

HP SureStore E Disk Array 12H Controller

This document explains how to install batteries, download firmware into a disk array controller, and how to replace an array controller.

About Battery Packs

If your disk array goes without power, the controller batteries are capable of retaining data in NVRAM for a minimum of one week. Always perform a successful Shutdown before replacing the batteries. For further protection, battery packs should be replaced one at a time, so that there is always at least one battery providing power for memory backup. If the disk array power is to be turned off for an extended period of time (more than five days), then the NVRAM memory maps should be saved to disk (by successful Shutdown) and both battery packs should be disconnected to prevent damage to the battery packs and the controller.

Disk Array Controller

Customer Part Number:

C5445-90903

Printed in U.S.A.

September 1999

Edition 6

E0999

Part Number



A3700-96026

Installing Controller Batteries

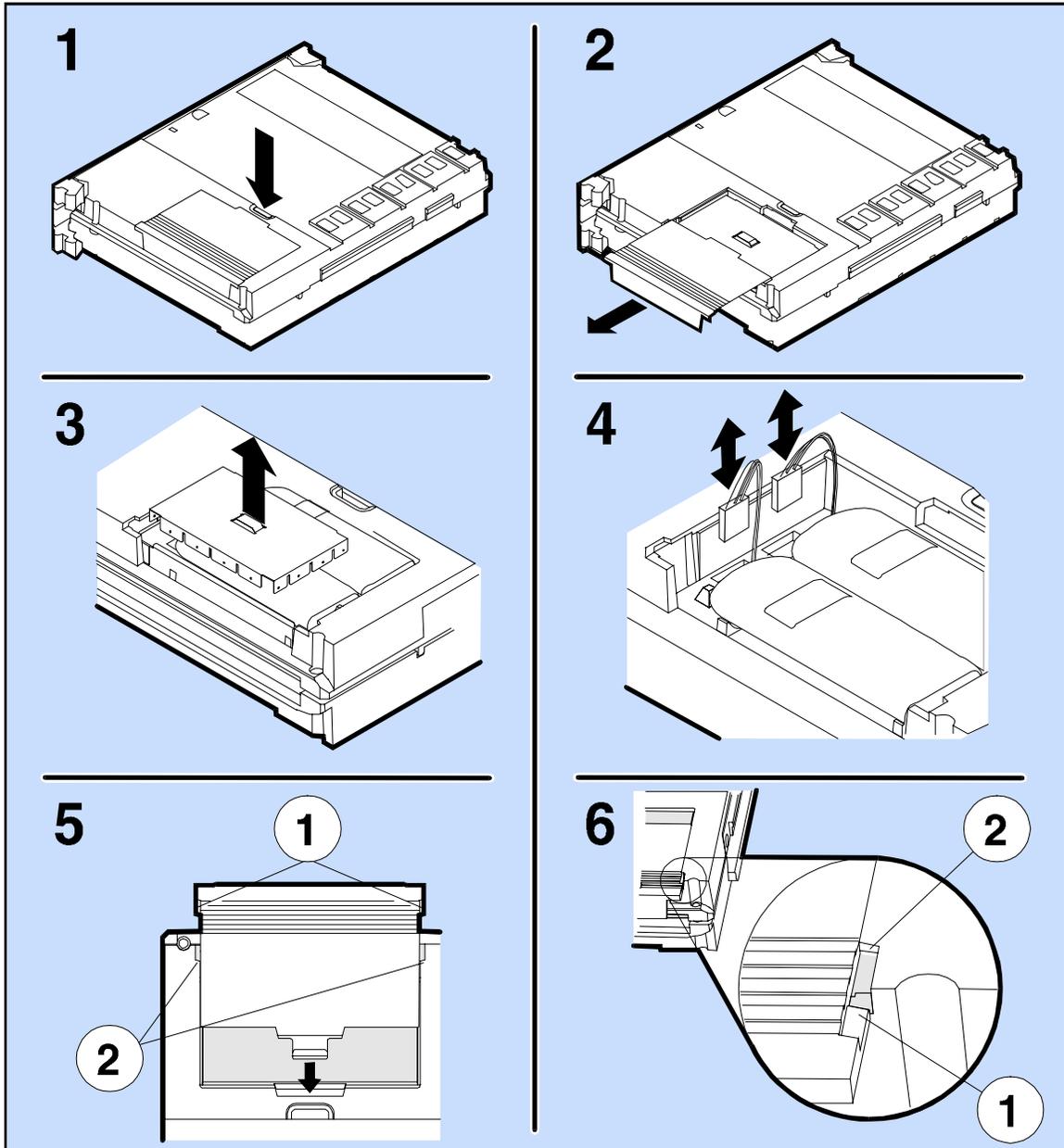
Two battery packs, part number 1420-0532, must be installed in each controller module before the module can be used. Two battery packs are shipped with each new controller module. In the disk array shipping carton, the batteries are located in a cardboard sleeve next to the array controller. If you are replacing a failed controller module, first remove and use the battery packs from the failed controller module in the new controller module. To install the controller battery packs, do the following (see Figure 1):

1. If the battery cover latch is not already removed, press down on the battery cover latch.
2. If the battery cover latch is not already removed, remove the battery cover latch and then remove the RFI shield (if necessary, you can use a flat-bladed screwdriver to remove the RFI shield).
3. Install both battery packs, and connect the cables as shown.
4. Reinstall the RFI shield and the battery cover latch.

CAUTION! Make sure you reinstall the battery cover latch carefully, so each of the locking tabs (see Figure 1, View 5, Items 1 and 2) slide beneath the battery compartment. If the battery cover latch is not secured properly, it could prevent the removal of the controller module once it is installed in the disk array enclosure.

After new battery packs are installed, and the array controllers are installed and powered on, about one minute is required before the “Battery Discharged” message on the control panel disappears. About twelve hours are required to fully charge new battery packs. During this time, a “Battery Charging” message will be displayed on the control panel.

