User Guide

hp StorageWorks

Modular Smart Array 1000 Controller

Second Edition (May 2004)

Part Number: 347281-002

This guide provides information needed to use, replace components, and maintain the HP StorageWorks Modular Smart Array 1000 Controller (MSA1000 Controller.)

Modular Smart Array 1000 Controller User Guide
Second Edition (May 2004)
Part Number: 347281-002

Contents

About This Guide

This user guide provides information to help you:

- Operate the MSA1000 Controller
- Replace the MSA1000 Controller and its components

“About this Guide” topics include:

Overview

This section covers the following topics:

Intended audience

This book is intended for use by administrators with a moderate amount of SAN-management experience.

Related documentation

In addition to this guide, refer to the *HP StorageWorks MSA1000 Installation Guide* that ships with this system.

Conventions

Conventions consist of the following:

Document conventions

The document conventions included in Table 1 apply in most cases.

Table 1: Document Conventions

Element	Convention
Cross-reference links	Figure 1
Key and field names, menu items, buttons, and dialog box titles	**Bold**
File names, application names, and text emphasis	*Italics*
User input, command and directory names, and system responses (output and messages)	`Monospace font` `COMMAND NAMES` are uppercase monospace font unless they are case sensitive
Variables	*`<monospace, italic font>`*
Web site addresses	Underlined sans serif font text: http://www.hp.com

Text symbols

The following symbols may be found in the text of this guide. They have the following meanings:

WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.

Caution: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

Note: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Equipment symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings:

Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of personal injury from electrical shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk of personal injury from a hot component, allow the surface to cool before touching.

Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

WARNING: To reduce the risk of personal injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.

Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

Getting help

If you still have a question after reading this guide, contact an HP authorized service provider or access our web site: http://www.hp.com.

HP technical support

In North America, call technical support at 1-800-652-6672, available 24 hours a day, 7 days a week.

Note: For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP web site under support: http://www.hp.com.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

HP storage web site

The HP storage web site has the latest information about this and other HP storage products. Access the primary storage web site on the Internet at http://www.hp.com/country/us/eng/prodserv/storage.html. From this web site, select the appropriate product or solution.

HP authorized reseller

For the name of your nearest HP Authorized Reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-263-5868
- Elsewhere, see the HP web site for locations and telephone numbers: http://www.hp.com.

Overview

1

The MSA1000 Controller is a drive array controller specifically designed for installation in the MSA1000 and the MSA1500 cs storage products.

Each MSA1000 and MSA1500 cs is equipped with one MSA1000 Controller installed. An additional controller for redundancy can be purchased separately.

The following topics are included in this chapter:

MSA1000 Controller display

Each controller contains an integrated Liquid Crystal Display (LCD). This module is used for displaying informational and error messages, showing the status of the module, and for providing user input when required. Traditional Power-On Self-Test (POST) messages issued by PCI-based array controllers have been combined with runtime event notification messages to create a new set of controller display messages.

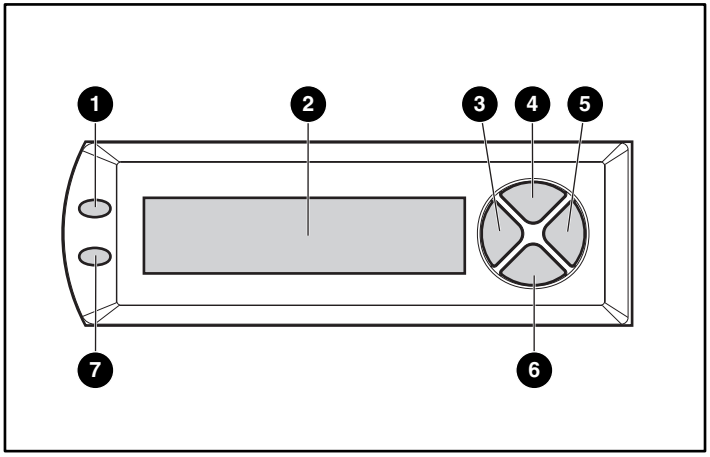

Figure 1: Controller display

Controller Display	Description
❶	Fault indicator (amber)
❷	Display
❸	Left push button
❹	Up push button
❺	Right push button
❻	Down push button
❼	Redundancy link indicator (green)

For more information about the MSA1000 Controller display, see "Controller Display Messages" on page 31.

MSA1000 Controller indicators

During normal runtime, the MSA1000 Controller has 18 indicators that indicate activity or malfunction of the controller. They are labeled 0-17, as shown in the following figure. The table that follows describes the purpose and function of each indicator.

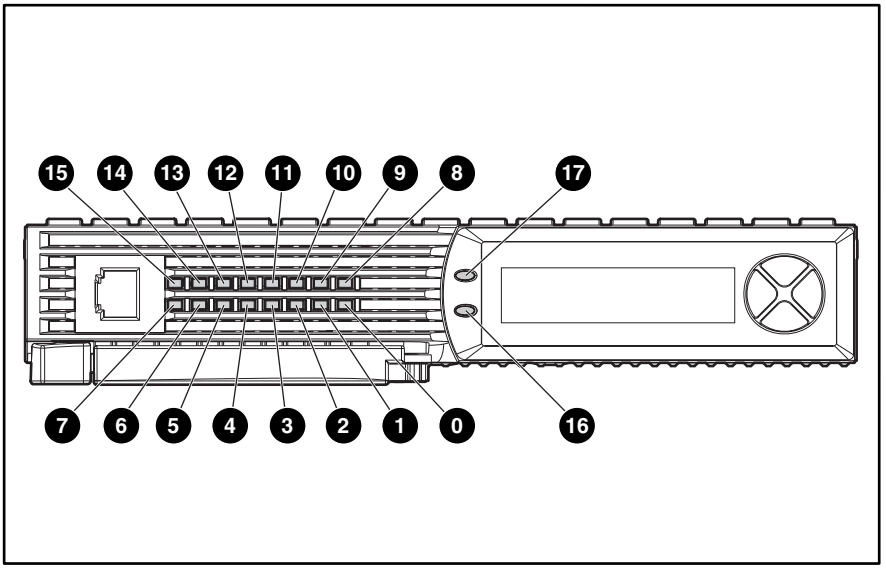

Figure 2: MSA1000 controller indicators

Table 2: MSA1000 Controller Indicator Descriptions

Indicator	Function	Description
❶-❷	Busy status	These three LEDs are used to progressively represent the processing load on the controller. ON = the controller is idle. OFF = the controller is operating at full capacity.
❸-❼	Fibre Channel ID	Indicates the 5-bit Arbitrated Loop Physical Address (ALPA) assigned to this array controller (not applicable when in fabric mode).
❽	Idle Heartbeat	Indicates the controller is idle and functioning.
❾	Active/Standby	ON=Controller is active. OFF=Controller is in standby.
❿	Direct Memory Access (DMA) active	ON = DMA transfers are active.
⓫	Logical I/O active	ON = Currently processing logical requests from the Host Adapter.
⓬	SCSI Port A (SCSI Bus 2)	ON = Indicates requests are outstanding on the first SCSI bus.
⓭	SCSI Port B (SCSI Bus 3)	ON = Indicates requests are outstanding on the second SCSI bus.
⓮	Cache Activity	ON = Cache active. OFF = No cache activity. Blinking = Cache transfer pending.
⓯	Drive failure	ON = A configured hard drive has failed in the array.
⓰	Redundancy Active	Green indicates two controllers are in a redundant mode of operation.
⓱	Fault	Amber indicates an error message has been sent to the controller display.

Array Accelerator (battery-backed cache)

The Array Accelerator is a high-performance, upgradeable 256-MB SDRAM DIMM read/write battery-backed cache that can increase performance in database and fault-tolerant configurations. It performs both protected posted-write caching and read-ahead caching, allowing data to be accessed much faster than from disk storage.

In protected posted-write caching, data is written to the cache memory on the Array Accelerator rather than directly to the drives. Later, when the storage system is idle, the controller writes the cached data to the drive array.

The read-ahead cache detects sequential accesses to the array, reads ahead data, and stores the data in the cache until the next read access arrives. If the data is of a sequential nature, the data can be loaded immediately into memory, avoiding the latency of a disk access.

If the MSA1000 Controller fails before cached data is stored on the disk, the Array Accelerator and its integrated batteries may be removed from one MSA1000 Controller and installed on a replacement controller. Any data in the Array Accelerator that has not been written to the hard drive will be transferred to the replacement MSA1000 Controller.

