Smart Array 5300A/6400A Backplane RAID Controller Installation and Configuration Guide

Order Number: EK-SA530-IN. E01

This guide provides installation and configuration information for the Smart Array 5300A/6400A backplane RAID controllers used on AlphaServer systems. The information in this guide is for step-by-step instructions for installing and configuring the RAID controllers

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Contents

Chapter 1 Smart Array 5300A/6400A Controller Information 1-1

1.1 Smart Array 5300A/6400A Features....1-1
1.2 Smart Array 5300A Overview....1-2
1.2.1 Features....1-2
1.2.2 Operating System Requirements....1-2
1.2.3 Available Upgrade Options....1-4
1.3 Smart Array 6400A Overview....1-5
1.3.1 Features....1-5
1.3.2 Operating System Requirements....1-5
1.3.3 Available Upgrade Options....1-6
1.34 Unsupported Upgrade Options....1-7

Chapter 2 Installation 2-1.

2.1 Installation Overview....2-1
2.2 Preparation....2-2
2.3 Installing the Controller....2-4
2.4 Cabling the Controlle....2-5
2.4.1 Internal Cabling....2-5
2.4.2 External Cabling....2-5
2.5 Completing the Installation.... 2-6
2.6 Configuring the Controller....2-7
2.6.1 Configuration Overview....2-8
2.6.2 SRM Console Setup and Use....2-8
2.6.3 Running ORCA Off-line Configuration Utility with the SRM Console....2-9
2.7 OpenVMS Online Configuration and Monitoring 2-13
2.7.1 Installing and Using the OpenVMS Online Monitoring Utility....2-13
2.7.2 Installing and Using the OpenVMS Online Array Configuration Utility....2-14
2.8 Tru64 UNIX Online Configuration and Monitoring 2-15
2.8.1 Installing and Using the Tru64 UNIX Online Monitoring Utility....2-15
2.8.2 Installing GS Platform View and Discovery Agents....2-16

2.8.3 Installing and Using the Tru64 UNIX Online Array Configuration..2-18

2.9 Using HP Management Agents.....2-21
2.9.1 Using the Management Agents on OpenVMS.....2-21
2.9.2 Using the Management Agents on Tru64 UNIX.....2-22
2.9.3 Launching the Agents in a Browser.....2-22

Chapter 3 ADFU 3-1

3.1 Booting from the ADFU CD.....3-1
3.2 Running the Firmware Update Utility.....3-2

Chapter 4 Upgrading Controller Firmware 4-1

Chapter 5 Troubleshooting 5-1

5.1 System Power-On.....5-2
5.2 SRM Console and ORCA Utility.....5-3
5.4 Online Utilities.....5-5

Figures

Figure 2-1 Installing the Controller.....2-4
Figure 2-2 Drive Update Menu.....2-8
Figure 2-3 ORCA Main Menu.....2-10
Figure 2-4 View Logical Drive Menu.....2-11
Figure 2-5 Create Logical Drive Menu.....2-12
Figure 3-1 Welcome Screen.....3-2
Figure 3-2 Scanning Screen.....3-3
Figure 3-3 Update Confirmation Screen.....3-4
Figure 3-4 Update Screen.....3-5
Figure 3-5 Results Screen.....3-6
Figure 3-6 Task-Completion Screen..... 3-7

Tables

Table 1-1 SA 5300A Controller Upgrade Option.....1-4
Table 1-2 Smart Array 6400A Controller Upgrade Options.....1-6
Table 5-1 System Power-On Troubleshooting.....5-2
Table 5-2 SRM Console and ORCA Utility Troubleshooting.....5-2
Table 5-3 Boot Sequence Troubleshooting.....5-3
Table 5-5 Online Utilities Troubleshooting.....5-5

Preface

This guide is intended for owners and users of Smart Array 5300A/6400A Backplane RAID controllers in an HP AlphaServer system.

Before handling or installing Smart Array 5300A/6400A controllers, please familiarize yourself with the following warnings and cautions:

WARNING: To prevent injury, access to internal components is limited to persons who have appropriate technical training and experience. Such persons are expected to understand the hazards of working within this equipment and take measures to minimize danger to themselves or others. These measures include:
o Remove any jewelry that may conduct electricity.
o Wear an anti-static wrist strap when handling internal components.

WARNING: To prevent fire, use only modules with current limited outputs. See National electrical Code NFPA 70 or Safety of Information Technology Equipment, Including Electrical Business Equipment EN 60 950.

WARNING: To reduce the risk of electrical shock or damage to the equipment, do not disable the power cord grounding plug. The grounding plug is an important safety feature. Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times. Disconnect power from your AlphaServer or workstation by unplugging the power cord from either the electrical outlet or the server.

WARNING: High current area. Currents exceeding 240 VA can cause burns or eye injury. Avoid contact with parts or remove power prior to access.

WARNING: The I/O area houses parts that operate at high temperatures. Avoid contact with components to prevent a possible burn.

CAUTION: Smart Array 5300A and 6400A controllers contain static sensitive components. Use ESD precautions when handling the controller.

Document Structure

This manual is organized as follows:

- **Chapter 1** describes components and features of the SmartArray 5300A/6400A RAID controllers.
- **Chapter 2** describes the steps to install a SmartArray 5300A/6400A controller in an AlphaServer system.
- **Chapter 3** describes the steps to update the firmware of drives connected to the Smart Array controller using the Alpha Drive Update Utility (ADFU).
- **Chapter 4** describes how to obtain and install firmware for a Smart Array 5300A/6400A controller in an AlphaServer system.
- **Chapter 5** describes how to troubleshoot a SmartArray 5300A/6400A controller in an AlphaServer system.

Associated Documentation

HP provides additional information in the following documents:

- SmartArray 5300A/6400A Backplane RAID Controllers Read-Me-First letter
- Release Notes for Smart Array 5300A Series RAID Controllers for AlphaServer Systems
- Release Notes for Smart Array 6400A Series RAID Controllers for AlphaServer Systems
- QuickSpec - HP Smart Array 5300A RAID Controller for AlphaServer Systems
- QuickSpec - HP Smart Array 6400A RAID Controller for AlphaServer Systems
- QuickSpec for your specific AlphaServer
- Release Notes and other relevant documentation for your operating system and specific Alpha Server
- Alpha Systems Firmware Release Notes for your specific Alpha Server, V6.8 or later
- Smart Array 5300 Controller User Guide, 4th Edition (135606-003 or later)
- HP StorageWorks Enclosure 4200 Family LVD Disk Enclosures Users Guide
- HP StorageWorks Enclosure Model 4300 Family Ultra3 LVD Disk Enclosures Users Guide
- HP StorageWorks Modular Smart Array 30 User Guide
- Array Configuration Utility XE User Guide
- Management Agents for AlphaServers for Tru64 UNIX Reference Guide, V3.0 or later
- User's Guide to HP Management Agents for OpenVMS, version 2.4 or later

- Release Notes for HP Management Agents for OpenVMS, version 2.4 or later
- Smart Array Technology: Advantages of Battery-Backed Cache, TC020202TB

Information on the Internet

Information on Alpha storage products is available at the following web site:

http://h18002.www1.hp.com/alphaserver/products/storage/index.html

Information and files for performing firmware updates are available at the following web site:

ftp://ftp.digital.com/pub/Digital/Alpha/firmware/readme.html

Chapter 1
Smart Array 5300A/6400A Controller Information

This chapter provides an overview of the Smart Array 5300A and Smart Array 6400A controllers for HP AlphaServer systems.

1.1 Smart Array 5300A/6400A Features

The Smart Array 5300A/6400A series of backplane RAID controllers are PCI controllers with hardware, firmware and software components specifically qualified for use on AlphaServer systems. Smart Array 5300A/6400A controller features include the following:

- Fourteen drives per channel.
- Two or four SCSI channels with support for up to 28 or 56 drives (14 drives per channel.)
- Support for attached HP Universal Ultra320, Ultra160, and Ultra2 SCSI disk drives. (Tape drives are not supported.)
- Fault tolerance: RAID 0, 1, 1+0, 5, and Advanced Data Guarding.
- Utilities include web-based monitoring software (the SNMP agent), web-based configuration and management software (ACU-XE), and an off-line configuration utility (ORCA).
- Software features include Hot Spare, online array expansion, online RAID and stripe-size migration, advanced data guarding, and off-line firmware updating with the SRM console LFU utility and the Alpha Drive Firmware Update Utility (ADFU).

1.2 Smart Array 5300A Overview

The following sections provide information about the Smart Array 5300A series.

1.2.1 Features

The Smart Array 5300A series consists of the Smart Array 5302A (2-channel) controller and Smart Array 5304A (4-channel) controller. The following table lists the models and their part numbers.