Figure 1. Installing the Controller Batteries



Replacing Controller Batteries

This procedure is different than installing batteries the first time the disk array is used, since replacing batteries assumes that you have valuable data stored on your disk array. Many factors affect battery life, including not only time of battery use, but also time of battery storage. Controller batteries should be replaced every three years, or sooner if the display module indicates a constant “Battery Discharged” message.

To replace controller batteries, do the following (see Figure 1):

CAUTION! If the disk array power is on, you should always perform a successful Shutdown using the control panel to avoid loss of data before replacing a controller battery. If a message appears on the control panel display indicating that the Shutdown did not complete successfully, the disk array WILL LOSE DATA if you remove the batteries. In this case, you should perform the following steps:

1. Install a second (functional) controller.
2. Wait about two minutes for the data to be posted from the controller with the bad batteries to the second controller. The “Ready” message appears at this time.
3. Remove the controller with the bad batteries, and install new batteries.

The controller batteries are Ni-Cad (Nickel Cadmium) type batteries. When replaced, these batteries must be recycled or disposed of properly. Replace batteries only with the same type.

1. Press down on the battery cover latch.
2. Remove the battery cover latch and RFI shield (if necessary, you can use a flat-bladed screwdriver to remove the RFI shield).
3. Disconnect the cable from the controller PCA to ONE of the battery packs.
4. Replace the first battery pack with a new battery pack, and reconnect the cable.
5. Disconnect the cable from the controller PCA to the other battery pack.
6. Replace the second battery pack with a new battery pack, and reconnect the cable.
7. Reinstall the RFI shield and the battery cover latch.

Downloading Array Controller Firmware

When two controllers are installed in the disk array enclosure (dual controllers), both controllers must have the same version of firmware. If you update (or download) new firmware, the new firmware is copied to both controllers. When a controller is replaced, however, the replacement controller may have a later version of firmware than the currently installed controller.

If the installed controllers have different versions of firmware, you will get an error message on the display panel that says, "Firmware Needed." In this case, you must copy the desired version of firmware from one controller to the other. Copy Firmware always copies from the PRIMARY to the SECONDARY controller. Firmware can be copied using ARMServer (`download -m`) or the front panel (Copy Firmware). You can also download the desired version of firmware from a file to both array controllers simultaneously using the ARMServer (AutoRAID Manager).

NOTE! The Download utility is described in further detail in the System Administrator's Guide, which is shipped with each disk array.

Before Beginning Firmware Download

Before you begin any of the following download procedures, have the following ready:

- Get `<array-id>` using ARMServer (`arraydsp -i`) or front panel (View Settings, Array S/N). You may also use the raw device file that is connected to the array.

NOTE! Alphabetic characters in the Array Serial Number are CASE SENSITIVE! Once you have the Array S/N, it may be easier to define the long serial number string as an alias. To create an alias for the Array S/N of 000000057D22, for example:

On HP-UX or MPE systems: `# export <id>=000000057D22` (use `$id` in place of `<array-id>`)

On Windows NT systems: `C:\>set <id>=000000057D22` (use `%id%` in place of `<array-id>`)

- Obtain the desired version of firmware and determine its `<codefilename>` (filename) and location (path). If you are downloading firmware, you must know the source of your firmware. The firmware could be on an installed controller, on a replacement controller, or from a file. Make sure you know which controller contains the desired version of firmware. If the desired version of firmware is not on any controller but is in a file, make sure you know the location (path) to the file and its filename.

Other Considerations About the Firmware Download Process

NOTE! For Windows NT Systems: Since the Download utility does not support long directory names, it is better to change to the directory where the firmware is located first, and then the `<codefilename>` is simply the filename of the firmware. Otherwise, a path with a directory named "Program Files" will have to be entered as its MS-DOS directory name equivalent, for example:

```
download -C c:\Progra~1\AutoRAID\Fw\Model_12H_HP26.fw 000000057D22
```

- If the array does not show up using ARMServer (`arraydsp -i`), you may have to re-connect to "see" the array using the ARMServer (`arraydsp -R`) command, which scans the bus for all arrays. This command can take a few seconds to execute. Once re-connected, you will "see" the array again.

Firmware Download Procedure

See the flowcharts (Figure 2 and Figure 3) to determine which download procedure to follow. Pick the appropriate procedure.

NOTE! This procedure assumes that the Model 12 and HP SureStore E Disk Array 12H controllers have been updated to at least HP25 and HP24 firmware revisions, respectively. If they have not been updated to these versions of firmware, then refer to the service notes indicated below to update the array before continuing.

- A3515A-03, A3516A-03, and A3516Z-01 HP AutoRAID Disk Array for the Model 12
- A3700A-01, A3700-AD-01, and A3700AZ-01 HP AutoRAID Disk Array for the HP SureStore E Disk Array 12H

NOTE! It is required that a backup of the array be performed before downloading the firmware.

CAUTION! Follow all the procedures exactly as described. If you fail to follow the procedures exactly, you could lose data!

CAUTION! In upgrading to HP40 or later firmware for the purpose of using 36-Gigabyte disk drives, it is important that the controller firmware be upgraded before adding the 36-Gigabyte disk drives, as any data written on those disk drives using any controller firmware previous to version HP40 will be lost!