Array Accelerator features

Other features of the Array Accelerator:

- Mounted on a removable daughterboard (allows stored data to be moved to another controller if the original controller fails)
- Backed up with replaceable batteries
- Upgradable to 512 MB (256 MB per controller)
- Adjustable read/write ratio - usually set during array configuration but can be changed at any time
- 16-bit Error Checking and Correcting (ECC) SDRAM memory

  ECC detects and corrects all single-bit memory errors. It also detects all two-bit memory errors in any position, and most three- and four-bit memory errors in a single SDRAM. With ECC, an entire memory chip can also fail without data loss. This provides a high level of data integrity by ensuring the correction of common memory errors without affecting performance.

Array Accelerator batteries

The Array Accelerator has two rechargeable and replaceable Nickel Metal Hydride (NiMH) battery packs. Under normal operating conditions, these should last for three years before replacement is necessary. They are continuously recharged via a "trickle" charging process whenever the MSA1000 storage system is powered on.

The battery packs protect data on the Array Accelerator against equipment failure or power outage for up to four continuous days.

Note: Temperature, age, and cache size may affect battery life.

This also applies if the Array Accelerator is removed from the MSA1000 Controller. When power is restored to the storage system, an initialization process writes the preserved data to the disk drives. This is particularly important for data that has been cached by a posted-write operation, but has not yet been written to the hard drives.

Note: The batteries on a new MSA1000 Controller may be discharged when the board is first installed. In this case, a Power-On Self-Test (POST) message will be displayed on the controller display panel when the controller is powered on, indicating that the Array Accelerator is temporarily disabled. No action is required on your part, since the internal circuitry will automatically recharge the batteries. Recharging the batteries can take up to 4 hours. The MSA1000 Controller will function properly during this time, although without the performance advantage of the Array Accelerator. When the batteries are charged to 90 percent of their capacity, the Array Accelerator is automatically enabled.

Depending on the status of the array accelerator, including a low battery charge, informational or error messages may be displayed on the controller's LCD panel. For a listing of cache module LCD messages, see the definitions for messages 60 through 79 in "Controller Display Messages" on page 31.

Controller firmware

Each MSA1000 Controller contains Read-Only Memory (ROM), which holds the firmware that operates the controller.

When operating in a redundant controller configuration, the MSA1000 or MSA1500 cs must contain two controllers executing the same firmware version.

Automatic firmware recovery

Two firmware images are stored in the ROM of each controller: one active image and one backup image.

Each time the system is powered on or restarted, the active and the backup images on the controller are checked to ensure they are valid. If one of the images is not valid, the valid image is automatically copied on top of the invalid image. This functionality does not require any user intervention.

Redundant-controller rirmware cloning

Each time a system with two controllers is powered on, restarted, or if a second controller is hot-plugged in a single-controller configuration, the firmware versions on the controllers are compared. If the firmware versions on the controllers are not the same, the system prompts to clone the firmware from the active controller onto the standby controller as follows:

```
CLONE FIRMWARE ? '<' = NO, '>' = YES
```

If a “no” response is entered or a response is not made to the prompt within 60 seconds, the firmware is not cloned and power to the standby controller is disabled. The system will operate from from one controller in a non-redundant mode until the firmware on both controllers is the same.

If a “yes” response is entered, the following messages are displayed while the contoller is updated and automatically restarted:

```
ROM CLONING STARTED
ARRAY CONTROLLER RESTARTING
MSA1X00 STARTUP COMPLETE
```

The two controllers should now operate in redundant mode.

Note: Cloning is not possible in single-controller configurations.

Controller firmware updates

Controller firmware updates and installation instructions are available on the HP web site.

For MSA1000 systems, obtain controller firmware from the **Software, Firmware & Drivers** page of the MSA1000 web site at www.hp.com/go/msa1000.

For MSA1500 cs systems, obtain controller firmware from the **Software, Firmware & Drivers** page of the MSA1500 cs web site at www.hp.com/go/msa1500cs.

To determine the firmware version you are currently running, do one of the following:

- On the MSA1000 Controller LCD panel, use the arrow keys to scroll backwards through the messages until the `ARRAY CONTROLLER FIRMWARE VER <version>` message is displayed.

  Each time the MSA1000 controller is restarted, the first message that is displayed includes the firmware version.
- In the CLI, use the `SHOW VERSION` command.
- In the ACU, highlight the controller and view the details.

Replacement Procedures

2

Information about replacing the following controller components is included in this chapter:

Replacing the MSA1000 Controller

If an MSA1000 Controller is failing, informational or error messages will be displayed on the LCD panel of that controller, depending on the condition.

The following steps detail how to replace a failed MSA1000 Controller; they can also be used to re-seat the controller.

Note: Redundancy is supported during a hard drive expansion, migration, or extension process and during regular drive rebuilds.

Note: Replacement Controllers include a new cache module. Remove this new module from the replacement Controller and replace it with the cache module from the failed controller. Using the same cache module will complete the disk writes that may have been trapped in the controller's cache. See "Replacing the MSA1000 Controller cache" for procedural instructions.

1. Press the controller's thumb latch and pull the latch handle toward you ❶.
2. Remove the MSA1000 Controller by pulling it straight out of the chassis ❷, as illustrated in Figure 3.

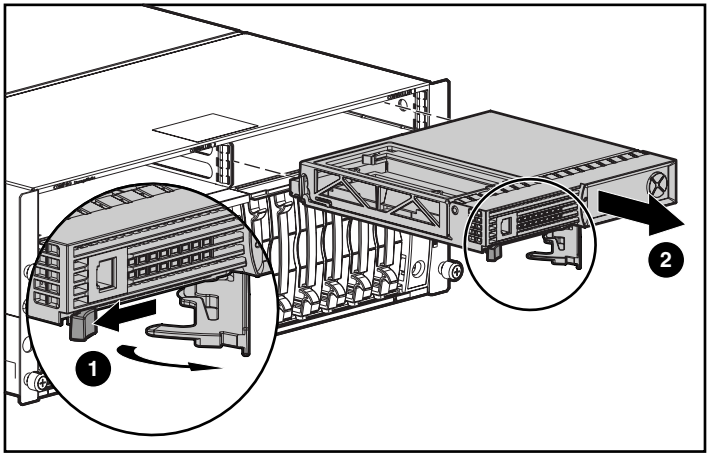

Figure 3: Removing the MSA1000 Controller from an MSA1000

3. As illustrated in Figure 4, insert the replacement controller into the chassis ❶.

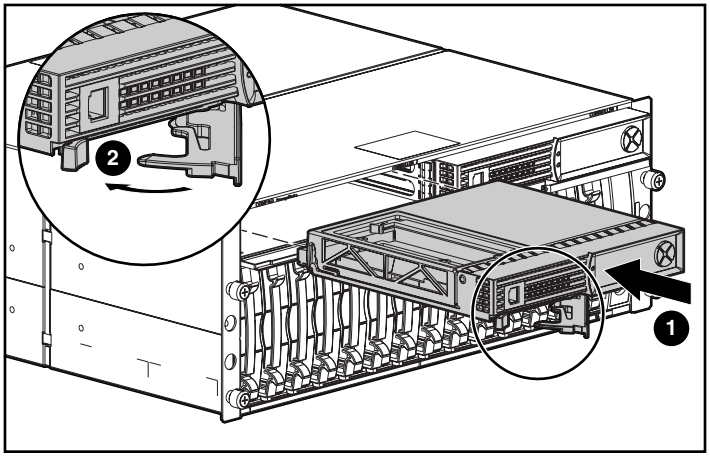

Figure 4: Installing the replacement controller

4. Push the controller in as far as it will go; press the latch inward until it is flush against the front panel ❷.

Replacing the MSA1000 Controller cache

Caution: It is important to follow these instructions when replacing components in the MSA1000 or MSA1500 cs. If the procedure is done improperly, it is possible to lose data or damage equipment. Refer to Appendix B, "Electrostatic Discharge," for important information on using the proper procedures.

Note: If your system is equipped with a single controller, and you must replace the controller cache, you must power down the system first. If your system is equipped with two controllers, and you want to replace a failed cache module with another of the same size, you can replace the module while the system is running. If your system is equipped with two controllers, and you are replacing the cache module with a module of a different size, you must power down the system first, and then change the cache module on both controllers at the same time.

1. Press the controller's thumb latch and pull the latch handle towards you ❶. See Figure 5.
2. Remove the MSA1000 Controller by pulling it straight out of the chassis ❷.