Option Model	Part Number
SA5302A/128: 2-ch 128 MB Cache	3X-KZPDC-BE
SA5304A/256: 4-ch 256 MB Cache	3X-KZPDC-DF

Smart Array 5300A controller features include:

- Support for operation in PCI Local Bus Specification, Rev. 2.3 compliant add-in card with support for 5v and 3.3v; PCI 33 MHz and 66 MHz; 32 bit and 64 bit buses.
- Two or four Ultra160 SCSI channels with support for up to 28 or 56 disk drives total (14 drives per channel).

1.2.2 Operating System Requirements

SA5300A controllers can be configured for operation under Tru64 UNIX Version 5.1A or Version 5.1B. OpenVMS support is available in Version 7.3-2 and Version 8.2 of the operating system.

The 5300A can be used as the system boot controller or as a data only array controller in all supported operating system environments. Installation requirements vary, depending on the system environment under consideration when the SA5300A is first installed.

The following sections describe the software components required for full support of the 5300A controller in the Tru64 UNIX and OpenVMS operating system environments.

Tru64 UNIX Software Components

To install the 5300A controller on a Tru64 UNIX system, the following minimum components are required:

- New Hardware Delivery 7 (NHD7)
- Patch kit 3 for Version 5.1B
- Patch kit 6 for Version 5.1A

The NHD7 software includes the latest version of the V5.1B and V5.1A patch kits. If you are installing NHD7 for the first time on a new or existing system, follow the instructions included with the NHD software to install the NHD and patch kit software during the same installation procedure.

For existing installations with NHD7 already installed, HP recommends that you upgrade to the latest available patch kit. The *Patch Kit Installation Instructions* will guide you through that process.

You can obtain the NHD7 kit and the latest patch kits from the following web site:

http://www2.itrc.hp.com/service/patch/mainPage.do

OpenVMS Software Components

Support for the Smart Array 5300A is present in the OpenVMS V7.3-2 and OpenVMS V8.2 releases. OpenVMS V7.3-2 introduces Fastpath support in the Smart Array controller driver (PKRdriver). Consult the OpenVMS V7.3-2 *Operating System Release Notes* and *New Features* documentation for more information.

The following OpenVMS software kits and patch updates are the minimum required for SA5300A controller installations:

- OpenVMS Version 8.2 with the following TIMA kit:
  - DEC-AXPVMS-VMS82A_FIBRE_SCSI-V0100
- OpenVMS Version 7.3-2 with the following TIMA kits:
  - DEC-AXPVMS-VMS732_FIBRE_SCSI-V0700
  - DEC-AXPVMS-VMS732_CPU27F-V0100

OpenVMS patches can be downloaded from the following web location:

http://h71000.www7.hp.com/serv_support.html

1.2.3 Available Upgrade Options

Table 1-1 lists option upgrade information for Smart Array 5300A controllers.

Table 1-1 SA 5300A Controller Upgrade Options

Option	Part Number
256 MB Cache Module for Smart Array 5302A Controller	254786-B21
Ultra160 Channel Expansion Module for Smart Array 5302A Controller	153507-B21
Battery Pack, Ni-MH for Battery Backed Cache Module (Spare)	120978-001
Advanced Data Guarding Module for SA 5302A	199371-B21
External VHDCI Cables	
VHDCI-VHDCI 6 ft. cable	3X-BC56J-02
VHDCI-VHDCI 12 ft.	3X-BC56J-03
VHDCI-VHDCI 24 ft. cable	3X-BC56J-04
Internal Cables	
Internal cables ship with BA610-6D internal drive cage.	
They are not separately orderable.	

Note: *Certain hardware options supported with the Smart Array 5300 controllers on Proliant systems are not supported for installation on Smart Array 5300A controllers. The list includes the 32MB and 64 MB Cache modules as well as the SAN Access Module.*

1.3 Smart Array 6400A Overview

The following sections provide information about the Smart Array 6400A series.

1.3.1 Features

The Smart Array 6400A series consists of the Smart Array 6402A (2-channel) controller and Smart Array 6404A (4-channel) controller. The following table lists the models and their part numbers.

Option Model	Part Number
SA6402A: 2-ch 128 MB Cache	3X-KZPEC-BF
SA6404A: 4-ch 256 MB Cache	3X-KZPEC-DG

Smart Array 6400A controller features include:

- PCI-X 1.0 specification compliant add-in card, with support for 3.3v; PCI-X 133 MHz and 66 MHz; PCI 66 MHz and 33 MHz; 32 bit and 64 bit buses.
- Two or four Ultra320 SCSI channels with support for up to 28 or 56 drives (14 drives per channel, 28 drives per controller array) .

1.3.2 Operating System Requirements

HP strongly recommends that you install the most current operating system patches.

Smart Array 6400A controllers require one of the following OpenVMS operating system versions and the specified TIMA kit:

- OpenVMS Version 7.3-2 with the following TIMA kits:
    - DEC-AXPVMS-VMS732_FIBRE_SCSI-V0700
    - DEC-AXPVMS-VMS732_CPU27F-V0100
- OpenVMS Version 8.2 with the following TIMA kit:
    - DEC-AXPVMS-VMS82A_FIBRE_SCSI-V0100

Smart Array 6400A controllers are not supported on systems running Tru64 UNIX.

1.3.3 Available Upgrade Options

Table 1-2 lists option upgrade information for Smart Array 6400A controllers.

Table 1-2 Smart Array 6400A Controller Upgrade Options

Option	Part Number
Battery Pack, Ni-MH for Battery Backed Cache Module (Spare)	307132-001
External VHDCI Cables	
VHDCI-VHDCI 6 ft. cable	3X-BC56J-02
VHDCI-VHDCI 12 ft.	3X-BC56J-03
VHDCI-VHDCI 24 ft. cable	3X-BC56J-04
Internal Cables	
Internal cables ship with BA610-6D internal drive cage. They are not separately orderable.	

1.3.4 Unsupported Upgrade Options

Some hardware options supported with the Smart Array 6400 controllers on Proliant systems are not supported for installation on Smart Array 6400A controllers. The following is not supported:

- Cache upgrades
- 256 MB and 512 MB battery backup kits

Chapter 2
Installation

This chapter describes how to install and configure a Smart Array Controller in an AlphaServer system.

2.1 Installation Overview

The following steps provide an overview of the preparation and installation tasks needed to get your Smart Array 5300A or Smart Array 6400A up and running.

If you are familiar with the process, these steps will remind you of the tasks you need to perform. If you have not previously installed a Smart Array controller, these steps will familiarize you with the process. You can then refer to the sections that follow for more detailed information on each step.

1. Review the Smart Array 5300A or Smart Array 6400A Release Notes for important information updates not included in this installation guide.
2. Check the Smart Array 5300A/6400A web page for availability of updated documentation and software components.
3. Install the ISA extension bracket onto the controller module. This step is required when the controller is installed into DS and GS class AlphaServer systems. Do not install the bracket if the controller is to be installed into an ES series AlphaServer system.
4. Install the controller module in your AlphaServer system.
5. Attach storage enclosures and disk drives to the controller. Consult the documentation accompanying your StorageWorks enclosure for additional usage information.
6. Run the BIOS on each controller after power up to determine whether disk drive firmware updates are required. The BIOS on the controller is executed from the SRM console prompt. If necessary, use the Alpha Drive Firmware Update utility to update your drive firmware.

7. Initialize the SRM console environment variables `heap_expand` (except for GS1280, ES47, and ES80 AlphaServers) and `init`, and then set `bootbios` if the Smart Array 5300A/6400A controller will be configured as a boot controller.
8. Create at least one logical volume using the ORCA offline configuration utility if the Smart Array 5300A/6400A is configured as the boot controller. ORCA provides basic functions for creating and deleting Smart Array 5300A/6400A logical volumes. You can create non-boot logical volumes using the online ACU-XE utility after Step 11 has been completed.
9. Install the Smart Array 5300A/6400A driver components for your Tru64 UNIX or OpenVMS operating system.
10. Install the Smart Array 5300A/6400A controller monitoring agent. This is done by installing the HP Management Agent kit for your operating system. The Smart Array 5300A/6400A monitoring agent provides detailed information on the status of your Smart Array 5300A/6400A controller and attached storage subsystem.
11. Install the Smart Array ACU-XE online configuration utility for your operating system. The ACU-XE utility provides access to the advanced configuration and maintenance features of the controller.