Figure 2. Downloading Controller Firmware Flowchart

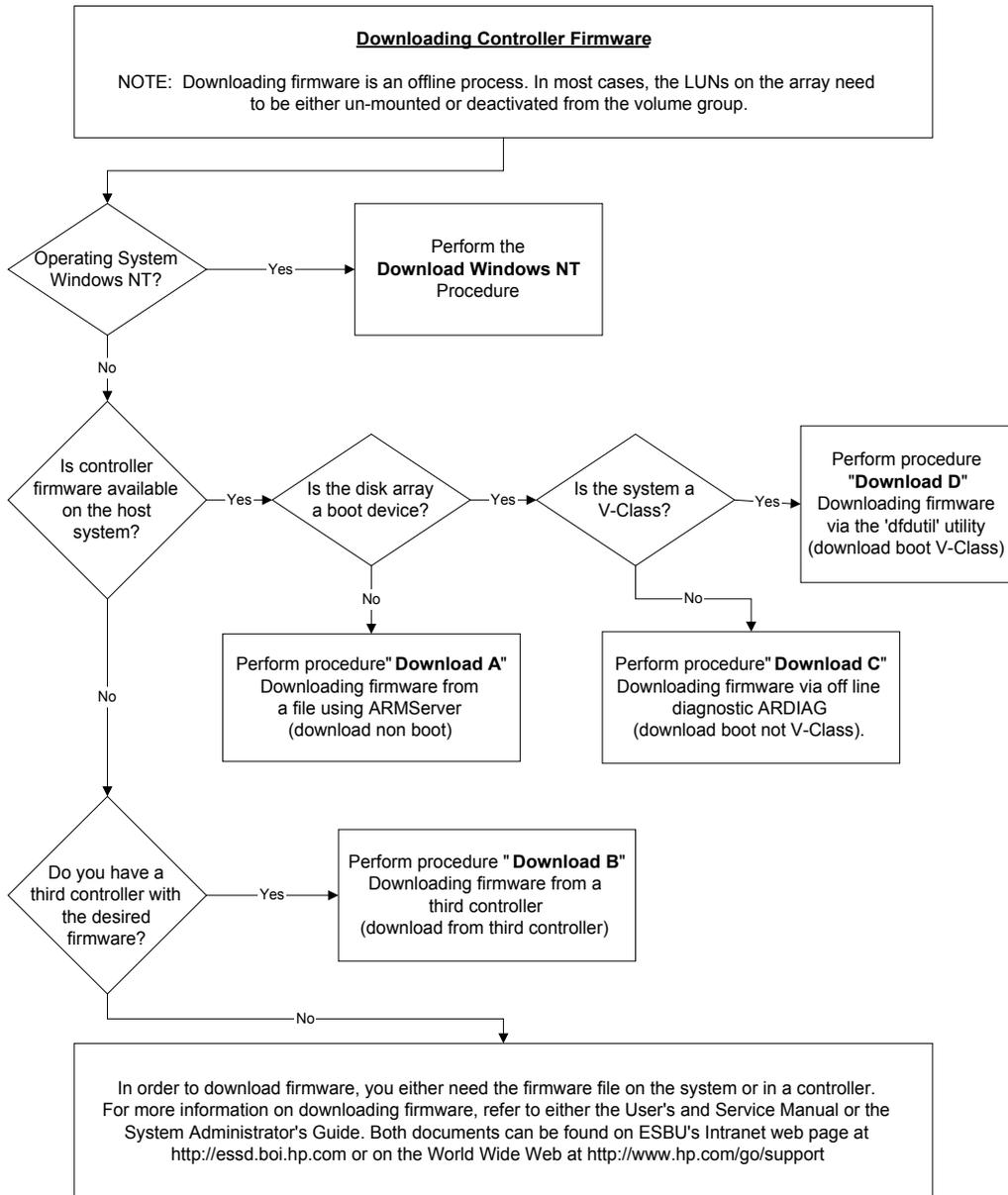
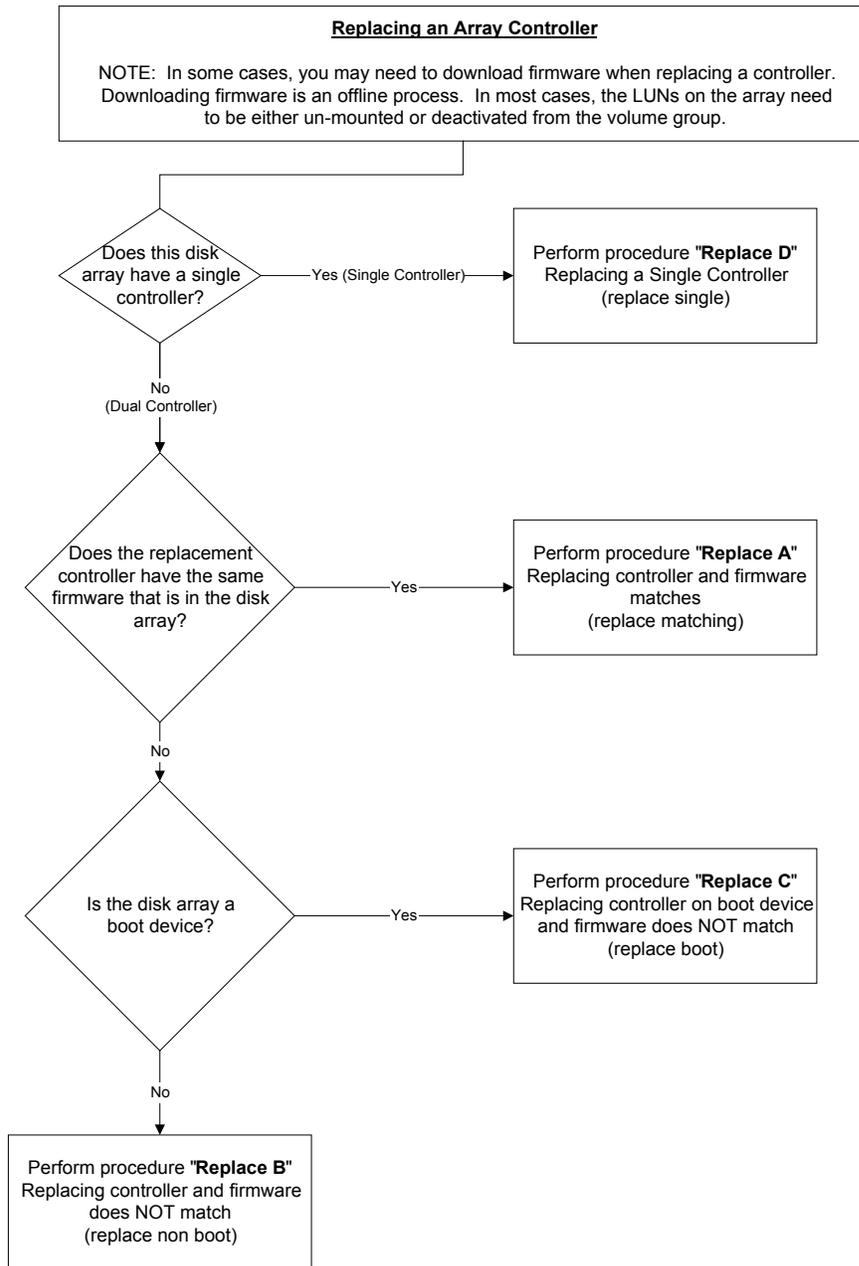