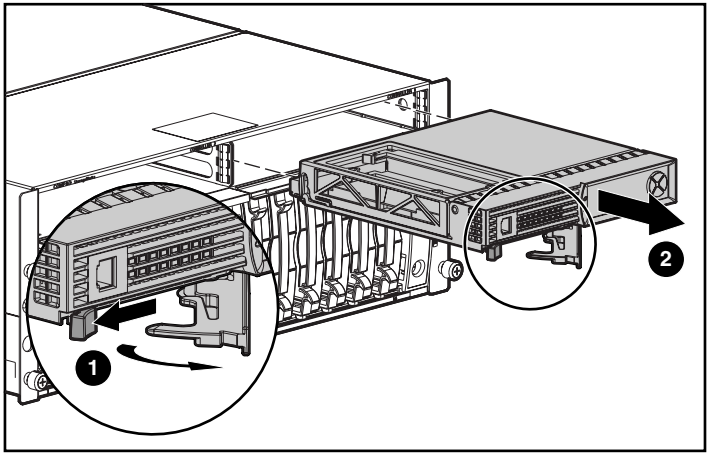

Figure 5: Removing the controller from an MSA1000

3. As illustrated in Figure 6, unlatch the controller cover clips ❶ on the rear of the controller and then raise the cover ❷.

Note: The controller in Figure 6 has been rotated so the side and rear of the controller are visible.

4. Simultaneously unlatch the clips that are holding the MSA1000 Controller cache in place ❸.
5. Carefully pull the cache away from the controller board ❹.

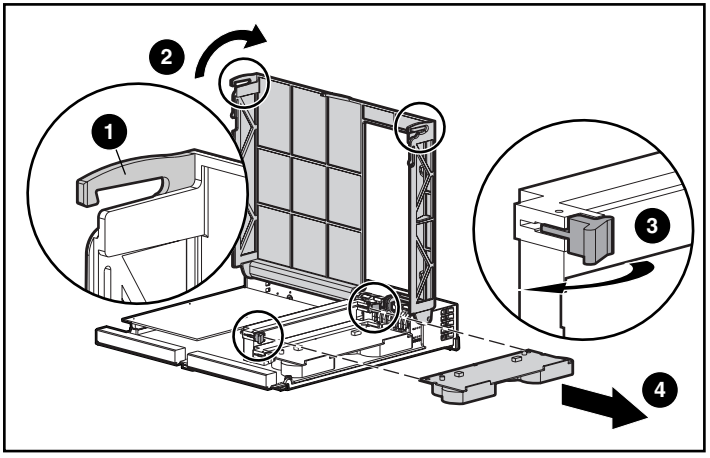

Figure 6: Removing the cache module

6. Install the new MSA1000 Controller cache by sliding the new MSA1000 Controller cache into the controller ❶. Be sure the side latches are fully engaged ❷. See Figure 7.

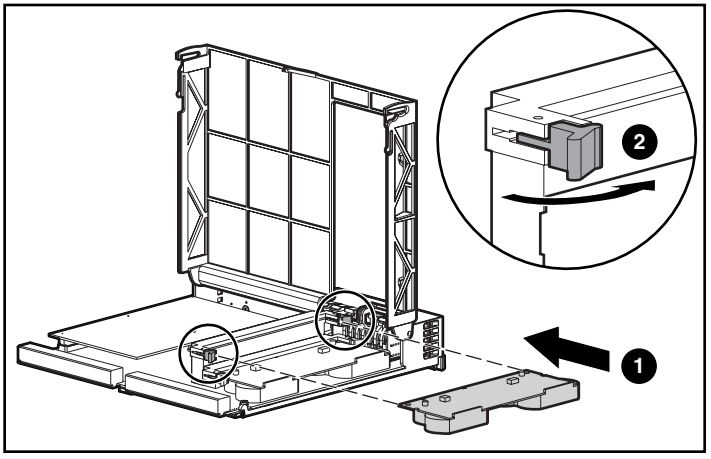

Figure 7: Installing the cache module

7. Push the controller in as far as it will go ❶; press the latch inward until it is flush against the front panel ❷. See Figure 8.

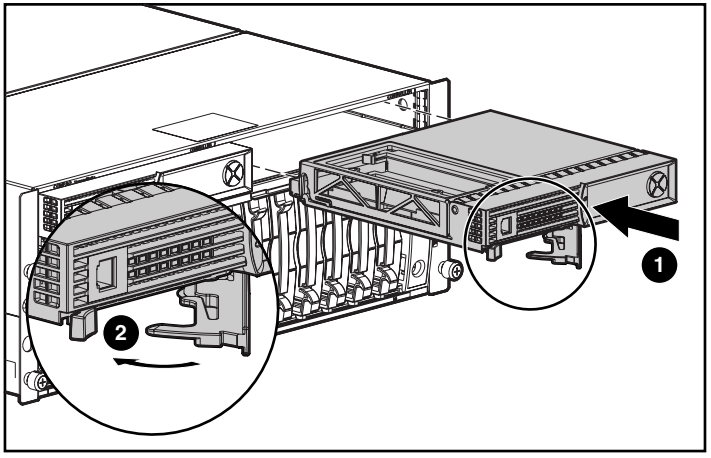

Figure 8: Installing the controller in an MSA1000

Replacing the controller cache battery pack

WARNING: There is a risk of explosion, fire, or personal injury if the battery pack is replaced incorrectly or mistreated. To reduce the risk:

- Do not attempt to recharge the battery outside of the controller.
- Do not expose to water, or to temperatures higher than 60°C.
- Do not abuse, disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with the spare designated for this product.
- Array Accelerator battery disposal should comply with local regulations. Alternatively, return them by established parts return methods to Hewlett- Packard Corporation for disposal.

Caution: It is important to follow these instructions when replacing components. If the procedure is done improperly, it is possible to lose data or damage equipment. Refer to the "Electrostatic Discharge" appendix for important information on using the proper procedures.

1. Remove the MSA1000 Controller Cache, as instructed in the previous section, "Replacing the MSA1000 Controller cache."
2. Push down on the bottom clip of the battery pack, attached near the lower corner of the Array Accelerator.

   See Figure 9 for an illustration.

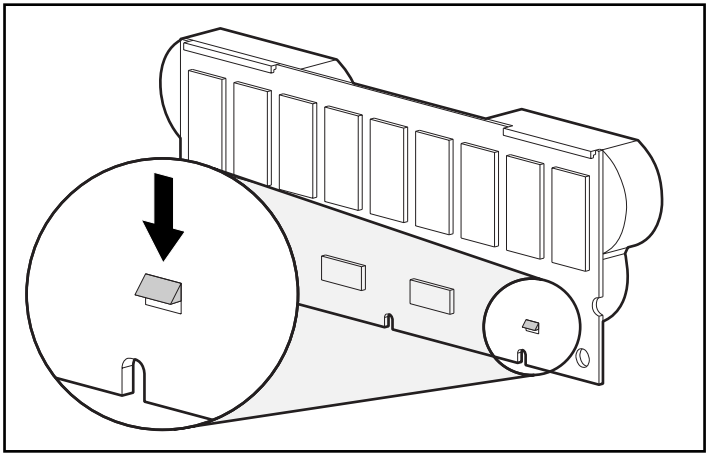

Figure 9: Bottom clip on battery pack

3. Swing the battery pack away from the Array Accelerator to about a 30-degree angle.

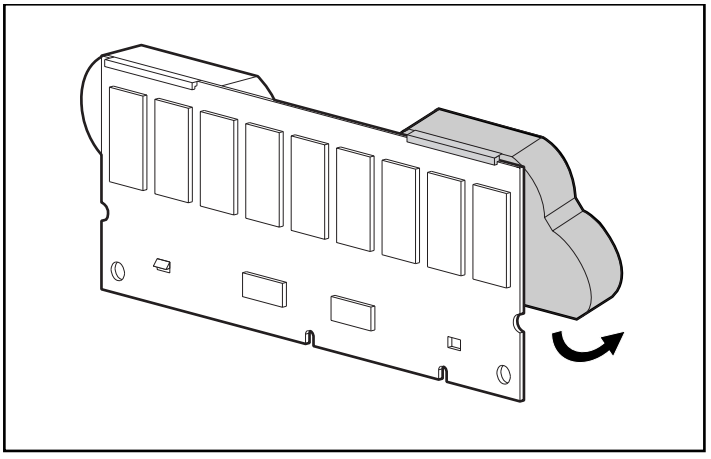

Figure 10: Angling the battery pack

4. Lift the pack upward to unhook the top of the battery pack.

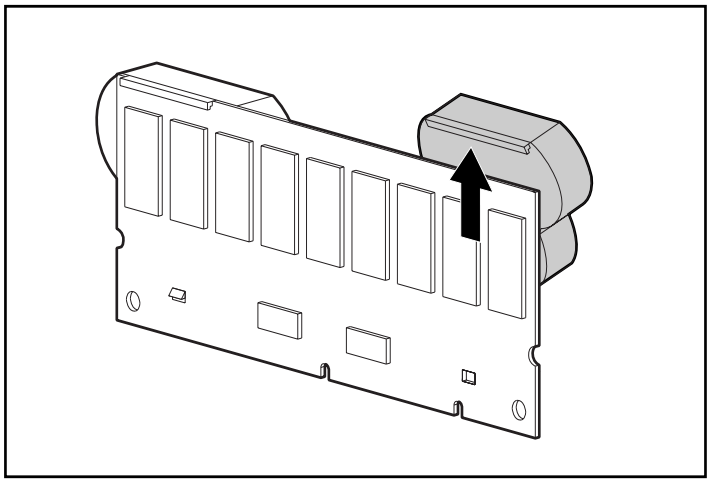

Figure 11: Removing the battery pack

Wait about 15 seconds after removing the old battery packs to allow the battery charge monitor to reset.