2.2 Preparation

To install the Smart Array 5300A/6400A controllers in your HP AlphaServer, perform the the following basic steps in order:

1. Determine that your system meets the requirements for the Smart Array 5300A/6400A controller. For supported system compatibility and requirements, refer to the Release Notes and Quickspecs for your product at the following web sites:

   For the Smart Array 5300A

   http://h18002.www1.hp.com/alphaserver/products/storage/sa5300a/

   For the Smart Array 6400A

   http://h18002.www1.hp.com/alphaserver/products/storage/sa6400a/

2. You should also reference the Quickspecs for the specific HP AlphaServer in which you are planning to install the controller.
3. Identify the contents of the Option Kit.
4. Install the Smart Array 5300A/6400A controller in your server and connect your storage. For best performance, install your controller as follows:
   - Smart Array 5300A – Install in a 66MHz PCI slot.
   - Smart Array 6400A – Install in a PCI-X slot or a 66 MHz PCI slot, based on your system's capabilities.
5. Power up your system. Be sure to power up your attached storage enclosures before powering up the HP AlphaServer.

Note: When powering down your system, power down your server before powering down your attached storage enclosures.

---

6. Configure your array:

   - Boot Device – If your boot device is a Smart Array 5300A/6400A logical volume, you must use the offline configuration utility to configure it. (See Section 2.6.3)
   - Data Device – You can configure your data device with the offline or online configuration utilities.

   When configuring your array, consider the following:

   - To achieve the most efficient use of total storage capacity, group drives with comparable capacity in the same array.

   - For best performance, make sure that the drive speed is comparable to the controller speed.

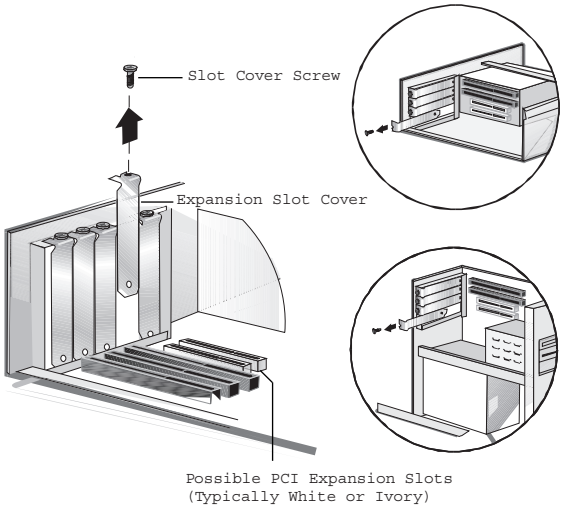
Note: Do not attempt to create a logical volume greater than 1TB, which is the maximum size supported by OpenVMS and Tru64 UNIX.

---

7. Install the operating system (if necessary) and the Smart Array 5300A/6400A Monitoring and Configuration Utilities. See Sections 2.7 and 2.8 for information on the monitoring and configuration utilities.

2.3 Installing the Controller

Figure 2-1 Installing the Controller



Install the controller as follows:

1. Use an ESD ground strap when handling the controller module.
2. Install the ISA extension bracket onto the controller module. This step is required when the controller is installed into DS and GS class AlphaServer systems. Do not install the bracket if the controller is to be installed into an ES series AlphaServer system.
3. Locate an available PCI bus expansion slot. Make certain there are no restrictions for the PCI slot into which you will install the controller. See the documentation that came with your AlphaServer or workstation for the location.

4. Depending on your AlphaServer or workstation model, remove the retaining screw (see Figure 2-1) or open the expansion slot latches that secure the PCI slots.
5. Remove the slot cover (see Figure 2-1) from the PCI slot. Save this protective cover for future use.
6. Install the controller into the PCI slot and press it firmly into place. The contacts on the adapter edge should be fully seated in the system board connector.
7. Depending on your AlphaServer or workstation model, secure the adapter by replacing the retaining screw or by closing the slot latch.
8. Do not install the computer cover or reconnect power until all the SCSI devices are connected.

2.4 Cabling the Controller

After the controller is installed, cable each of the controller's ports to either external or internal storage enclosures. If your system contains both types of storage enclosures, cable your Smart Array controller to the internal enclosures first. Be careful not to cable any one port to both an internal and external storage enclosure.

2.4.1 Internal Cabling

Install drives in the BA610 removable media bays on the server.

Attach the internal point-to-point SCSI cable (provided with BA610) from one internal connector of the controller to the hot-plug drive cage.

2.4.2 External Cabling

The following steps describe how to install the external cable:

1. On the rear of the server, connect the external cable to the VHDCI connector on the controller, and tighten the lock screws on the cable connector.
2. Attach the other end of the cable to the storage enclosure, and tighten the lock screws on the cable connector.

2.5 Completing the Installation

After the cabling and connections are complete, reassemble your AlphaServer or workstation as follows:

1. Make certain all cables are routed properly and are not restricted or pinched by other components. Refer to your system documentation for proper routing of cables.
2. Reconnect any peripheral devices to your AlphaServer or workstation.
3. Plug the AC power cord into the server and then into a grounded AC outlet.
4. Turn on any peripheral devices attached to the AlphaServer or workstation.
5. Turn on the AlphaServer or workstation.
6. To verify that your new Smart Array controller is available at the console, enter the `show configuration` command at the SRM console prompt. Examine the PCI bus information in the display to make sure that the new option is listed. Your Smart Array controller will be presented at the prompt as a py*X*0 device (where *X* is a corresponding controller ID).

Example 2-1 shows a typical `show configuration` command on a DS15 system with a Smart Array 5300A and a Smart Array 6400A.

Example 2–1 Show Configuration Command

```
>>> show config

                hp AlphaStation DS15

Firmware
SRM Console:    V7.1-1
PALcode:        OpenVMS PALcode V1.98-6, Tru64 UNIX PALcode V1.92-7
SROM Extended:          V1.0-1
SROM Fail Safe:         V1.0-0
RMC Runtime:            V1.1-0
RMC Booter:             V1.0-0

Processors
CPU 0           Alpha EV68CB pass 4.0 1000 MHz  2MB Bcache

Core Logic
Cchip           Rev 18
Dchip           Rev 17
PPchip 0        Rev 17
TIG             Rev 1.11
Acer Chip Revision B1-E
```

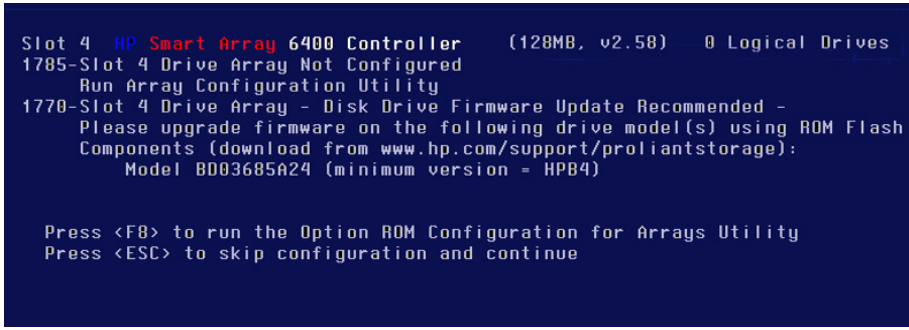
```
Memory
  Array       Size       Base Address    Intlv Mode
---------  ----------  ----------------  ----------
    0       1024Mb     0000000000000000    1-Way

     1024 MB of System Memory

 Slot   Option               Hose 0, Bus 0, PCI - 33 MHz
   7    Acer Labs M1543C                    Bridge to Bus 1, ISA
   8/0  Adaptec AIC-7899     pka0.7.0.8.0     SCSI Bus ID 7
   8/1  Adaptec AIC-7899     pkb0.7.0.108.0   SCSI Bus ID 7
   9    Intel 82559ER Ethern eia0.0.0.9.0     00-02-A5-20-C3-AB
  10    Intel 82559ER Ethern eib0.0.0.10.0    00-02-A5-20-C3-AA

Slot   Option                Hose 0, Bus 0, PCI - 33 MHz
   7    Acer Labs M1543C                    Bridge to Bus 1, ISA
   8/0  Adaptec AIC-7899     pka0.7.0.8.0     SCSI Bus ID 7
   8/1  Adaptec AIC-7899     pkb0.7.0.108.0   SCSI Bus ID 7
   9    Intel 82559ER Ethern eia0.0.0.9.0     00-02-A5-20-C3-AB
  10    Intel 82559ER Ethern eib0.0.0.10.0   00-02-A5-20-3-AA
  13    Acer Labs M1543C IDE dqa.0.0.13.0
                             dqb.0.1.13.0

        Option               Hose 0, Bus 1, ISA
        Floppy               dva0.0.0.1000.0

 Slot   Option               Hose 2, Bus 0, PCI - 66 MHz
   7    HP Smart Array 5300A pya0.0.0.7.2
   8    IBM PCI-X Bridge             Bridge to Bus 2, PCI

 Slot   Option               Hose 2, Bus 2, PCI - 66 MHz
   4    HP Smart Array 6400  pyb0.0.0.2004.2
   5    Smart Array 6400 EM  pyc0.0.0.2005.2
```

Note: The console displays a Smart Array 5302A and Smart Array 5304A as "HP Smart Array 5300A." It displays a Smart Array 6402A as a Smart Array 6400 and displays a Smart Array 6404A as two separate controllers – Smart Array 6400 and Smart Array 6400 EM, as seen in Example 2-1.