Figure 3. Replacing an Array Controller Flowchart



Links to Downloading Firmware:

[Download Windows NT](#)

[Download A\) Downloading Disk Array Firmware from a File Using ARMServer \(AutoRAID Manager\)](#)

[Download B\) Downloading Disk Array Firmware from a “Third” Controller Using the Front Panel](#)

[Download C\) Downloading Disk Array Firmware from a File Using Off-Line Diagnostics \(ARDIAG\)](#)

[Download D\) Downloading Disk Array Firmware from a File on a V-Class system using dfdutil Utility](#)

Links to Replacing an Array Controller:

[Replace A\) Replacing an Array Controller \(Version of Firmware on the Replacement Array Controller Matches Version of Firmware on the Installed Array Controllers\)](#)

[Replace B\) Replacing an Array Controller In an Array that IS NOT used as a boot device and the Version of Firmware on the Replacement Array Controller DOES NOT Match Version of Firmware on the Installed Array Controllers.](#)

[Replace C\) Replacing an Array Controller in an Array that is Used as a Boot Device \(Version of Firmware on the Replacement Array Controller DOES NOT Match Version of Firmware on the Installed Array Controllers\)](#)

[Replace D\) Replacing an Array Controller in an Array with one controller installed.](#)

Download Windows NT

AutoRAID Manager includes a separate utility for downloading controller firmware. This utility, WinDownload, simplifies the process of downloading new firmware to the controller in your disk array.

The WinDownload utility is used only for downloading firmware to the disk array controllers. Firmware can also be downloaded to the disk modules using the ARM download command line utility described in the System Administrator's Guide, which is shipped with each disk array.

The download process shuts down the disk array while the firmware is being downloaded, so the disk array will be inaccessible while the download is in progress.

CAUTION! In multi-host configurations, other hosts must not access the disk array while the download is in progress. Data can be lost if write requests are made to the disk array while a download is in progress.

Do not attempt to download controller firmware to a disk array that is serving as the NT boot device. If you attempt to do so, the operating system will crash.

To download controller firmware:

1. Alert users that data on the disk array will be inaccessible during the download.
2. From the **Start** menu, select **Programs|AutoRAID Manager|WinDownload**
3. Select the disk array you want to upgrade with new firmware.
4. Click **Select Firmware File**
5. Select the firmware file to be downloaded to the disk array. The latest version of firmware is installed in the AutoRAID\FW folder during setup. If the desired firmware file is in another location, locate and select it .
6. Click **Download**

The download process will begin. The process can take up to 5 minutes to complete. When the download is complete the disk array will be brought back on line, ready to process I/Os from the host.

Download A) Downloading Disk Array Firmware from a File Using ARMServer (AutoRAID Manager)

CAUTION! Controller firmware HP4x and any later versions have a different data map format in NVRAM memory. Once you have HP48 or later, you can not “downgrade” to any firmware version prior to HP4x without first completely backing up all data on the array, including any meta-data, e.g., LUN and LVM configuration. After you have “downgraded” the firmware and formatted the array, all meta-data and real data will need to be restored from backup.

Assumptions: Use this procedure if the desired version of firmware is available from the host system, and you want to update the firmware on the installed array controllers.

1. Get <array-id> using ARMServer (`arraydsp -i`) or front panel (View Settings, Array S/N). You may also use the raw device file that is connected to the array.
2. Obtain the desired version of firmware and determine its <codefilename> (filename) and location (path).
3. Quiet (quiesce) or stop all I/Os, deactivate volume set, unmount file systems, stop traffic to the array.
4. Shutdown the array using ARMServer (`arraymgr -s shut <array-id>`) or front panel (Shutdown). The following table shows the proper front panel commands to shutdown the array:

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Ready”
MENU	“Language”
–	“View Settings”
–	“Shutdown”
ENTER	“Confirm”
ENTER	“Shutting Down”
	then “Shutdown Complete”

5. Download the firmware (`download -C <codefilename> <array-id>`).

6. Verify updated firmware revisions on both controllers using ARMServer (`arraydsp -c <array-id>`) or front panel. The following table shows the proper front panel commands to verify the firmware on the array:

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Ready”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Ready”
+	“Primary Cntrl: __”
+	“SCSI ID x: __”
+	“SCSI ID y __”
+	“Firmware: HP __”

7. If ARMServer issues a “switch controller” command, you may have to repeat step 5 (download).

NOTE! In some older versions of ARMServer, the download command had a problem recognizing the primary array controller. This happens when the primary array controller SCSI ID is a higher number than the secondary array controller SCSI ID. If this problem occurs, the download command will issue a “switch controller” command and then stop. When this happens, issuing the download command again causes the download to complete properly.

8. The disk array will display the “Ready” state when the download command has completed.

Download B) Downloading Disk Array Firmware from a “Third” Controller Using the Front Panel (This is not the preferred method! Use this procedure only if the disk array firmware is NOT available from the host.)