Note: Repeat the replacement procedure for any batteries that were installed at the same time as the batteries that were removed.

---

5. Install the new NiMH battery pack by hooking the top of the battery pack to the top of the Array Accelerator with the pack held at a 30-degree angle to the plane of the Array Accelerator board.

   See Figure 12 for an illustration.

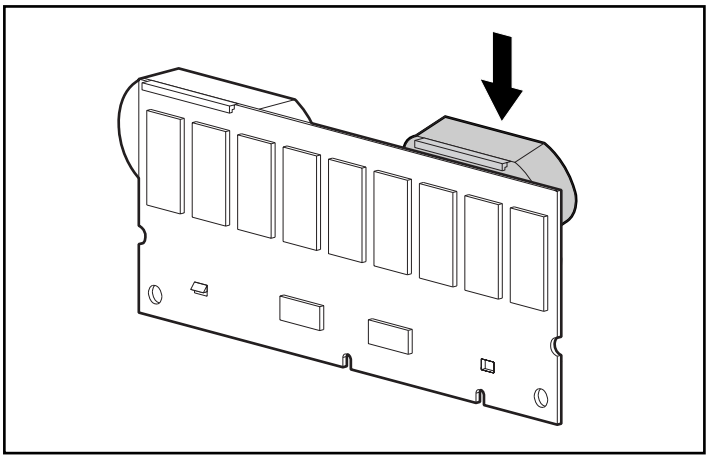

Figure 12: Installing the battery pack

6. After the pack is hooked in position, swing the pack downward making sure the bottom clip and two pegs line up with the holes in the Array Accelerator.
7. Make sure that the top hook ❶ and bottom clip ❷ on the battery pack are securely attached to the Array Accelerator.

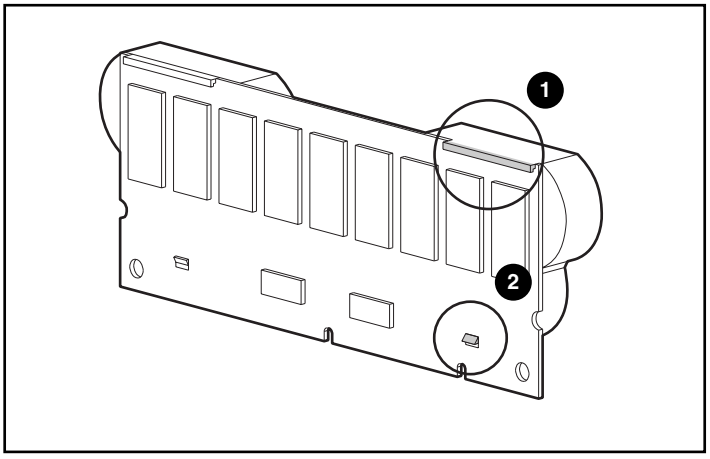

Figure 13: Securing the battery pack

8. Installation of the new battery pack is complete. Repeat for the second battery on this battery pack.

Controller Display Messages

3

Each array controller contains an integrated display panel. This panel is used for displaying informational and error messages, showing the current status of the module, and for providing user input when required.

Traditional Power-On-Self-Test (POST) messages issued by PCI-based array controllers have been combined with runtime event notification messages to create a new set of controller display messages.

The display module is capable of holding up to 100 messages. After this maximum size has been reached, older messages are automatically removed to make room for newer ones.

Included in this chapter:

LCD message types

Messages can be of three types: error, informational, and user input.

See "LCD message descriptions" on page 34for a complete list of messages and their meanings.

Error messages

Error messages indicate that a problem has occurred and may require user action to correct it.

An amber indicator to the left of the display text display window will be turned on when ever an error message is being viewed. This indicator will also be turned on if an error message was sent to the display module but has not been viewed because non-error type messages were sent to the display module afterwards.

After scrolling backwards and viewing all error messages, the indicator will return to only lighting up when currently on an error message.

Informational messages

Informational messages indicate non-critical changes in the system that are provided as feedback to the user.

The amber indicator to the left of the display text display window will normally be turned off whenever an informational message is being viewed unless an unviewed error message was previously sent to the display module.

After scrolling backwards and viewing all error messages, the indicator will return to only lighting up when currently on an error message.

User input messages

User input messages indicate that the system has encountered an issue that can be handled in two different ways. It allows the user to choose which way to handle the issue or it will default to a standard choice after a set period of time. These input messages only occur during system power on and not during run time.

The amber indicator to the left of the display text display window will blink on and off when a user input message is being viewed and is available for input.

Press the left or right button on the LCD panel to respond to the prompt. If the user has not provided input within the time-out period, the message will remain but the indicator will stop blinking.

Responding to LCD messages

When a new message is sent to the LCD, the display will automatically show that message and ignore any previous scrolling position.

The display panel consists of a two-line, twenty-character text display window and four push buttons arranged in a circular “pie” shape. The push buttons are used to scroll through the messages, respond to prompts, and delete messages, as described in the following illustration and table.

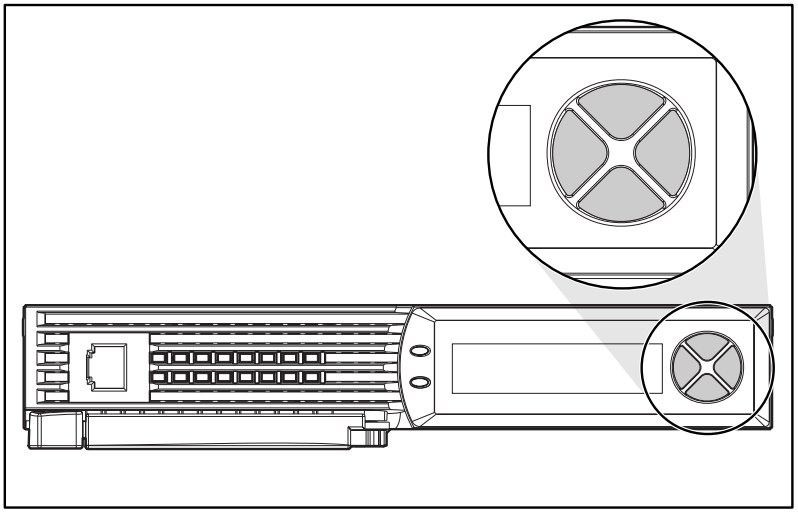

Figure 14: Controller push buttons

Button	Use
Up	Scroll to an older message
Down	Scroll to a newer message
Left	User input response, as defined by the LCD display.
Right	User input response, as defined by the LCD display
Simultaneous left and right	Delete the displayed message

Note: For complete list of LCD messages and their definitions see “LCD message descriptions” on page 34.