2.6 Configuring the Controller

Running the BIOS on the controller can identify those drives in your configuration that require updates. You may be presented with a list of drives -- the candidates for updates, as shown in Figure 2-2.

Figure 2-2 Drive Update Menu



Note: If the firmware indicates that one or more drives need to be updated, perform the update as outlined in Chapter 3 before configuring the controller.

Smart Array 5300A/6400A controllers do not support Hot Plug tape drives.

2.6.1 Configuration Overview

If your Smart Array 5300A/6400A controller is intended to be used as an operating system boot device, you need to configure the SRM console and run the ORCA off-line configuration utility.

2.6.2 SRM Console Setup and Use

The following steps show you how to enable the logical volumes residing on a Smart Array 5300A/6400A controller pointed to by the SRM console environmental variable `bootbios` (**pya0** in the example) to become visible at the SRM console. This is a prerequisite to booting off a Smart Array 5300A/6400A logical volume and is not required if the controller will not be used as boot devices.

Setting `bootbios` will cause the BIOS on the selected controller to be executed automatically whenever the console is initialized.

Note: Your system must be installed with a supported SRM console firmware version. See the system specific release notes for the supported versions.

---

1. Enter the `set heap_expand` command, specifying 2 MB or 4 MB. For example:
   ```
   P0>>> set heap_expand 2mb
   ```
   (This operation is not valid for ES47, ES80, and GS1280 systems.)
2. Enter the `initialize` command:
   ```
   P0>>> initialize
   ```
3. Set the controller. For example:
   ```
   P0>>> set bootbios pya0
   ```
4. Enter the `initialize` command:
   ```
   P0>>> initialize
   ```
5. Enter the `show bootbios` command to verify the bootbios variable:
   ```
   P0>>> show bootbios
   ```

Note: When you execute a show device SRM command you will only be able to see configured logical volumes behind the Smart Array controller for which the bootbios variable is set. To see logical devices behind another Smart Array controller, you first need to set the bootbios variable to point to that controller.

2.6.3 Running ORCA Off-line Configuration Utility with the SRM Console

To discover BIOS enabled controllers in the system use the `show bios` command. For example:

```
P0>>> show bios

vga0.0.0.1.0 - DEC PowerStorm
pyb0.0.0.4.0 -  HP Smart Array 5300
pka0.7.0.2000.0 - NCR 53C875
pkb0.7.0.2001.0 - NCR 53C875
pya0.0.0.5.1 -  HP Smart Array 5300
```

To run the BIOS-based configuration utility, use `run bios` command to invoke BIOS on the desired Smart Array controller. In the following example, pyX0 is the controller to be configured:

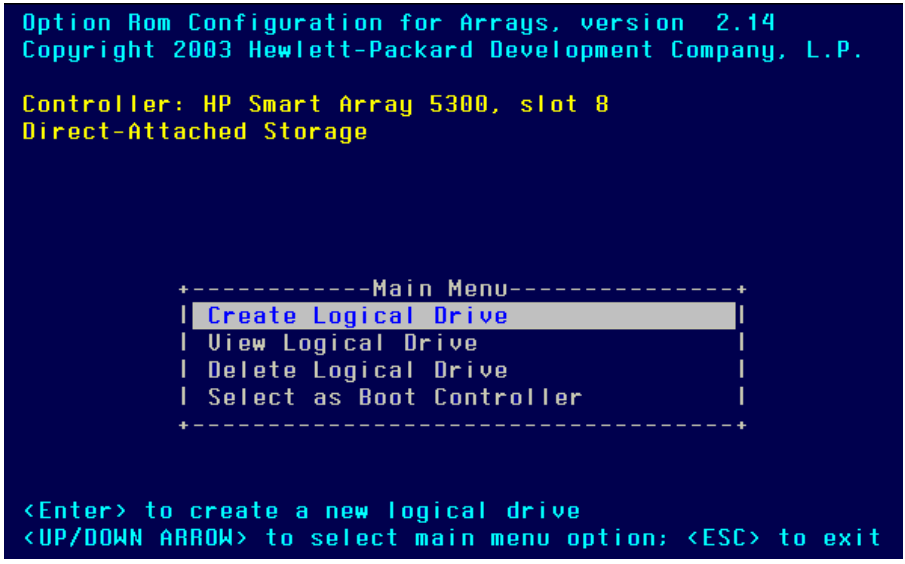
```
P0>>> run bios pyX0
```

This command invokes the ORCA utility that will enable you to configure logical units. The following information is displayed:

```
Slot 9 HP Smart Array 5300 Controller Initializing…

Press <F8> to run the Option ROM and Configuration for
Arrays utility

Press <ESC> to skip configuration and continue
```

After pressing F8, you will see the main ORCA menu (Figure 2-3), which allows you to create, view, or delete a logical drive.

Figure 2-3 ORCA Main Menu

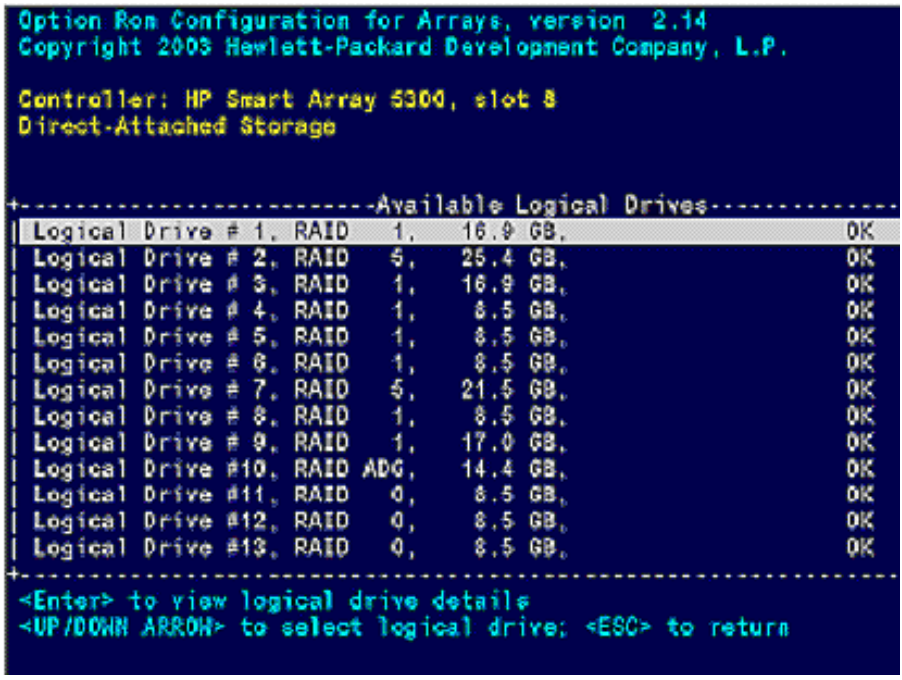


Note: The option - "Select as Boot Controller" is not required to be used on AlphaSever systems and should not be selected

---

Figure 2-4 shows the View Logical Drive screen.

Figure 2-4 View Logical Drive Menu



To create a logical drive:

1. Choose the Create Logical Drive menu option.

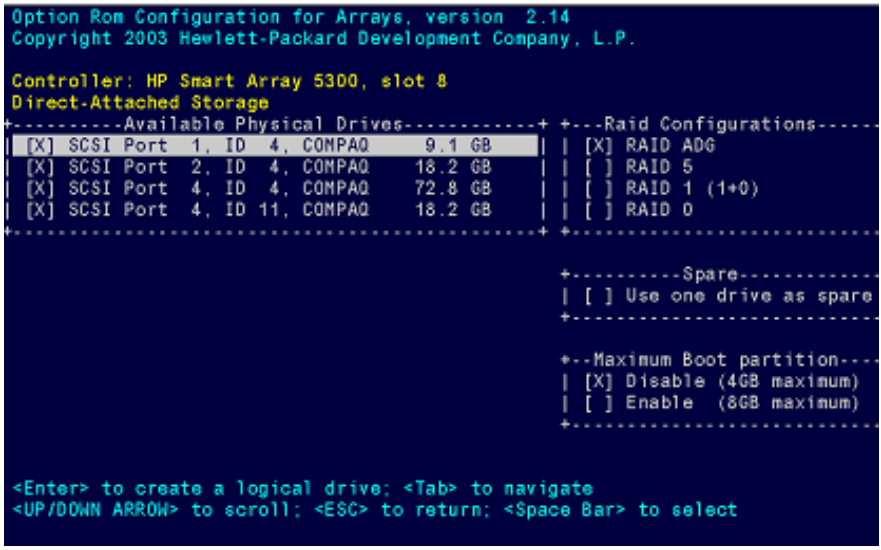
   The screen (Figure 2-5) now displays a list of all available (not configured) physical drives and the valid RAID options, and allows you to configure a spare drive for the array. You can only create one logical drive at a time.