CAUTION! Controller firmware HP4x and any later versions have a different data map format in NVRAM memory. Once you have HP4x or later, you can not use this procedure to “downgrade” to any firmware version prior to HP4x.

NOTE! This procedure is not recommended if you have a single controller installed in your array.

Assumptions: Use this procedure to download firmware if you are unable to use the host computer or the AutoRAID Manager (ARMServer). This procedure is used to update firmware using an array controller as the source of the new firmware.

1. Obtain a “third” controller with the desired version of firmware.
2. Reset (disconnect and then re-connect) both batteries on third controller at the same time to erase NVRAM.
3. Quiet (quiesce) or stop all I/Os, deactivate volume set, unmount file systems, stop traffic to the array.
4. The front panel display should say “Ready”. Check the “System State” on the front panel display. It should say “System State: Ready”. Also check to see which controller is set to primary. The primary controller is _____.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL	“Ready”
CANCEL	“Ready”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Ready”
+	“Primary Cntrl: __”

5. Shutdown the array using the front panel.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Ready”
MENU	“Language”
-	“View Settings”
-	“Shutdown”
ENTER	“Confirm”
ENTER	“Shutdown Complete”

After shutdown has completed, push the on/off button to the off position completing the shutdown. This will turn off power to all modules.

6. Disconnect all disk drive modules from the back plane. You do not need to remove them completely. Just pull them out so that the cam handle is fully extended.
7. Remove the controller that was noted as primary in one of the previous steps.
8. Install the “third” controller into slot X. This may mean that you have to move the existing controller into slot Y.
9. Push the on/off button to the on position and allow the array to complete its initialization process. After the initialization has completed, the front panel should say “Not Enough Disks”. Check the system state using the key strokes below. The System state should be “Not Enough Disks” with a “Firmware Needed” warning.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
-	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Warning: Firmware Needed”

10. Verify if the primary controller currently installed has the desired firmware using the front panel display. The following table shows the proper front panel commands to view which controller is the primary array controller, and what version of firmware is on the primary array controller.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Warning: Firmware Needed”
+	“Primary Cntrl: X”
+	“SCSI ID x: ___”
+	“SCSI ID y: ___”
+	“Firmware: HP ___”

11. Copy the firmware from the primary controller to the secondary controller using the front panel:

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
+	“Cntrl Changes”
ENTER	“SCSI ID”
–	“Copy Firmware”
ENTER	“Confirm”
ENTER	“Copying Firmware”, then “Firmware Loading”, then array will initialize then “Offline SCSI ID”

12. The front panel display should say “Not Enough Disks”. Check the “System State” on the front panel display. It should say “Not Enough Disks” with no other warnings.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Primary Cntrl: X”

13. Verify that both controllers have the desired firmware using the front panel. The following table shows the proper front panel commands to view the firmware revision installed:

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Primary Cntrl: X”
+	“SCSI ID x: ___”
+	“SCSI ID y: ___”
+	“Firmware: HP ___”

14. Push on/off button to off position and wait for the array to turn off
15. Remove the “third” controller that was obtained in step 1. It should be in controller slot X.
16. Move the controller that is in slot Y into controller slot X.
17. Take the previously removed (original) controller and reset (disconnect and then re-connect) its batteries both at the same time.
18. Install this previously removed (original) controller in the now empty controller slot Y.
19. Push the on/off button to the on position and allow the array to complete its initialization process. After the initialization has completed, the front panel should say “Not Enough Disks”. Check the system state using the key strokes below. The system state should be “Not Enough Disks” with a “Firmware Needed” warning.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Warning: Firmware Needed”

20. Verify if the primary controller currently installed has the desired firmware using the front panel display. The following table shows the proper front panel commands to view which controller is the primary array controller, and what version of firmware is on the primary array controller.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Warning”
+	“Warning: Firmware Needed”
+	“Primary Cntrl: X”
+	“SCSI ID x: Offline”
+	“SCSI ID y: Offline”
+	“Firmware: HP __”

21. Copy the firmware from the primary controller to the secondary controller using the front panel:

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
+	“Cntrl Changes”
ENTER	“SCSI ID”
–	“Copy Firmware”
ENTER	“Confirm”
ENTER	“Copying Firmware”, then “Firmware Loading”, then array will initialize then “Offline SCSI ID”

22. The front panel display should say “Not Enough Disks”. Check the “System State” on the front panel display. It should say “Not Enough Disks” with no other warnings.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Primary Cntrl: X”

23. You are now at a point in which the drives need to be re-installed. The drives were disconnected earlier to further protect the NVRAM. The NVRAM is very important. NVRAM stores all configuration and meta-data that point or map drive location information to real data. If this procedure has been successful up to this point, the correct NVRAM memory maps are located in both controllers and also in the disk drive modules.

If the NVRAM is located in both the controllers and the disk drive module correctly (there were no errors encountered during this procedure) Then do the following:

- Push on/off button to the off position
- Plug in all drive modules
- Push on/off button to the on position and wait for the initialization to complete.

If you are unsure that the NVRAM is correct in both controllers, there were errors, especially errors like No Address Map or NVRAM errors. Then do the following:

- Push on/off button to the off position
- Remove both controllers from slot X and Y and reset (disconnect and then re-connect) both batteries at the same time on each controller.
- Re-install both controllers. It doesn't matter which controller goes into which slot at this time.
- Plug in all drive modules
- Push on/off button to the on position and wait for the initialization to complete.

24. The front panel display should say "Ready". Check the "System State" on the front panel display. It should say "Ready".

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	"Ready"
MENU	"Language"
-	"View Settings"
ENTER	"System State: Ready"

25. If the array does not show up using ARMServer (`arraydsp -i`), you may have to re-connect to "see" the array using the ARMServer (`arraydsp -R`) command, which scans the bus for all arrays. This command can take a few seconds to execute. Once re-connected, you will "see" the array again.