LCD message descriptions

The following table contains the defined messages and their components.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
00 ARRAY CONTROLLER FIRMWARE VER <version>	Informational	Displays the current version of the firmware running on the array controller.	
01 MSAxxxx STARTUP COMPLETE	Informational	The array controller has completed its power on sequence and is now operational.	
02 ENABLE VOLUME <n>? '<'=NO, '>'=YES	User Input	An issue has been found with a configured volume that may result in data loss. The exact nature of the issue will be detailed in a previous display message.	Selecting the *no* option will result in the volume being disabled so the user can attempt to fix the issue. Selecting the *yes* option will result in the volume being enabled regardless of the issue.
03 CRITICAL LOCK-UP DETECTED. CODE=<n>h	Error	A critical error has been detected by the array controller firmware. In order to prevent any possible data loss, the firmware has entered a lock-up state. The code contains engineering specific information about the lock-up condition. HP support should be contacted.	Remove the failing array controller, wait 10 seconds, and then reinsert it insuring that it is fully seated in the chassis. Should the issue persist please contact HP support.
04 ENABLE VOLUMES ? '<'=NO, '>'=YES	User Input	An issue has been found with all of the configured volumes that may result in data loss. The exact nature of the issue will be detailed in a previous display message.	An issue has been found with all of the configured volumes that may result in data loss. The exact nature of the issue will be detailed in a previous display message.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
05 SYSTEM NAME: <name>	Informational	Displays the user assigned name for the system. This name can be assigned using the Array Configuration Utility (ACU).	
06 RESTARTING SYSTEM	Informational	Indicates that the system has been reset and is being restarted.	
20 INITIALIZING SCSI SUBSYSTEM	Informational	The SCSI subsystem is being initialized as part of the power on sequence.	
21 SCANNING FOR SCSI DEVICES	Informational	The firmware is searching for SCSI devices attached to the system as part of the power on sequence.	
22 INITIALIZING SCSI DEVICES	Informational	The firmware is initializing all SCSI devices attached to the system as part of the power on sequence.	
23 SCSI SUBSYSTEM HARDWARE FAILURE	Error	The SCSI subsystem has experienced a hardware failure and is not operating correctly. The array controller has halted itself and cannot continue.	Please contact HP support.
24 BAD SCSI BUS MODE NON-LVD DEVICE FOUND	Error	The system does not support SCSI Single Ended (SE) devices, it only supports SCSI Low Voltage Differential (LVD) devices.	The system should be powered off and then all SCSI devices attached to it should be examined. Any SE devices found should be removed and replaced with LVD devices.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
30 I2C READ FAILURE <I2C device name>	Error	The system has a number of internal devices that are accessed via an I2C hardware bus. One of these devices failed when attempting to read from it. Certain I2C devices are considered critical and will result in a failure of the array controller while others may result in some loss of functionality (such as lost display messages).	Should the issue persist please contact HP support.
31 I2C WRITE FAILURE <I2C device name>	Error	The system has a number of internal devices that are accessed via an I2C hardware bus. One of these devices failed when attempting to write to it. Certain I2C devices are considered critical and will result in a failure of the array controller while others may result in some loss of functionality (such as lost display messages).	Should the issue persist please contact HP support.
32 CHASSIS NVRAM CONTENTS CORRUPTED	Error	The system has non-volatile memory on it that contains required information which is needed to operate. This non-volatile memory appears to be corrupted and the information is not valid. The system cannot continue to operate and will halt.	Please contact HP support.
40 BEGIN REDUNDANCY SUPPORT	Informational	The array controllers are attempting to enter redundant mode.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
41 REDUNDANCY ACTIVE ACTIVE CONTROLLER	Informational	The array controllers are now in redundant mode and this array controller is *active* which means that it is allowed to access the configured volumes on the system.	
42 REDUNDANCY ACTIVE STANDBY CONTROLLER	Informational	The array controllers are now in redundant mode and this array controller is *standby* which means that it can be made *active* should the current *active* array controller fail, assuming you have all cables, I/O module or embedded switch installed.	
43 REDUNDANCY FAILED HARDWARE FAILURE	Error	While either attempting to enter redundant mode or already operating in redundant mode, one of the array controllers encountered a hardware failure on the communication channel between the two array controllers. Redundancy is disabled at this time.	If the system is currently involved in host I/O, remove the *standby* array controller, wait 10 seconds, and then reinsert it insuring that it is fully seated in the chassis. If this does not resolve the issue then wait until down-time is available. Power off the system, remove both array controllers and reinsert them insuring they are fully seated in the chassis. Should the issue persist please contact HP support.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
44 REDUNDANCY FAILED MISMATCH HARDWARE	Error	Both array controllers must contain the same hardware for them to successfully enter redundant mode. The current array controllers do not contain the same hardware, possibly because one has an attached Fibre Channel daughter card and the other does not.	If the system is currently involved in host I/O, remove the *standby* array controller, add or remove the Fibre Channel daughter card as needed, wait 10 seconds, and then reinsert it insuring that it is fully seated in the chassis. If this does not resolve the issue then wait until down-time is available. Power off the system, remove both array controllers, add or remove Fibre Channel daughter cards as needed on both, and reinsert them insuring they are fully seated in the chassis. Should the issue persist please contact HP support.
45 REDUNDANCY FAILED MISMATCH FIRMWARE	Error	Both array controllers must be running the same version of firmware for them to successfully enter redundant mode. A process called firmware cloning that attempts to make them both the same firmware level has failed.	Manually update the firmware on the older array controller.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
47 REDUNDANCY FAILED CACHE SIZE MISMATCH	Error	Both array controllers must have the same size of cache memory for them to successfully enter redundant mode.	If the system is currently involved in host I/O, remove the *standby* array controller, add or remove cache memory as needed, wait 10 seconds, and then reinsert it insuring that it is fully seated in the chassis. If this does not resolve the issue then wait until down-time is available. Power off the system, remove both array controllers, add or remove cache memory as needed on both, and reinsert them insuring they are fully seated in the chassis. Should the issue persist please contact HP support.
48 REDUNDANCY HALTED FIRMWARE CLONED	Informational	Both array controllers must be running the same version of firmware for them to successfully enter redundant mode. A process called firmware cloning has been successfully completed in order to make them both the same firmware level. The *standby* array controller will now be restarted automatically so they can attempt to achieve redundancy again.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
49 REDUNDANCY FAILED FIRMWARE LOCKUP	Error	While either attempting to enter redundant mode or already operating in redundant mode, one of the array controllers encountered a critical condition resulting in a firmware lockup. Redundancy is disabled at this time.	If the system is currently involved in host I/O, remove the *standby* array controller, wait 10 seconds, and then reinsert it insuring that it is fully seated in the chassis. If this does not resolve the issue then wait until down-time is available. Power off the system, remove both array controllers, and reinsert them insuring they are fully seated in the chassis. Should the issue persist please contact HP support.
50 REDUNDANCY FAILED OUT OF MEMORY	Error	While either attempting to enter redundant mode or already operating in redundant mode, one of the array controllers failed to allocate required memory. Redundancy is disabled at this time.	If the system is currently involved in host I/O, remove the *standby* array controller, wait 10 seconds, and then reinsert it insuring that it is fully seated in the chassis. If this does not resolve the issue then you wait until down-time is available. Power off the system, remove both array controllers, and reinsert them insuring they are fully seated in the chassis. Should the issue persist please contact HP support.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
51 REDUNDANCY FAILED I/O REQUEST ERROR	Error	While either attempting to enter redundant mode or already operating in redundant mode, one of the array controllers encountered an error while sending I/O between the two array controllers over the communication channel between them. Redundancy is disabled at this time.	If the system is currently involved in host I/O, remove the *standby* array controller, wait 10 seconds, and then reinsert it insuring that it is fully seated in the chassis. If this does not resolve the issue then wait until down-time is available. Power off the system, remove both array controllers, and reinsert them insuring they are fully seated in the chassis. Should the issue persist please contact HP support.
52 REDUNDANCY FAILED PCI BUS ERROR	Error	While either attempting to enter redundant mode or already operating in redundant mode, one of the array controllers encountered a PCI bus error on the communication channel used between the two array controllers. Redundancy is disabled at this time.	If the system is currently involved in host I/O, remove the *standby* array controller, wait 10 seconds, and then reinsert it insuring that it is fully seated in the chassis. If this does not resolve the issue then wait until down-time is available. Power off the system, remove both array controllers, and reinsert them insuring they are fully seated in the chassis. Should the issue persist please contact HP support.
53 REDUNDANCY FAILED NO SECOND CONTROLLER	Error	While operating in redundant mode, one of the array controllers was removed. Redundancy is disabled at this time.	Reinsert the missing array controller insuring that it is fully seated in the chassis.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
54 REDUNDANCY FAILED CACHE DIMMS MISMATCH	Error	The cache memory modules on two different controllers are not the same size. All cache memory modules must be the same size for redundancy to operate.	Remove the array controller that has been halted, replace the cache modules with the appropriately sized ones, wait 10 seconds, and then reinsert the array controller insuring that it is fully seated in the chassis.
60 NO CACHE MODULE FOUND	Error	The array controller requires at least one cache module in order to operate. Either there is not one present or it has failed.	Remove the failed array controller, either add a cache module or replace the failed one, wait 10 seconds, and then reinsert it insuring that it is fully seated in the chassis. Should the issue persist please contact HP support.
61 DUAL CACHE MODULE SIZE MISMATCH	Error	The array controller has two cache modules attached but they are of different sizes. Both cache modules must be the same size.	Remove the failed array controller, replace one of the cache modules with a different one that is of the correct size, wait 10 seconds, and then reinsert it, insuring that it is fully seated in the chassis.
62 CACHE MODULE #<n> <n>MB	Informational	Displays the size of the cache module inserted into the respective cache module slot.	
63 VALID CACHE DATA FOUND AT POWER-UP	Informational	Valid host data was found in the battery backed cache memory at power up. This data has been flushed to the drives.	
64 CACHE DATA LOST BATTERY DEAD	Error	The battery on the cache memory was no longer charged. If there was data in the cache memory then it has been lost.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
65 CACHE HARDWARE ENABLED	Informational	The cache hardware had been temporarily disabled but is now enabled again. This may have been due to insufficient charge on the batteries that have now charged up to capacity.	