   The maximum array size supported by the controller, OpenVMS, and Tru64 UNIX is 2 TB.

   The maximum Logical Volume size supported by the controller and Tru64 UNIX with LSM is 2 TB.

   The maximum Logical Volume size currently supported by OpenVMS and Tru64 UNIX if not using LSM is 1 TB

Figure 2-5 Create Logical Drive Menu



Use the arrow keys, space bar, and tab key to navigate around the screen and set up your logical drive.

2. Press **Enter** to accept the settings. If you do not want to make a logical volume with the drives that are highlighted with the "X", select the drive via the arrow key and use the space bar to deselect. On initial installation, all available drives on the first SCSI bus will be selected. Leave the "Maximum Boot partition" setting at the default value of "Disable."

   If you tab to the Spare drive box and select a spare drive, an S will be displayed by the selected spare drive in place of an X.

3. At the next screen, press **F8** to confirm your settings and save the new configuration.

4. After several seconds, the Configuration Saved screen is displayed. Press **Enter** to continue.

5. You can now create another logical drive on any remaining available hard drives by repeating the previous steps.

   When you have a logical volume or disk selected in ORCA, the drive fault light on all of the physical drives associated with that logical volume will be on as a locator indicator for the user.

After exiting the ORCA utility, issue the following SRM commands in the next steps to view your newly created logical units.

6. Enter the `initialize` command

```
P0>>> initialize
```

7. Enter the `show configuration` command:

```
P0>>> show configuration

Bus 00 Slot 09:  HP Smart Array 5300 pya0.0.0.9.0

          dya1.0.0.9.0  CPQCISS
          dya2.0.0.9.0  CPQCISS
          dya0.0.0.9.0  CPQCISS
```

2.7 OpenVMS Online Configuration and Monitoring

The following sections will guide you through the process of using Open VMS online monitoring and configuration utilities.

2.7.1 Installing and Using the OpenVMS Online Monitoring Utility

The OpenVMS SNMP Storage Agent for the Smart Array 5300A/6400A controller is installed as part of the HP Management Agents kit software. See Section 2.9 for information about the HP Managment Agents.

After installing the HP Management agents, you can use them to monitor your system.

Launch the HP Management agents in a Web browser, as outlined in Section 2.9. Click on the "HP Insight Management Agents for OpenVMS" icon to view the information about the Server running SNMP agents. Select/Click on the link "Smart Array …" to view the controller information and devices attached to the controller.

2.7.2 Installing and Using the OpenVMS Online Array Configuration Utility

This section provides information for installing and using the Online Array Configuration Utility (ACU-XE) on OpenVMS. See the Smart Array 5300A or 6400A Release Notes for the latest supported version and the WEB location of the ACU-XE.

Before installing the ACU-XE utility, make sure the following manditory conditions are met:

- TCPIP services are installed and configured on the system.
- A supported version of the OpenVMS Management Agents is installed.

Procedure to Install and run ACU-XE

1. The steps required for installing the ACU-XE utility depend on whether you are installing ACU-XE for the first time or if you previously installed the utility:
   - First time installation

     If installing ACU-XE for the first time, change the default directory to the location where you downloaded the V0640 ACU-XE PCSI kit and issue the following command at the DCL prompt:

     ```
     $PRODUCT INSTALL ACUXE
     ```

   - Subsequent installations

     If you are installing the kit on a system that has or has had the ACU-XE kit previously installed, you must use the `ACUXE_CLEANUP.COM` installation support script to perform the installation. This script ensures that pre-installation conditions are appropriate before kit component delivery is initiated and prepare the system and cluster environment for cluster-wide installation of the kit..

     The ACUXE_CLEANUP.COM script is packaged as part of the self-extracting archive containing the V0640 ACU-XE PCSI kit and is available from the Smart Array web site.

     After downloading the V0640 kit distribution file and placing it in `SYS$UPDATE`, run the `.EXE` file to extract the V0640 PCSI kit and the accompanying `ACUXE_CLEANUP.COM` script.

Install and upgrade the ACU-XE utility by following the instruction provided after launching the `ACUXE_CLEANUP.COM` script as follows:

```
$ @SYS$UPDATE:ACUXE_CLEANUP.COM
```

2. The ACU-XE utility requires HP Management Web server process WBEM$SERVER to display the details on the Web browser. To verify the presence of this process, run the following command:

```
$SHOW SYSTEM/PROCESS=WBEM$SERVER

OpenVMS V7.3-2 on node ASDF  15-AUG-2002 14:17:54.43 Uptime 0
01:13:45
Pid      Process Name State Pri I/O  CPU  Page flts     Pages
0000023E WBEM$SERVER  HIB   6   6533 0 00:00:05.62 846  772 M
```

3. Issue the following command to start ACU-XE:

```
$@SYS$SYSROOT:[WBEM.ACUXE]CPQ$ACUXE.COM -R
```

This command starts the ACU-XE as a detached process. The -R option is required to configure the devices from a remote system, using a Web browser.

Issue the following command to obtain more information about the command line options:

```
$@SYS$SYSROOT:[WBEM.ACUXE]CPQ$ACUXE.COM -h
```

To access Smart Array controllers from your browser, connect to the HP Management Agents. See Section 2.9 for information about connecting to HP Management Agents.

Click on the Array Configuration Utility icon to launch the ACU-XE utility.

2.8 Tru64 UNIX Online Configuration and Monitoring and Configuration Utilities

The following sections will guide you through the process of using Tru64 UNIX online monitoring and configuration utilities.

2.8.1 Installing and Using the Tru64 UNIX Online Monitoring Utility

With the HP Management Agents for Tru64 UNIX you can:

- View your AlphaServer hardware configuration including all installed

Smart Array 5300A controllers and attached storage devices.

- Monitor the state of the system locally or remotely.
- Locate logical and physical drives attached to Smart Array 5300A controllers by flashing the relevant drive LEDs.

The Tru64 SNMP Storage Agent for the Smart Array 5300A controller is installed as part of the HP Management Agents kit software.

HP Management Agents are delivered on the HP Management CD or the Tru64 UNIX Web site. Support for Smart Array 5300A series controllers was introduced in the V3.1 HP Management Agents kit for Tru64 UNIX. This kit appears on the V6.2 HP Management CD.

See Section 2.9 for information about using HP Management Agents.

Note: In order to be able to use the drive locate function via the Storage Management Agent, the community permission in the /etc/snmpd.conf file must be set to write. The format for a community definition is:

```
community <community_name> <IP address> <permission>
```

See the section on "Configuring Tru64 UNIX for SNMP Set and Trap Operations" in the *Management Agents for AlphaServers for Tru64 UNIX Reference Guide* for detailed instructions on enabling write permission for SNMP communities.

Note: This modification has security implications. Consult the snmpd(8) reference page for more information.

You will have to reboot or restart the HP Management Agents after making this change.

2.8.2 Installing GS Platform View and Discovery Agents

After installing the Tru64 UNIX patch kits and the HP Insight Management Agents for Tru64 UNIX you can install the runtime utilities.

For GS platform support, you must update to at least the V1.5 GS Platform Discovery kit (CPQGS150) or a later release before installing the CPQIM and ACU-XE.

Note: The GS Platform View and Discovery Agents only run on GS series Alpha servers. The installation must be done only after the Insight Management Agents for Tru64 UNIX have been installed.

The Tru64 UNIX Insight Management Agent kit version V3.4 provides KZPDC utility support for V5.1A and V5.1B Tru64 UNIX installations on all AlphaServer system platforms. You can install the V3.4 kit or a kit later than V3.5, but do not use the V3.5 kit.

You must also update to the latest GS Platform Discovery kit prior to installing CPQIM and ACU-XE.

The following steps describe how to install the GS Platform View and Discovery software:

1. Log in as root on the Tru64 UNIX system.
2. Download the tape archive of the latest GS Platform View and Discovery from the HP Insight Management Agents for Tru64 UNIX web site to the `/tmp/CPQGS` directory. That web site is:

   http://h30097.www3.hp.com/cma/download.html
3. Click on the Download tab and follow the provided instructions.
4. Extract the GS Platform View and Discovery Agents software from the tape archive file.

   ```
   # cd /tmp/CPQGS
   # tar xvf cpqgsddd.tar
   ```

   The tar utility creates a directory named `cpqgs`*`ddd`*, which contains the GS Platform View and Discovery Agents software.
5. Use the `setld` utility to install the GS Platform View and Discovery Agents software. For example:

   ```
   # /usr/sbin/setld -l cpqgsddd
   ```

From the `setld` menu, select the first option, "ALL of the above". The `setld` utility will install the subsets for the GS Platform View and Discovery Agents software.