Download C) Downloading Disk Array Firmware from a File Using Off-Line Diagnostics (ARDIAG)

Assumptions: Use this procedure if the desired version of firmware is available on a tape or other such media that can boot with the offline diagnostic environment (ODE). Do not use this procedure if the system is on a V class computer.

CAUTION! Controller firmware HP4x and any later versions have a different data map format in NVRAM memory. Once you have HP4x or later, you can not “downgrade” to any firmware version prior to HP4x without first completely backing up all data on the array, including any meta-data, e.g., LUN and LVM configuration. After you have “downgraded” the firmware and formatted the array, all meta-data and real data will need to be restored from backup.

NOTE! HP-qualified personnel only: For more information on ARDIAG, refer to the web address: <http://essd.boi.hp.com/products/DiskArrays/autoraid/ARMdoclist.htm> click on “Off-Line Diagnostic Command Specification”.

1. Obtain a bootable LIF file. You can get the LIF file from the web:

On the World Wide Web:

- <http://www.hp.com/go/support>
- click next on “Enterprise Storage”
- click next on “HP Enterprise Disk Arrays”
- click next on “SureStore E Disk Arrays”
- click next on “Disk Array 12H”
- click GO on “Software/Firmware” beneath “Software & Drivers”

or, inside the HP firewall (HP-qualified personnel only):

- <http://essd.boi.hp.com>
- click on “Products”
- click on “Disk Arrays”
- click on “Disk Array 12H”
- click on “AutoRAID firmware”
- left click on “ARDlif_HPxx” (xx = the controller firmware revision you want to download)
- save the file using “save as” to your system

Once you have the ARDlif file, copy it to a tape using the following command:

```
dd if=ARDlif of=/dev/rmt/{tapedrive} bs=2k
```

2. On the machine you want to download and while the operating system is running get the following information:

Perform an “ioscan -fnCdisk” and “ioscan -fnCtape” to locate the arrays and the tape device and note their location.

Tape device hardware address	_____
Tape device location (i.e., /dev/rmt/...):	_____
Disk array(s) bus number(s):	_____
Firmware file name needed to download (This file should be in the ARDlif file)	_____
Primary controller	_____

If you are unsure which controller is the primary, verify from the front panel. Use the information below to discover which controller is the primary.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Ready”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Ready”
+	“Primary Cntrl: __”

- Once this is complete, you can use this tape as a boot tape to run ARDIAG on any PA-RISC system using an AutoRAID product as a boot device. Shutdown HP-UX system and reboot the system from the tape.
- At “Interact with IPL (y or n)?”, answer “y”.
- At ISL>, type “ODE ARDIAG”.
- Enter the password at this point.
- ARDIAG will scan the array busses and report those on the screen (each bus will be referenced by an index number).
- At the “Please enter a range of the disk array busses you want to check,” select only the range (by index number) that the array(s) is on. If you select the default range (index numbers of all busses found), this process could take 5+ minutes.
- After checking the array busses, ARDIAG will search for firmware files on the tape and report those to you as well. The firmware files located on the tape will present you a table that looks like the following:

<u>File name</u>	<u>Intended Product ID</u>	<u>Revision</u>	<u>Size</u>
C3586AHPxx	HPC3586A disk array	HPxx	1048576
C5447AHPxx	HPC5447A disk array	HPxx	2097152

Now to set the environment variables:

10. Run the DISPMAP command. This command allows you to display all available AutoRAID disk arrays (controllers) on the system. Note the Test Disk # of the controller you've identified as the primary (by its path in ioscan).
11. Type TESTDISK_# (where _ is a space and # is the Test Disk # from DISPMAP). Your returned message will read "Array state is ready".
12. Run the DISPMECH command. This command allows you to display physical mechanisms within a selected AutoRAID disk array. Note the Test Level # of the FRU you want to download the firmware to (i.e., Cntrl X).
13. Type TESTLEVEL_# (where _ is a space and # is the Test Level # from DISPMECH). Your returned message will read "TESTLEVEL=# (where # is the number you selected).
14. At this point, you can run the INQUIRY command to verify that you have selected the primary controller. If you did not select the primary controller, use the TESTDISK and TESTLEVEL commands as detailed above to change to the primary controller.

To Download:

15. Type DOWNLOAD. You'll be presented with two options:
 - 1 - Download a firmware image file to the primary controller with an automatic update of same firmware to the secondary controller.
 - 2 - Update the secondary controller with the same firmware as the primary controller.Select option #1.
16. Enter the firmware filename that is on the tape to download. Type "?" to redisplay the firmware files.
17. At "Do you want to do the update?", enter "y". DO NOT INTERRUPT THIS PROCESS OR THE DEVICE COULD BE RENDERED INOPERATIVE!
18. You will receive several messages letting you know what is happening. After a few minutes, you will receive a message "Firmware Downloaded Successfully".
19. Repeat this process for all other arrays on the system.
20. When finished downloading firmware to all arrays, at ARDIAG>, type "EXIT ALL".
21. At ISL>, type "RESET".

Download D) Downloading Disk Array Firmware from a File on a V-Class system using dfdutil Utility

Assumptions: Use this procedure when the desired version of controller firmware is available as a DFDUTIL.LIF file for the V-Class system.

CAUTION! Controller firmware HP4x and any later versions have a different data map format in NVRAM memory. Once you have HP4x or later, you can not “downgrade” to any firmware version prior to HP4x without first completely backing up all data on the array, including any meta-data, e.g., LUN and LVM configuration. After you have “downgraded” the firmware and formatted the array, all meta-data and real data will need to be restored from backup.

Note! For information on dfdutil, refer to the man page dfdutil.