66 CACHE HARDWARE FAILED AND DISABLED	Error	The cache memory has experienced a hardware failure.	If the failure has occurred on the *standby* array controller, then remove the *standby* array controller, replace the cache modules, wait 10 seconds, and then reinsert the array controller insuring that it is fully seated in the chassis. If the failure has occurred on the *active* array controller, then wait until downtime is available. Power off the system, remove the array controller, replace the cache modules, and reinsert the array controller insuring it is fully seated in the chassis. Should the issue persist please contact HP support
67 CACHE HARDWARE TEMPORARILY DISABLED	Informational	The cache memory hardware has temporarily been disabled typically because either the battery is not charged up or a capacity expansion operation is occurring. The cache will automatically be enabled once the condition has been corrected.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
68 OBSOLETE CACHE DATA DELETED	Informational	Old data that no longer belongs to any current configured volumes was found in the cache memory at power up. This data has been deleted. This typically happens if cache modules are moved between array controllers.	
69 CACHE BATTERIES LOW, RECHARGING	Informational	The batteries on the cache module are low and are being recharged.	
70 CACHE DISABLED NO CONFIGURATION	Informational	The cache has not been configured and therefore is disabled. The cache can be configured by using the Array Configuration Utility (ACU).	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
71 SYSTEM HALTED FOR CACHE ERROR	Error	This message is generated if the user chooses to ignore a critical cache error condition. It is always preceded by message #72 (although message #72 is removed from the LCD display once it has accepted user input).	The *no* option will cause the array controller to halt itself, providing the user an opportunity to resolve the issue. Selecting the *yes* option will result in the cache data being erased. Operation of the array controller will continue normally. **Error *1.1* and *1.2:*** There is only one cache board in the array controller at present but it was previously configured with a second cache board that is now missing (dual cache module configuration). **Error *2.1* and *2.2:*** A second cache board that contained valid data was removed from its original array controller and added to this array controller (dual cache module configuration). **Error *2.3:*** A cache board that contained valid data was removed from its original array controller and added to this array controller (single cache module configuration). Return all cache boards to their original array controllers. Power up the systems without allowing any host I/O and wait for the cache data to be written to the drives. This will take a few minutes after the systems have finished the power on sequence. The systems can be powered off and cache boards moved to their new locations.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
72 CACHE ERROR <n> IGNORE? <=NO >=YES	User Input	During power up, data was found in the cache that could not be flushed to the drives. The reason is either because the data does not belong to this array controller (the cache board was moved from a different array controller) or the cache data is partial (the rest of the data is in another cache board that was removed from the array controller). This error could occur if cache boards are moved improperly.	The *no* option will cause the array controller to halt itself, providing the user an opportunity to resolve the issue. Selecting the *yes* option will result in the cache data being erased. Operation of the array controller will continue normally. **Error *1.1* and *1.2:*** There is only one cache board in the array controller at present but it was previously configured with a second cache board that is now missing (dual cache module configuration). **Error *2.1* and *2.2:*** A second cache board that contained valid data was removed from its original array controller and added to this array controller (dual cache module configuration). **Error *2.3:*** A cache board that contained valid data was removed from its original array controller and added to this array controller (single cache module configuration). Return all cache boards to their original array controllers. Power up the systems without allowing any host I/O and wait for the cache data to be written to the drives. This will take a few minutes after the systems have finished the power on sequence. The systems can be powered off and cache boards moved to their new locations.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
73 CACHE HARDWARE BATTERIES MISSING	Error	The cache memory does not have its required batteries attached to it.	If the failure has occurred on the *standby* array controller, then remove the *standby* array controller, replace the cache modules, wait 10 seconds, and then reinsert the array controller insuring that it is fully seated in the chassis. If the failure has occurred on the *active* array controller, then wait until down-time is available. Power off the system, remove the array controller, replace the cache modules, and reinsert the array controller insuring it is fully seated in the chassis. Should the issue persist please contact HP support.
80 REPLACEMENT DRIVE FOUND BOX #<n> BAY <n>	Informational	A SCSI drive that was previously missing or failed has now been replaced with a working SCSI drive.	
81 SMART DRIVE ALERT BOX #<n>, BAY <n>	Informational	A SCSI drive may be close to failing. This was determined either by the drive firmware itself using SMART technology or by the array controller using monitor and performance testing.	The drive should be replaced as soon as possible following the guidelines in Appendix E, "Recovering from Hard Drive Failure" in this guide.
82 DRIVE HOT ADDED BOX #<n>, BAY <n>	Informational	A SCSI drive has been added to the system.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
83 DRIVE HOT REMOVED BOX #<n>, BAY <n>	Informational	A SCSI drive has been removed from the system.	
84 DRIVE FAILURE BOX #<n>, BAY <n> 84	Error	A SCSI drive in the system has failled. If the drive was part of a configured volume, then the state of the volume will depend on the fault tolerance used.	The drive should be replaced as soon as possible following the guidelines in the "Recovering from Hard Drive Failure" section in this guide (Appendix E).
85 BAD DRIVE FRMWARE BOX #<n>, BAY <n>	Error	A SCSI drive has been detected that has known, bad firmware on it. Continued usage of this drive could result in drive failure, decreased performance or data loss.	Either the drive firmware should be updated or the drive should be replaced as soon as possible following the guidelines in the "Recovering from Hard Drive Failure" (Appendix E) in this guide.
86 DRIVE POSITION CHANGE DETECTED	Informational	The SCSI drives that make up a configured volume have been physically moved within the system. The array controller has updated its configuration information accordingly.	
87 DRIVE POSITION CHANGE INVALID	Informational	The SCSI drives that make up a configured volume have been physically moved in such a way that the array controller can no longer access the configured volume.	The system should be powered off and the drives restored to their original positions.
100 VOLUME #<n> STATE OK	Informational	The configured volume has returned to its normal operating state. This typically occurs after a rebuild operation has completed.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
101 VOLUME #<n> STATE FAILED	Error	The configured volume has been failed because too many SCSI drives that it is composed of have failed exceeding the fault tolerance level. The data on the configured volume is no longer available.	
102 VOLUME #<n> STATE INTERIM RECOVERY	Informational	The array controller has failed one or more SCSI drives that the configured volume is composed of but no data loss has occurred because fault tolerance is allowing the data to be recovered.	The failed drives should be replaced as soon as possible following the guidelines in the *Recovering from Hard Drive Failure* (Appendix E) section in this guide.
103 VOLUME #<n> STATE REBUILDING	Informational	The configured volume is rebuilding data on a SCSI drive that replaced a previously failed drive.	
104 VOLUME #<n> STATE DISABLED	Error	The configured volume has been disabled because too many of the SCSI drives that it is composed of are missing.	Power off the system and then all attached storage enclosures. Unplug and reinsert all SCSI drives insuring they are fully seated in their bays. Check the cables connecting the system to any attached storage enclosures. Power on the attached storage enclosures and then the system.
105 VOLUME #<n> STATE EXPANSION ACTIVE	Informational	The configured volume is currently performing a volume expansion operation.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
106 VOLUME #<n> STATE WAITING TO REBUILD	Informational	The configured volume is waiting to start rebuilding data on a SCSI drive that replaces a previously failed drive. The rebuild may not have started yet because the array controller is already performing a rebuild on another configured volume.	
107 VOLUME #<n> STATE WAITING TO EXPAND	Informational	The configured volume is waiting to start a volume expansion operation. The expansion may have not started yet because another configured volume is undergoing expansion or a rebuild is occurring on the configured volume.	
108 VOLUME #<n> STATE MISSING DRIVES	Error	The configured volume is missing too many of the SCSI drives that it is composed of making it unusable. The volume will be disabled.	Power off the system and then all attached storage enclosures. Unplug and reinsert all SCSI drives insuring they are fully seated in their bays. Check the cables connecting the system to any attached storage enclosures. Power on the attached storage enclosures and then the system.
109 VOLUME #<n> STATE WRONG DRIVE REPLACED	Error	The configured volume appears to have had known, good SCSI drives replaced instead of known, failed drives.	The system should be powered off and the good drives should be restored while the failed drives should be replaced.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
110 VOLUME #<n> EXPANSION DISABLED	Informational	The volume expansion operation on the configured volume has been disabled. This may be because a rebuild operation is ongoing, another expansion is already running, or the cache memory is disabled due to a low battery. The expansion will start once the condition has been cleared.	
111 VOLUME #<n> INITIALIZING PARITY	Informational	The array controller is calculating and storing parity information for the configured volume and therefore performance may be lower until it completes.	
112 VOLUME #<n> REBUILD FAILURE	Error	The rebuild operation on the configured volume has failed.	If the volume is still operating in regenerative mode, remove the new SCSI drive that was added as a replacement for the original failed drive and replace it with a different new drive.
113 VOLUME #<n> EXPANSION FAILURE	Error	The volume expansion operation on the configured volume has failed.	Run the Array Configuration Utility (ACU) and use it to determine the state of the volume. If the volume is still operational then it is possible to reattempt the operation.
114 VOLUME #<n> STATE DELETED	Informational	The configured volume has been deleted and is no longer available. Volumes are deleted by using the Array Configuration Utility (ACU).	
120 CONFIGURED VOLUMES <n>	Informational	The specified number of configured volumes were detected at power up.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
121 NO VOLUMES DETECTED	Informational	No configured volumes were detected at power up.	If there are supposed to be configured volumes, power off the system and then all attached storage enclosures. Unplug and reinsert all SCSI drives insuring they are fully seated in their bays. Check the cables connecting the system to any attached storage enclosures. Power on the attached storage enclosures and then the system.
122 NEW VOLUME(S) DETECTED	Informational	Configured volumes from another array controller were migrated to this array controller. The configuration information has been updated.	
123 TOO MANY VOLUMES DETECTED	Error	The array controller only supports a maximum of 32 configured volumes. More volumes then that were detected at power up. This typically occurs when migrating a set of volumes from one array controller to a different array controller that already has configured volumes on it. The migrated volumes have not been added.	Remove the migrated drives and run the Array Configuration Utility (ACU). Delete any unneeded volumes until the number of existing volumes plus the number of migrated volumes is 32 or less. Add the migrated drives back.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
