance port of the failed controller.

Table 6: Resolving an Unexpected Bugcheck Condition Error Message (Continued)

	Resolution
Resolution (Cont'd)	<p>6. Set the hardware version and manufacturing level by entering the following command:</p> <pre style="margin-left: 40px;">DANGEROUS X HARDWARE=xyz</pre> <hr/> <p>Note: The <i>xyz</i> in the above command represents the hardware version that is located on the label on the bottom (component side) of the controller board.</p> <hr/> <p>7. Set the serial number by entering the following command:</p> <pre style="margin-left: 40px;">DANGEROUS X SERIAL=ZGxxxxxxxx</pre> <hr/> <p>Note: The <i>xxxxxxxx</i> in the above command represents the serial number of the controller which is located on the label on the bottom (component side) of the controller board.</p> <hr/> <p>8. Shut down the failed controller. 9. Disconnect the PC or terminal from the maintenance port of the failed controller. 10. Disengage the failed controller, but do not remove it. 11. Disengage the program card of the failed controller, but do not remove it.</p>

Software Anomalies

This section describes software anomalies inherent in ACS V8.7, 8.7-1, and V8.7-2.

LED Code 38

When installing a controller, *FRUTIL* output incorrectly states that the controller halts with LED code 38. The controller actually halts with LED code 33.

Installing Both the Controller and Cache Module

FRUTIL allows you the option to install both controller and cache module. However, HP recommends that you do *not* install both the controller and cache module together. Install either the controller or cache module as separate procedure, exiting *FRUTIL* after installing one of the two module.

NVRAM Cache Configuration

The **Port #5** button reset does not clear NVRAM cache configuration information. This anomaly causes numerous invalid cache and bugcheck faults.