1. Obtain the desired version of DFDUTIL_VHPxx.LIF (xx = the controller firmware revision) and copy it the file /spp/data/DFDUTIL.LIF on the teststation. You can get the LIF file from the web:

On the World Wide Web:

- <http://www.hp.com/go/support>
- click next on “Enterprise Storage”
- click next on “HP Enterprise Disk Arrays”
- click next on “SureStore E Disk Arrays”
- click next on “Disk Array 12H”
- click GO on “Software/Firmware” beneath “Software & Drivers”

or, inside the HP firewall (HP-qualified personnel only):

- <http://essd.boi.hp.com>
 - click on “Products”
 - click on “Disk Arrays”
 - click on “Disk Array 12H”
 - click on “AutoRAID firmware”
 - left click on “DFDUTIL_VHPxx.LIF” (xx = the controller firmware revision you want to download)
 - save the file using “save as” to your system
2. Once you have the DFDUTIL_VHPxx.LIF, copy it to a tape using the following command:
`dd if= the DFDUTIL_VHPxx.LIF of=/dev/rmt/{tapedrive} bs=2k`
 3. Run dfdutil and download HPxx firmware.

Replace A) Replacing an Array Controller (Version of Firmware on the Replacement Array Controller Matches Version of Firmware on the Installed Array Controllers)

Assumptions: Use this procedure if an existing array controller has failed (if disk array is either a boot or non-boot device), and the replacement array controller has the same version of firmware as the installed array controllers.

1. If replacement controller is new, install the controller batteries (supplied).
2. If replacement controller is NOT new, reset (disconnect and then re-connect) both batteries on the replacement controller at the same time to erase NVRAM.
3. Verify which controller has failed by examining the logs using the `logprint` command. This is to make sure you do not remove the functioning (good) controller.
4. Remove the “failed” controller. After Initialization, display panel shows “Ready.”
5. Install the replacement controller in the disk array. After initialization, display panel shows “Ready.”
6. The disk array will display the “Ready” state when both versions of firmware match.

Replace B) Replacing an Array Controller In an Array that IS NOT used as a boot device and the Version of Firmware on the Replacement Array Controller DOES NOT Match Version of Firmware on the Installed Array Controllers.

CAUTION! Controller firmware HP4x and any later versions have a different data map format in NVRAM memory. Once you have HP4x or later, you can not “downgrade” to any firmware version prior to HP4x without first completely backing up all data on the array, including any meta-data, e.g., LUN and LVM configuration. After you have “downgraded” the firmware and formatted the array, all meta-data and real data will need to be restored from backup.

NOTE! This is an off line procedure. All I/O to the array will need to be suspended for duration of this procedure.

Assumptions: Use this procedure if an existing array controller has failed, if the disk array a non-boot device, and the replacement array controller DOES NOT have the same version of firmware as the installed array controllers.

1. If replacement controller is new, install the controller batteries (supplied).
2. If replacement controller is NOT new, reset (disconnect and then re-connect) both batteries on the replacement controller at the same time to erase NVRAM.
3. Verify which controller has failed by examining the logs using the `logprint` command. This is to make sure you do not remove the functioning (good) controller.
4. Quiet (quiesce) or stop all I/Os, deactivate volume set, unmount file systems, stop traffic to the array.
5. Remove the “failed” controller. After Initialization, display panel shows “Ready.”

CAUTION! It is very important that the array be in a “Ready” state. The array should not present any warning (other than a single controller warning) statements at this point.

6. Shutdown the array using the front panel.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Ready”
MENU	“Language”
–	“View Settings”
–	“Shutdown”
ENTER	“Confirm”
ENTER	“Shutdown Complete”

After shutdown has completed, push the on/off button to the off position completing the shutdown. This will turn off power to all modules.

7. Disconnect all disk drive modules from the back plane. You do not need to remove them completely. Just pull them out so that the cam handle is fully extended.
8. Pull the existing good controller and reset (disconnect and then re-connect) both batteries at the same time. This will mean that the only copy of valid maps reside on the disk drive modules.
9. Install both controllers. Put the controller with the desired firmware into controller slot X.
10. Push the on/off button to the on position and allow the array to complete its initialization process. After the initialization has completed, the front panel should say “Not Enough Disks”. Check the system state using the key strokes below. The System state should be “Not Enough Disks” with a “Firmware Needed” warning.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Warning: Firmware Needed”

11. Verify if the primary controller currently installed has the desired firmware using the front panel display. The following table shows the proper front panel commands to view which controller is the primary array controller, and what version of firmware is on the primary array controller.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Warning: Firmware Needed”
+	“Primary Cntrl: X”
+	“SCSI ID x: __”
+	“SCSI ID y: __”
+	“Firmware: HP __”

12. Copy the firmware from the primary controller to the secondary controller using the front panel:

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
+	“Cntrl Changes”
ENTER	“SCSI ID”
–	“Copy Firmware”
ENTER	“Confirm”
ENTER	“Copying Firmware”, then “Firmware Loading”, then array will initialize then “Not Enough Disks”

13. The front panel display should say “Not Enough Disks”. Check the “System State” on the front panel display. It should say “Not Enough Disks” with no other warnings.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Primary Cntrl: X”

14. Verify that both controllers have the desired firmware using the front panel. The following table shows the proper front panel commands to view the firmware revision installed:

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Primary Cntrl: X”
+	“SCSI ID x: __”
+	“SCSI ID y __”
+	“Firmware: HP __”

15. Push on/off button to off position and wait for the power to turn off
16. Remove both controllers from slot X and Y and reset (disconnect and then re-connect) both batteries on each controller at the same time.
17. Re-install both controllers. It doesn't matter which controller goes into which slot at this time.
18. Plug in all drive modules
19. Push on/off button to the on position and wait for the initialization to complete
20. The disk array should display the “Ready” state. Check the system state. There should be no other warnings.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Ready”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Ready”
+	“Primary Cntrl: X”

21. If the array does not show up using ARMServer (`arraydsp -i`), you may have to re-connect to “see” the array using the ARMServer (`arraydsp -R`) command, which scans the bus for all arrays. This command can take a few seconds to execute. Once re-connected, you will “see” the array again.