125 ACCESS CONTROL CONFLICT DETECTED	Error	A set of volumes have been migrated from one array controller to a different array controller that already has configured volumes on it. The migrated volumes have access controls defined for them that conflicts with the existing configuration. The access controls has been modified so as to allow the migration to proceed.	Run the Array Configuration Utility (ACU) to check the new access controls and modify them if needed.
126 ACCESS CONTROL RESOURCES EXCEEDED	Error	A set of volumes have been migrated from one array controller to a different array controllers that already has configured volumes on it. The migrated volumes have access controls defined for them that conflicts with the existing configuration. The access controls has been modified so as to allow the migration to proceed.	Run the Array Configuration Utility (ACU) to check the new access controls and modify them if needed.
201 ARRAY CONTROLLER TEMPERATURE OK	Informational	The temperature sensor on the array controller indicates that the temperature which was previously exceeding the normal operating range is now back within the range.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
202 ARRAY CONTROLLER OVERHEATING	Error	The temperature sensor on the array controller indicates that the array controller is starting to exceed the normal operating range.	Check all system fans and insure they are operating. Any failed fans should be replaced. Insure that there are drive blank cartridges in any empty drive bays of the system chassis. If only one array controller is inserted, insure that there are cover plates installed in the empty array controller bay and the Fibre Channel bay of the chassis.
203 ARRAY CONTROLLER OVERHEATED	Error	The temperature sensor on the array controller indicates that the array controller has exceeded the safe operating range.	The system should be powered off as soon as possible to avoid hardware failure. Check all system fans and insure they are operating. Any failed fans should be replaced. Insure that there are drive blank cartridges in any empty drive bays of the system chassis. If only one array controller is inserted, insure that there are cover plates installed in the empty array controller bay and the Fibre Channel bay of the chassis.
204 ARRAY CONTROLLER DISABLED	Error	The array controller has been disabled due to a redundancy failure.	Remove the failed array controller, wait 10 seconds, and then reinsert the array controller insuring that it is fully seated in the chassis. Should the issue persist please contact HP support.
205 ARRAY CONTROLLER RESTARTING	Informational	The array controller has completed firmware cloning and will be restarted automatically.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
300 RECOVERY ROM AUTOFLASH STARTED	Informational	Indicates that the array controller has detected that the firmware's backup recovery ROM image is invalid and is copying the current active firmware image into the backup recovery ROM.	
301 RECOVERY ROM AUTOFLASH DONE	Informational	Indicates that the array controller has successfully completed the process of copying the current active firmware image into the backup recovery ROM.	
302 RECOVERY ROM AUTOFLASH FAILED	Error	Indicates that the array controller failed to copy the current active firmware image into the backup recovery ROM. Recovery ROM support is disabled.	Remove the failing array controller, wait 10 seconds, and then reinsert the array controller insuring that it is fully seated in the chassis. The ROM autoflash process will be attempted again. Should the issue persist please contact HP support.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
303 ROM CLONING STARTED	Informational	Indicates that the two array controllers in the system do not have the same version of firmware on them. Therefore, one array controller's version of the firmware will be copied on to the other array controller. Both controllers must be running the same version of firmware in order for controller redundancy to operate. If both array controllers are in the power up sequence, then the most recent version of firmware will be used. If one array controller has already completed the power up sequence and is now *active*, then its version of firmware will be used even if less recent.	
304 ROM CLONING DONE	Informational	Indicates that the two array controllers in the system have finished copying one array controller's version of firmware to the other array controller. Both controllers must be running the same version of firmware in order for controller redundancy to operate.	
305 ROM CLONING FAILED	Error	Indicates that the two array controllers in the system failed to copy one array controller's version of firmware to the other array controller. Both controllers must be running the same version of firmware in order for controller redundancy to operate.	Remove the *standby* array controller, wait 10 seconds, and then reinsert the array controller insuring that it is fully seated in the chassis. The ROM cloning process will be attempted again. Should the issue persist please contact HP support.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
306 FIRMWARE FLASH STARTED	Informational	Indicates that the array controller in the system has started the firmware flash process. Do not turn off power to the system until it has completed. This could take several minutes.	
307 FIRMWARE FLASH DONE	Informational	Indicates that the array controller in the system has completed the firmware flash process. It is now safe to turn off power to the system.	
308 FIRMWARE FLASH FAILED	Error	Indicates that the array controller in the system has failed the firmware flash process.	Attempt the flash process again. Should the issue persist, please contact HP support.
309 EMU FLASH STARTED	Informational	Indicates that the EMU in the system has started the firmware flash process. Do not turn off the power to the system until it has completed. This could take five minutes.	
310 EMU FLASH DONE	Informational	Indicates that the EMU in an system has completed the firmware flash process. It is now safe to turn off power to the system.	
311 EMU FLASH FAILED	Error	Indicates that the EMU in an system has failed the firmware flash process.	Attempt the flash process again. Should the issue persist, please contact HP support.
312 FIRMWARE FLASH STARTED ON BOX <n>	Informational	Indicates that the specified storage enclosure has started the firmware flash process. Do not turn off the power to the system until it has completed. This could take five minutes.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
313 FIRMWARE FLASH DONE ON BOX <n>	Informational	Indicates that the specified storage enclosure has completed the firmware flash process.	
314 FIRMWARE FLASH FAILED ON BOX <n>	Error	Indicates that the specified storage enclosure has failed the firmware flash process.	Attempt the flash process again. Should the issue persist, please contact HP support.
400 STORAGE BOX #<n> FAN OK	Informational	The specified storage enclosure indicates that one of its fans which previously had been failed or degraded is now operating normally.	
401 STORAGE BOX #<n> FAN FAILED	Error	The specified storage enclosure indicates that one of its fans has failed. The storage enclosure and any devices in it may now be susceptible to overheating if corrective action is not taken.	Check all fans and insure they are operating. Any failed fans should be replaced.
402 STORAGE BOX #<n> FAN DEGRADED	Error	The specified storage enclosure indicates that one of its fans is not operating at full efficiency. The fan may eventually fail.	Check all fans and insure they are operating. Any failed fans should be replaced.
403 STORAGE BOX #<n> FAN HOT INSERTED	Informational	The specified storage enclosure indicates that a fan has been added.	
404 STORAGE BOX #<n> FAN HOT REMOVED	Informational	The specified storage enclosure indicates that a fan has been removed.	
405 STORAGE BOX #<n> TEMPERATURE OK	Informational	The temperature sensor in the storage enclosure indicates that the temperature is now back in the normal operating range.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
406 STORAGE BOX #<n> OVERHEATING	Error	The temperature sensor in the storage enclosure indicates that the enclosure is starting to exceed the normal operating range.	Check all fans and insure they are operating. Any failed fans should be replaced. Insure that there are drive blank cartridges in any empty drive bays in the enclosure. If the enclosure is an MSA1000 and only one array controller is inserted, insure that there are cover plates installed in the empty array controller bay and the Fibre Channel bay in the chassis.
407 STORAGE BOX #<n> OVERHEATED	Error	The temperature sensor in the storage enclosure indicates that the enclosure has exceeded the safe operating range.	The system should be powered off as soon as possible and immediately after that, the enclosure should be powered off, to avoid hardware failure. Check all fans and insure they are operating. Any failed fans should be replaced. Insure that there are drive blank cartridges in any empty drive bays in the enclosure. If the enclosure is an MSA1000 and only one array controller is inserted, insure that there are cover plates installed in the empty array controller bay and the Fibre Channel bay in the chassis.
408 STORAGE BOX #<n> POWER SUPPLY OK	Informational	The specified storage enclosure indicates that one of its power supplies which previously had been failed is now operating normally.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
409 STORAGE BOX #<n> POWER SUPPLY FAILED	Error	The specified storage enclosure indicates that one of its power supplies has failed.	Check all power supplies and insure they are operating. Any failed power supplies should be replaced.
410 STORAGE BOX #<n> POWER SUPPLY ADDED	Informational	The specified storage enclosure indicates that a power supply has been added.	
411 STORAGE BOX #<n> POWER SUPPLY REMOVED	Informational	The specified storage enclosure indicates that a power supply has been removed.	
412 STORAGE BOX #<n> EMU NOT RESPONDING	Error	The specified storage enclosure is not responding to commands.	Insure the storage box is powered on. Insure all cables are connected securely. Power off the system and the storage box. Power on the storage box first and then the system. Should the issue persist, please contact HP support.
413 STORAGE BOX #<n> EMU VERSION <version>	Informational	The version of the firmware running on the EMU. This is only displayed for the internal EMU of the system. It is not displayed for externally connected storage boxes.	
415 STORAGE BOX #2 OR #3 HOT ADDED	Informational	A HP StorageWorks SCSI expansion storage enclosure has been hot-added to the system.	
500 INITIALIZING PCI SUBSYSTEM	Informational	The array controller's PCI subsystem is being initialized as part of the power up sequence.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
501 PCI SUBSYSTEM HARDWARE FAILURE	Error	The array controller's PCI subsystem has encountered a critical error during the power up sequence.	Remove the failed array controller, wait 10 seconds, and then reinsert the array controller insuring that it is fully seated in the chassis. Should the issue persist please contact HP support.
502 PCI BRIDGE ASIC SELF TEST FAILURE	Error	The array controller's PCI bridge ASIC has encountered a critical error during the power up sequence.	Remove the failed array controller, wait 10 seconds, and then reinsert the array controller insuring that it is fully seated in the chassis. Should the issue persist please contact HP support.
510 INITIALIZING FIBRE SUBSYSTEM	Informational	The array controller's Fibre Channel subsystem is being initialized as part of the power up sequence.	
513 UNCORRECTED ECC MEMORY ERROR SEEN	Error	The array controller has detected an uncorrectable error in the ECC memory on the memory cache board.	Remove the failed array controller and replace the memory cache board with a new one.
514 FIBRE SWITCH HARDWARE FAILURE	Error	The MSA SAN Switch 2/8 that is installed in the MSA1000 failed to establish a connection with the array controller over Fibre Channel.	Remove the MSA Fabric Switch 6 switch, wait one minute and then reinsert it insuring it is fully seated in the chassis. Wait one minute and check the LCD to see if a new copy of this error message is created. The service indicator LED on the back of the switch should turn solid green if the switch is operating normally. The service indicator LED will flash amber if it has failed again. Should the issue persist please contact HP support.