6. Verify that the GS Platform View and Discovery Agents software was installed correctly by entering the following command:

```
# ps agx | grep gshmmod
```

The output will resemble the following:

```
root ... /var/opt/CPQGSddd/web/im/GSview/gshmmod
```

7. Delete the temporary directory and its contents. For example:

```
# rm -fr /tmp/CPQGS
```

2.8.3 Installing and Using the Tru64 UNIX Online Array Configuration Utility

This section provides information for installing and using the Online Array Configuration Utility (ACU-XE) on Tru64 UNIX. See the Smart Array 5300A Release Notes for the latest supported version and the WEB location of the ACU-XE.

You can download a user guide for the ACU-XE utility from the following location:

ftp://ftp.compaq.com/pub/products/servers/proliantstorage/acu-xe-userguide.pdf

Version 3.1 or later of the HP Management Agents for Tru64 UNIX software must be installed on the target system prior to installation of the ACU-XE utility.

The following is an example of the installation procedure:

1. Download the file CPQACUXE13071A.tar to a target system.
2. Ensure that you have root permissions on the target system.
3. Uncompress the tar file as follows:

```
# tar xvf CPQACUXE13071A.tar
```

4. Run the following command:

```
# /usr/sbin/setld -1 CPQACUXE13071A
```

```
*** Enter subset selections ***
The following subsets are mandatory and will be installed
automatically unless you choose to exit without
installing any subsets:
       * Compaq Array Configuration Utility XE version
1.30.7.0 for Tru64 UNIX
You may choose one of the following options:

 1) ALL of the above
 2) CANCEL selections and redisplay menus
 3) EXIT without installing any subsets

                        Enter your choice:
```

5. If you select 1 at the Enter your choice prompt, you will see messages similar to the following:

```
You are installing the following mandatory subsets:
Compaq Array Configuration Utility XE version
1.30.7.0 for Tru64 UNIX

You are installing the following optional subsets:
Estimate free diskspace (MB) in root:791.9
usr:4782.1

Is this correct? (y/n)
```

6. Enter y to continue the installation. You will see messages similar to the following:

```
Setld:
Checking file system space required to install selected
subsets:
File system space checked OK.
1 subsets will be installed.
Loading subset 1 of 1 …
  Compaq Array Configuration Utility XE version 1.30.7.0
for Tru64 UNIX
                Copying from cpqacuxepackB1 (disk)
        Verifying
1 of 1 subsets installed successfully.
Configuring "Compaq Array Configuration Utility XE
version 1.30.7.0 for Tru64 UNIX" (CPQACUXE13071A)
```

Running the ACU-XE Configuration Utility

Run the following command to display all command line options for running ACU-XE:

Note: The HP Management Agent software must be install prior to running the ACU-XE utility.

```
# /usr/sbin/cpqacux -h

Compaq Array Configuration Utility XE version 1.30.7.0
The Compaq Array Configuration Utility XE (ACU-XE) allows
you to configure and manage your Smart Array storage
through a Web browser.
Format: cpqacuxe [Option}
Options: (use one only)
-d, --disable-remote      Disable remote
connection(default).
-R, --enable-remote       Enable remote connection.
-stop                     Stop the server.
-v                        Print version information.
-h, --help                Print this page.
```

Administrative login in the HP Management Agent homepage is required before connecting to the ACU-XE homepage.

Administrative login requires the setup of operator and administrator accounts. You will need to create an *IM_admin* group and an *IM_oper* group in /etc/group and assign user accounts to these groups. Consult the *Management Agents for AlphaServers for Tru64 UNIX Reference Guide* section on "Configuring Users and Groups" for more information.

For example if you want root to have Insight Manager Administrative privileges, the entry in /etc/group should be similar to the following:

```
IM_admin::200:root
```

Make sure that you have gone through the following checklist:

1. Only run ACU-XE on servers that are on a local intranet or a secure network.

2. Secure the management port (port 2301).

   Invoking cpqacuxe without any options disables remote connection. See Section 2.9 for information about using HP Management Agents.

Note: The ACU-XE utility is not in general recommended for monitoring Smart Array 5300A storage arrays. The Smart Array SNMP Storage Agent should be used instead.

Uninstalling the ACU-XE

Perform the following steps to uninstall the ACU-XE:

1. Make sure you have root permissions

2. Run the following command:

```
# /usr/sbin/setld -d CPQACUXE130

Deleting "Compaq Array Configuration Utility XE version
1.30.7.0 for Tru64 UNIX" (CPQACUXE).
```

Event Logging

Smart Array controller events are reported in the system error log. These events can be translated and reported to a text file by using the WEBES service tool, which can be downloaded from the following web site:

http://h18023.www1.hp.com/support/svctools/webes/index.html

2.9 Using HP Management Agents

The following sections provide information about the HP Management Agents.

2.9.1 Installing or Using the Management Agents on OpenVMS

HP Management Agents are available on the HP Management CD or on the OpenVMS web site:

http://h71000.www7.hp.com/openvms/products/mgmt_agents/

Refer to your Smart Array release notes for the required minimum version information of the HP Management Agents. Refer to the *HP Management Agents for* OpenVMS *User Guide* found on the OpenVMS Web site for installation and configuration instructions, as well as for the guidelines for using the HP Management Agents.

2.9.2 Installing or Using the Management Agents on Tru64 UNIX

The HP Management Agents for Tru64 UNIX web site is:

http://h30097.www3.hp.com/cma

Refer to the Compaq Management Agents for Tru64 UNIX Reference Guide found on the Tru64 UNIX Web site for installation and configuration instructions, as well as for the guidelines for using the HP Management Agents.

2.9.3 Launching the Agents in a Browser

After installing the HP Management agents, you can launch them in a Web browser specifing the following:

- The IP address or system name of the system containing the Smart Array 5300A/6400A controller.
- The port number, 2301, used by the Management Agents. (See the Management Agent documentation for informantion about supported Web browsers.)

For example:

IP address

```
http://192.168.0.2:2301/
```

System name

```
http://zed.fan.com:2301
```

For later versions of the HP Management Agents you can use secure http (https) and port 2381. For example:

https://zed.fan.com:2381/

The older format works with all Management Agents versions.

Chapter 3
ADFU

The Alpha Drive Firmware Update utility (ADFU) provides an easy way to update the firmware of drives connected to the Smart Array Controller. This chapter describes the steps for using the utility.

3.1 Booting from the ADFU CD

The ADFU is provided on a bootable CD that you run when the controller's BIOS alerts you of the need for a firmware update.

To run the ADFU, insert the ADFU CD into the first CD-ROM drive in your system (DQA0) and boot the CD. On systems with multiple CD-ROM drives, you must use the first drive or the ADFU will not run. To boot the CD, use one of the following commands:

- When booting from a graphics console use:

  ```
  >>>b -fl 0 DQA0
  ```

- When booting from a serial console connected to COM1 use:

  ```
  >>>b -fl 1 DQA0
  ```

- When booting from a serial console connected to COM2 use:

  ```
  >>>b -fl 2 DQA0
  ```

- When booting an AlphaServer ES47, ES80, or GS1280 using a serial console connected to the MBM service port or to the management LAN use:

  ```
  >>>b -fl 3 DQA0
  ```

On an ES47, ES80, or GS1280 system the following ADFU restrictions apply:

- Boot flags 1 and 2 are not supported. When running ADFU in either graphics or serial mode, use the console set serial mode, and use either boot flags 0 or 3, respectively.
- The console environment variable `limited_CRB_map` must be set to ON prior to running the ADFU; reset it to OFF after the ADFU has been run.

On a GS80, GS160, or GS320, the ADFU is not supported in graphics mode and must be run with boot flags 1 or 2.

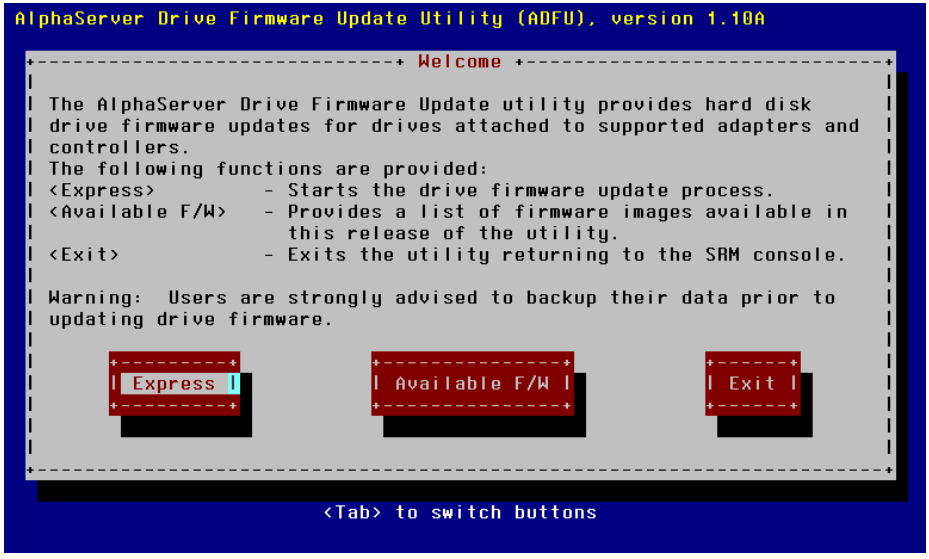
Prior to running the ADFU, refer to your Smart Array release notes to look for any other specific ADFU restrictions.