**Replace C) Replacing an Array Controller in an Array that is Used as a Boot Device
(Version of Firmware on the Replacement Array Controller DOES NOT Match Version of
Firmware on the Installed Array Controllers)**

CAUTION! Controller firmware HP4x and any later versions have a different data map format in NVRAM memory. Once you have HP4x or later, you can not “downgrade” to any firmware version prior to HP4x without first completely backing up all data on the array, including any meta-data, e.g., LUN and LVM configuration. After you have “downgraded” the firmware and formatted the array, all meta-data and real data will need to be restored from backup.

NOTE! This is an off line procedure. Because the array is a boot device, the operating system needs to be shut down

Assumptions: Use this procedure if an existing array controller has failed on a boot device, and the replacement array controller DOES NOT have the same version of firmware as the installed array controllers.

NOTE! The offline diagnostic is another way to install firmware when the array is a boot device. Offline diagnostics are not covered in this paper.

1. If replacement controller is new, install the controller batteries (supplied).
2. If replacement controller is NOT new, reset (disconnect and then re-connect) both batteries on the replacement controller at the same time to erase NVRAM.
3. Verify which controller has failed by examining the logs using the `logprint` command. This is to make sure you do not remove the functioning (good) controller.
4. Perform a shutdown of the operating system. Insure that there is no I/O traffic presented to the array.
5. Remove the “failed” controller. After Initialization, the display panel should say “Ready”.

CAUTION! It is very important that the array be in a “Ready” state. The array should not present any warning (other than a single controller warning) statements at this point.

6. Shutdown the array using the front panel.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Ready”
MENU	“Language”
–	“View Settings”
–	“Shutdown”
ENTER	“Confirm”
ENTER	“Shutdown Complete”

After shutdown has completed, push the on/off button to the off position completing the shutdown. This will turn off power to all modules.

7. Disconnect all disk drive modules from the back plane. You do not need to remove them completely. Just pull them out so that the cam handle is fully extended.
8. Pull the existing good controller and reset (disconnect and then re-connect) both batteries at the same time. This will mean that the only copy of valid maps reside on the disk drive modules.
9. Install both controllers. Put the controller with the desired firmware into controller slot X.
10. Push the on/off button to the on position and allow the array to complete its initialization process. After the initialization has completed, the front panel should say “Not Enough Disks”. Check the system state using the key strokes below. The System state should be “Not Enough Disks” with a “Firmware Needed” warning.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Warning: Firmware Needed”

11. Verify if the primary controller currently installed has the desired firmware using the front panel display. The following table shows the proper front panel commands to view which controller is the primary array controller, and what version of firmware is on the primary array controller.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Warning: Firmware Needed”
+	“Primary Cntrl: X”
+	“SCSI ID x: __”
+	“SCSI ID y: __”
+	“Firmware: HP__”

12. Copy the firmware from the primary controller to the secondary controller using the front panel:

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
+	“Cntrl Changes”
ENTER	“SCSI ID”
–	“Copy Firmware”
ENTER	“Confirm”
ENTER	“Copying Firmware”, then “Firmware Loading”, then array will initialize then “Not Enough Disks”

13. The front panel display should say “Not Enough Disks”. Check the “System State” on the front panel display. It should say “Not Enough Disks” with no other warnings.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Primary Cntrl: X”

14. Verify that both controllers have the desired firmware using the front panel. The following table shows the proper front panel commands to view the firmware revision installed:

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Not Enough Disks”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Not Enough Disks”
+	“Primary Cntrl: X”
+	“SCSI ID x: __”
+	“SCSI ID y __”
+	“Firmware: HP __”

15. Push on/off button to off position and wait for the power to turn off
16. Remove both controllers from slot X and Y and reset (disconnect and then re-connect) both batteries on each controller at the same time.
17. Re-install both controllers. It doesn’t matter which controller goes into which slot at this time.
18. Plug in all drive modules
19. Push on/off button to the on position and wait for the initialization to complete
20. The disk array should display the “Ready” state. Check the system state. There should be no other warnings.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Ready”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Ready”
+	“Primary Cntrl: X”

21. If the array does not show up using ARMServer (`arraydsp -i`), you may have to re-connect to “see” the array using the ARMServer (`arraydsp -R`) command, which scans the bus for all arrays. This command can take a few seconds to execute. Once re-connected, you will “see” the array again.

Replace D) Replacing an Array Controller in an Array with one controller installed.

Assumption #1: If a successful shutdown has occurred in which the NVRAM memory maps were copied to the disk drive modules, then you can replace the controller and restore the maps using the following procedure:

1. If replacement controller is new, install the controller batteries (supplied).
2. If replacement controller is NOT new, reset (disconnect and then re-connect) both batteries on the replacement controller at the same time to erase NVRAM.
3. Replace the failed controller with the new one in controller slot X.
4. Push the on/off button to the on position and wait for the initialization to complete.
5. The disk array should display the “Ready” state. Check the system state. There should be no other warnings.

<u>KEY</u>	<u>DISPLAY</u>
CANCEL CANCEL	“Ready”
MENU	“Language”
–	“View Settings”
ENTER	“System State: Ready”
+	“Primary Cntrl: X”

Assumption #2: Since there is only one controller in the array, it is very likely that when the controller failed the NVRAM memory maps were destroyed as well. If the maps were destroyed or the procedure failed above, there are only two other options:

1. Try to restore maps using *arrayrecover* utility. See the man page for details on command usage.

NOTE! The *arrayrecover* utility is only available on ARMServer patch released IPR 9810 or newer (PHCO_15699 for 10.x and PHCO_15700 for 11.0 or newer).

Also, the array controller firmware must be running version HP4x or newer.

2. Restore array configuration (LUN and or LVM) plus data from backup storage medium.