Table 3: LCD Message Descriptions

Message	Type	Description	Action
515 FIBRE DEVICE HARDWARE FAILURE	Error	The Fibre Channel device that is installed in the MSA1000 Fibre Channel bay was not recognized by the array controller.	Verify the Fibre Channel device is supported by the MSA1000 by checking the documentation that came with it. If it is supported then remove the Fibre Channel device, wait one minute and then reinsert it insuring it is fully seated in the chassis. Wait one minute and check the LCD to see if a new copy of this error message is created. The service indicator LED on the back of the switch should turn solid green if the device is operating normally. The service indicator LED will flash amber if it has failed again. Should the issue persist, please contact HP support.
516 FIBRE SUSBYSTEM LINK FAILURE	Error	There is no active Fibre Channel connection to this array controller (Laser OFF). If the Fibre Channel connection is a direct-connect from an HBA to the MSA, this message is expected when the server is powered off or restarted.	Power on the server and load the HBA drivers. If the status does not change to OK, check cables, Fibre Channel bay board, SFP, and HBA.
517 FIBRE SUBSYSTEM LINK OK	Informational	There is an active Fibre Channel connection to this array controller (Laser On). This message is only displayed when preceded by message 516.	

Table 3: LCD Message Descriptions

Message	Type	Description	Action
518 PERSISTENT MEM ENABLED	Informational	Global variables such as system prompts and profile information remain persistent in cache over power cycles of the system. This message is displayed each time the system is powered up.	

Regulatory Compliance Notices

A

Regulatory Compliance Identification Numbers

For the purpose of regulatory compliance certifications and identification, your HP StorageWorks device is assigned an HP Series number. The Storage System Series number can be found on the product label, along with the required approval markings and information. The product label is located on the right side of the chassis. When requesting certification information for this product, always refer to this Series number. This Series number should not be confused with the marketing name or model number for your Storage System.

Federal Communications Commission notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to comply with FCC Rules and Regulations.

Canadian notice (Avis Canadien)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union notice

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (in brackets are the equivalent international standards):

- EN55022 (CISPR 22) - Electromagnetic Interference
- EN50082-1 (IEC801-2, IEC801-3, IEC801-4) - Electromagnetic Immunity
- EN60950 (IEC950) - Product Safety

Japanese notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です　この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

BSMI notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Laser compliance

The SFP Module contains a laser diode of either gallium aluminum arsenide (GaALAs) emitting in the wavelength range of 770-860 nm, or indium gallium arsenide phosphide (InGaAsP) emitting in the wavelength range of 1270-1355 nm. All HP systems equipped with a laser device comply with safety standards, including International Electrotechnical Commission (IEC) 825. With specific regard to the laser, the equipment complies with laser product performance standards set by government agencies as a Class 1 laser product. The product does not emit hazardous laser radiation.

WARNING: Use of controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure. To reduce the risk of exposure to hazardous radiation:

- Do not try to open the unit enclosure. There are no user-serviceable components inside.
- Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
- Allow only HP Authorized Service technicians to repair the unit.

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States. This device is classified as a Class 1 laser product as defined by IEC 825.

This indicates that the product is classified as a CLASS 1 LASER PRODUCT.

Battery replacement notice

Your system is provided with a Nickel Metal Hydride**,** Lithium Manganese Dioxide, or a Vanadium Pentoxide, batteries. There is a danger of explosion and risk of personal injury if the array is incorrectly replaced or mistreated. Replace only with the HP spare designated for this product. For more information about battery replacement or proper disposal, contact your HP Authorized Reseller or your Authorized Service Provider.

WARNING: Your Accelerator Array contains Lithium manganese Dioxide, or Vanadium Pentoxide batteries. There is risk of fire and burns if the battery pack is not handled properly. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose to temperatures higher than 60 C.
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with HP spare designated for this product.

Caution: Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP, your authorized HP Partners, or their agents.

Electrostatic Discharge

B

To prevent damage to the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always make sure you are properly grounded when touching a static-sensitive component or assembly.

Grounding methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ± 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an Authorized HP Reseller install the part.

Note: For more information on static electricity, or assistance with product installation, contact your HP Authorized Reseller.

Index

D