The ADFU cannot be run on systems that are either hard or soft partitioned; the system must be unpartitioned prior to running the ADFU.

3.2 Running the Firmware Update Utility

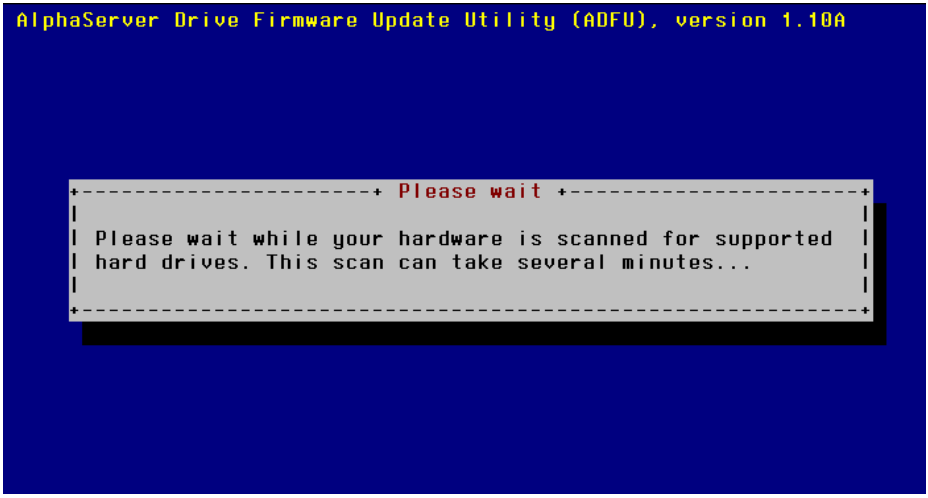
When the ADFU starts, the Welcome screen (Figure 3-1) is displayed.

Figure 3-1 Welcome Screen



Select “Express” to start the update process. The ADFU will scan the system looking for drives that require a firmware update. A screen similar to the one in Figure 3-2 is displayed during this process.

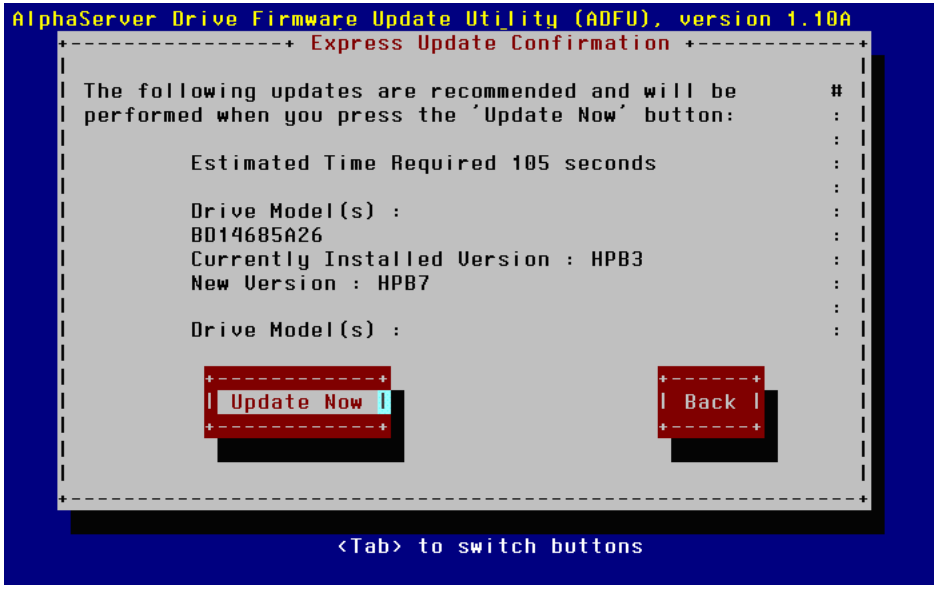
Figure 3-2 Scanning Screen



If updates are required, the ADFU indicates which drive types require an update and displays an estimated amount of time required for the updates.

Select “Update Now” from the Update Confirmation screen (Figure 3-3) to start the firmware update.

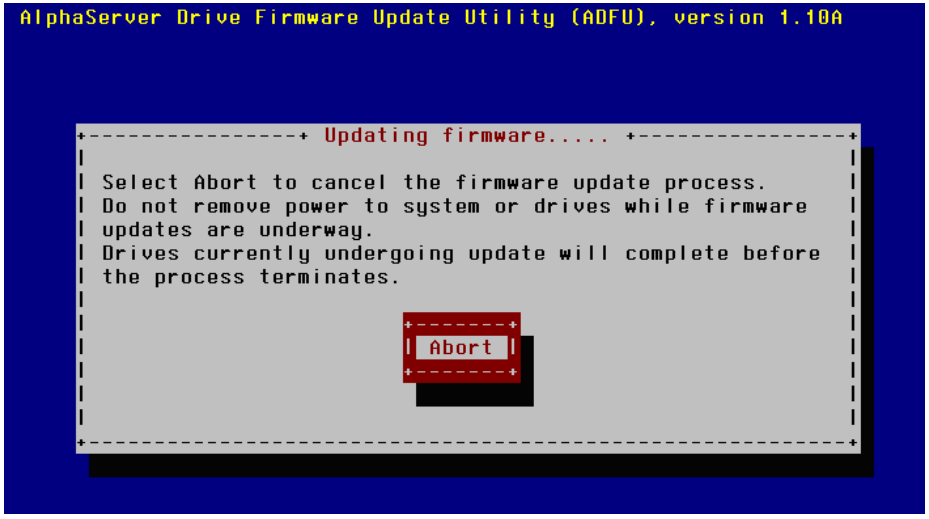
Figure 3-3 Update Confirmation Screen



While the update is in process, the screen shown in Figure 3-4 is displayed. If you need to stop the update process, select the Abort button. This allows the process to be completed on the drives currently being updated. Be aware that this may leave your system with some drives still not updated.

Caution: Do not attempt to abort the process by turning off power or otherwise halting the system while the update process is in progress other than by using the Abort button. Doing so can corrupt the firmware on one or more drives, causing the drives to not function or to function incorrectly. If this occurs the ADFU may not be able to reprogram the drives and the drives may need to be replaced.

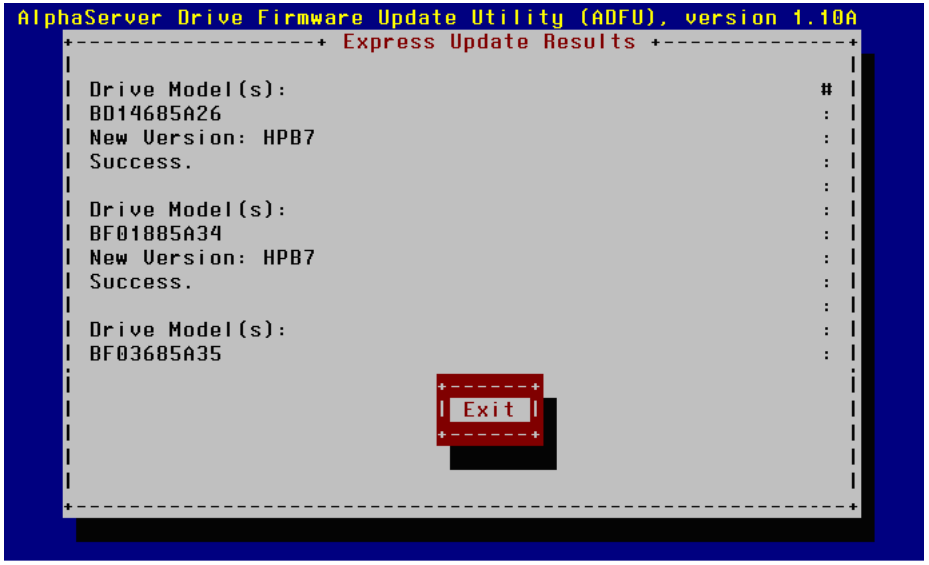
Figure 3-4 Update Screen



Once all drives have been updated, the screen shown in Figure 3-5 will be displayed. Verify that no update failures are reported and then select “Exit.”

Be patient while awaiting this screen to display; it may enter a sleep mode. If it does, use only the Alt or Ctrl keyboard keys to wake up the display. Do not attempt to wake it by pressing keyboard keys such as Enter, Return, or Space. Doing so could result in selecting the next menu item, such as Abort.

Figure 3-5 Results Screen

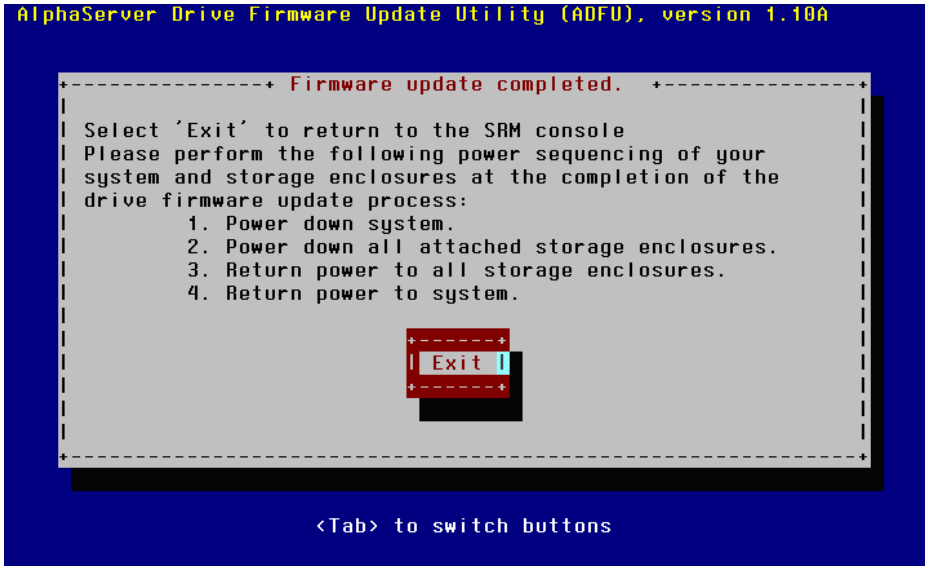


To complete the update process, perform the following steps, as shown in Figure 3-6:

- Power down the system
- Power down all attached storage enclosures
- Return power to storage enclosures
- Return power to system

The drive firmware update process is now complete. A second pass run of ADFU is recommended to ensure that all the drives have been updated.

Figure 3-6 Task-Completion Screen



Chapter 4
Upgrading Controller Firmware

Firmware updates for Smart Array 5300A/6400A controllers are distributed on the Alpha Systems Firmware Update CD. This bootable CD automatically updates the firmware for all installed Smart Array controllers when you issue the `update` command. This is the suggested method for updating Smart Array firmware on all Alpha systems.

For information on this CD, go to the following web site:

ftp://ftp.digital.com/pub/DEC/Alpha/firmware/index.html

Check the 5300A or 6400A Web pages (listed in Section 2.1) to see if new controller firmware files are posted. If new firmware is available, you can use the SRM console Loadable Firmware Update Utility (LFU) to update the firmware.

The following steps describe the process for updating the firmware on a supported Alpha Server with a firmware image located on a diskette, on a CD-ROM, and on a MOP server:

1. Invoke the console Loadable Firmware Update Utility by booting the Alpha Systems Firmware Update CD.

2. At the LFU prompt, enter the applicable command. (The use of wildcards is supported. For example, you can specify `pya*`, and for multiple controlers, `py*`.) The following command syntax specifies a KZPDC device as an example. Substitute a KZPEC device if necessary.

   ```
   For a diskette:

   UPD> update pya0 -p fat:KZPDCxxx.bin/dva0

   For a CD-ROM:

   UPD> update pya0 -p iso9660:[option]KZPDCxxx.sys/dqa0
   ```

```
For a MOP server:

UPD> update pya0 -p mopdl:KZPDCxxx.sys/eia0
```

The fields in these commands represent the following:

- pya0 is the name of the controller device to be updated
- KZPDCxxx.bin/KZPECxxx.bin or KZPDCxxx.sys/KZPECxxx.sys is the firmware file image name
- dva0 is the diskette device
- dqa0 is a CD-ROM device
- eia0 is a network device.

Note that a file with a .sys extention is required for a network load. Either a .sys or a .bin file can be used for a floppy or CD-ROM load.

After the firmware image is read, confirm the update procedure and wait for the verification of the updated controller firmware image.

3. After the process is completed, you can update other controllers by substituting their controller device names accordingly.

4. When all controllers have been updated, exit the update procedure by issuing the following command:

```
UPD> exit
```

Chapter 5
Troubleshooting

The troubleshooting techniques described in this chapter do not identify all possible problems with your Smart Array controller; however they do cover the most common problems that may typically occur.

If a problem is not described, or if the actions suggested does not solve the problem, call your authorized service representative. For problems that might be related to the host, refer to your host system documentation.

Note: If a significant fault event such as a power hit or a cable pull occurs to your system or you suspect that something is wrong with your Smart Array storage subsystem, you will need to execute the BIOS on each Smart Array controller. If POST error conditions occur with either a Smart Array 5300A or 6400A, refer to Appendix G in the "Smart Array 5300 Users Guide" or the Diagnosing Array Problems chapter in the "Smart Array 6400 Series controller User Guide."

Troubleshooting information covered in this chapter can be found in the following tables.

- System power-on problems -- Table 5-1
- SRM console/ORCA utility problems -- Table 5-2
- Boot-sequence problems -- Table 5-3
- Online utilities related problems -- Table 5-4

5.1 System Power-On

The Table 5-1 describes common system power-on problems.

Table 5-1 System Power-On Troubleshooting

Symptom: Controller is not detected at the system console.	**Corrective Action:** Ensure that "hot plug" latches are secure and LEDs are on
Symptom: The Alpha system power-on self test halts with an error message or an error summary appears on the console terminal.	**Probable Cause:** The system detected an error while running the self-test **Corrective Action:** Make sure the Smart Array controller and the system boards are firmly seated in their respective connectors. Check all connections to external devices. Record the error message or error summary and call your authorized service representative.
Symptom: POST messages	**Cause:** Smart Array controllers produce diagnostic error messages at reboot. Many of the POST messages are self-explanatory and suggest corrective actions.

5.2 SRM Console and ORCA Utility

The Table 5-2 describes a common SRM console/ORCA utility problem.

Table 5-2 SRM Console and ORCA Utility Troubleshooting

Symptom: Console device list is not updated after running the ORCA BIOS emulator.	**Probable Cause:** The console device list that exists prior to invoking ORCA remains after ORCA is run. **Corrective action:** The INIT command has to be executed at the console prompt to get the device list updated.

5.3 Boot Sequence

The Table 5-3 describes common boot sequence problems.

Table 5-3 Boot Sequence Troubleshooting

Symptom:	Possible Cause:
Boot failure.	Incorrect boot device was specified.
.	**Corrective action:** Redefine the default boot device. Refer to your system's reference guide for specific environmental parameter settings.
	Possible Cause: Bootbios console variable is not set properly.
	Corrective action: Set the bootbios variable to point to the desired Smart Array boot controller.
	Possible Cause: Cable is not properly connected to the controller.
	Corrective action: Secure both ends of SCSI cable.
	Possible Cause: Controller is in an unknown state.
	Corrective action: Reset your system to initialize the controller.
	Possible Cause: Incorrect console version.
	Corrective action: Upgrade the console to the minimum version specified in the Smart Array 5300A or 6400A Release Notes.

Symptom: Devices are not recognized during boot.	**Possible Cause:** Bootbios console variable is not set properly. **Corrective action:** Set the bootbios variable to point to the desired controller.
	Possible cause: Operating system is not configured correctly. **Corrective action:** Reconfigure system software. Refer to your system's reference guide.
	Possible Cause: Operating system does not contain the device driver or the driver not installed correctly. **Corrective action:** Make sure that the operating system revision level supports the controller.
	Possible cause: Your configuration has been changed. **Corrective action:** Boot generic kernel and rebuilt the custom kernel.

5.4 Online Utilities

The Table 5-4 describes common online utilities problems.

Table 5-4 Online Utilities Troubleshooting

Symptom: Certain physical drives may be shown as “degraded” via SNMP agent while the same drives are still shown as “optimal” via ACU-XE utility.	**Probable cause:** A soft error threshold is reached. **Corrective action:** These devices should be replaced.
Symptom: After invoking the ACU-XE daemon via the *cpqacuxe -R* command, the ACU-XE icon within the HP Web Management does not appear immediately.	**Probable cause:** ACU-XE infrastructure related issue. **Corrective action:** You have to wait for up to several minutes for this application to become available.